418 & 422 GUELPH LINE REDEVELOPMENT

Functional Servicing & SWM Report

Project Location:
418 & 422 Guelph Line
Burlington, ON

Prepared for:
Waldemar Limited
3410 South Service Road, Suite G5
Burlington, ON L7N 3T2

Prepared by:
MTE Consultants Inc.
1016 Sutton Drive, Unit A
Burlington, ON L7L 6B8

November 8, 2019

MTE File No.: 45401-100



TABLE OF CONTENTS

1.0 INTRODUCTION 1

1.1 Overview 1
1.2 Background Information 1
1.3 Geotechnical Investigation 4

2.0 STORMWATER MANAGEMENT 4

2.1 Stormwater Management Criteria 4
2.2 Existing Conditions 4
2.3 Proposed Conditions 7
2.3.1 Proposed Storm Catchment Areas 7
2.3.2 Proposed Water Quantity Controls 9
2.3.3 Post-Development Modelling Analysis 10
2.3.4 Private Storm Service Connection 12
2.3.5 Proposed Water Quality Controls 12
2.4 Sediment and Erosion Control 13

3.0 SANITARY SEWER SERVICING 13

3.1 Existing Conditions 13
3.2 Sanitary Demands 13
3.3 Proposed Sanitary Servicing Plan and Capacity Analysis 14

4.0 DOMESTIC AND FIRE WATER SUPPLY SERVICING 15

4.1 Existing Conditions 15
4.2 Domestic Water Demands 15
4.3 Fire Flow Demands 15
4.4 Proposed Water Servicing Plan and Analysis 16

5.0 IMPACT TO EXTERNAL UNDERGROUND INFRASTUCTURE 16

6.0 GROUND WATER 17

7.0 CONCLUSIONS AND RECOMMENDATIONS 18

TABLES

TABLE 2.1 – EXISTING CONDITIONS CATCHMENT AREAS 5
TABLE 2.2 – ALLOWABLE RELEASE RATES FOR THE SITE 5
TABLE 2.3 – PROPOSED CONDITIONS CATCHMENT AREAS 7
TABLE 2.4 – STAGE-STORAGE-DISCHARGE CALCULATIONS FOR UNDERGROUND STORM TANK 10
TABLE 2.5 – PROPOSED CONDITIONS STORAGE VOLUME REQUIREMENTS SUMMARY (STORMWATER TANK) 10
TABLE 2.6 – PROPOSED CONDITIONS SITE PEAK DISCHARGE RATES TO GUELPH LINE 11
TABLE 2.7 – PROPOSED CONDITIONS SITE PEAK DISCHARGE RATES TO WATERFRONT TRAIL 11
TABLE 3.1 – SANITARY DISCHARGE RATES FROM THE SITE 14
TABLE 4.1 – DOMESTIC WATER DEMAND 15
TABLE 4.2 – FIRE FLOW REQUIREMENTS 15

FIGURES

FIGURE 1 – LOCATION PLAN 3
FIGURE 2 – PRE-DEVELOPMENT CATCHMENT AREAS PLAN 6
FIGURE 3 – POST-DEVELOPMENT CATCHMENT AREAS PLAN 8

APPENDICES

APPENDIX A STORMWATER MANAGEMENT INFORMATION ..... Encl.
APPENDIX B SWMHYMO INPUT / OUTPUT FILES ..... Encl.
APPENDIX C SANITARY DEMAND CALCULATIONS ..... Encl.
APPENDIX D WATER DEMAND CALCULATIONS & ANALYSIS ..... Encl.
APPENDIX E CITY CORRESPONDENCE ..... Encl.
APPENDIX F GEOTECHNICAL REPORT ..... Encl.
APPENDIX G PHASE II ESA REPORT ..... Encl.

ATTACHMENTS

BY OTHERS SUBSURFACE UTILITIES AND TOPOGRAPHIC SURVEY ..... Encl.
DRAWING C1.1 CONSTRUCTION MANAGEMENT PLAN ..... Encl.
DRAWING C1.2 EROSION AND SEDIMENT CONTROL PLAN ..... Encl.
DRAWING C2.1 PRELIMINARY SITE GRADING PLAN ..... Encl.
DRAWING C2.2 PRELIMINARY SITE SERVICING PLAN ..... Encl.
DRAWING C2.3 PRELIMINARY CROSS-SECTIONS PLAN ..... Encl.

SELECTED NOMENCLATURE, ABBREVIATIONS and ACRONYMS

ED	Extended Detention
FUS	Fire Underwriters Survey
g	Acceleration due to gravity ($9.81 m/s^2$)
hr	Hours
ha	Hectares
K	Minor loss coefficient
kPa	Kilopascals
l , L	Litres
l/min	Litres per minute
l/s	Litres per second
l/c/d	Litres per Capita per Day
m	Metres
m^2	Square metres
m^3	Cubic metres
m/s	Metres per second
m^3/s	Cubic metres per second
mm	Millimeter
MOECC	Ministry of the Environment and Climate Change (Ontario)
OBC	Ontario Building Code
PP	Permanent Pool
psi	Pounds per Square Inch
SWM	Stormwater Management
SWMF	Stormwater Management Facility
STC	Stormceptor ™
TSS	Total Suspended Solids
USGPM	U.S. Gallons per Minute
v, V	Velocity
Yr.	Year
% Imp	Percentage Impervious
OGS	Oil Grit Separator

1.0 INTRODUCTION

1.1 Overview

MTE Consultants Inc. were retained by Waldemar Limited Partnership to complete the functional servicing and stormwater management design for a proposed 200 unit, thirteen-storey residential building located at 418 & 422 Guelph Line in Burlington, Ontario (see Figure 1 for Location Plan). This report will outline a functional grading, servicing and stormwater management strategy for the proposed development in support of the Zoning Bylaw Application.

The site is located on a 0.3817ha parcel of land on the south side of Guelph Line fronting the Waterfront Trail. Under existing conditions, the site consists of two properties containing a brick storage building with an asphalt parking lot and a two-storey residential dwelling with an asphalt driveway and landscaped area behind it. The two properties will be combined and the proponent plans to demolish the existing structures on site and construct a new residential development with a podium and above grade and underground parking facilities. Existing municipal services are located on Guelph Line and will be utilized to service the proposed development.

The functional servicing described in this report will provide additional detailed information on the proposed grading and servicing scheme for the site. Please refer to the Site Plan prepared by KNYMH Inc. for additional information.

1.2 Background Information

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

Ref. 1: *Water Supply for Public Fire Protection*, Fire Underwriters Survey (1999).

Ref. 2: *MOE Stormwater Management Practices Planning and Design Manual* (Ministry of Environment, March 2003).

Ref. 3: *Erosion & Sediment Control Guideline for Urban Construction* (December, 2006).

Ref. 4: *Design Guidelines for Drinking-Water Systems*, Ministry of the Environment and Climate Change (2008).

Ref. 5: *Design Guidelines for Sewage Works*, Ministry of the Environment and Climate Change (2008).

Ref. 6: *Low Impact Development Stormwater Management Planning and Design Guideline, Credit Valley Conservation & Toronto and Region Conservation for the Living City, Version 1.0 (2010).*

Ref. 7: *Ontario Building Code* (2012).

Ref. 8: *Standard Drawing Manual*, City of Burlington Engineering Department (March 2014).

Ref. 9: *Water and Wastewater Linear Design Manual (Version 4.0),* Regional Municipality of Halton (April 2019).

Ref.10: Geotechnical Investigation, 418 and 422 Guelph Line Burlington, Ontario, SOLA Engineering (October 31, 2019)

Ref.11: Phase II ESA, 418 and 422 Guelph Line Burlington, Ontario, EXP Services Inc. (October 31, 2019)

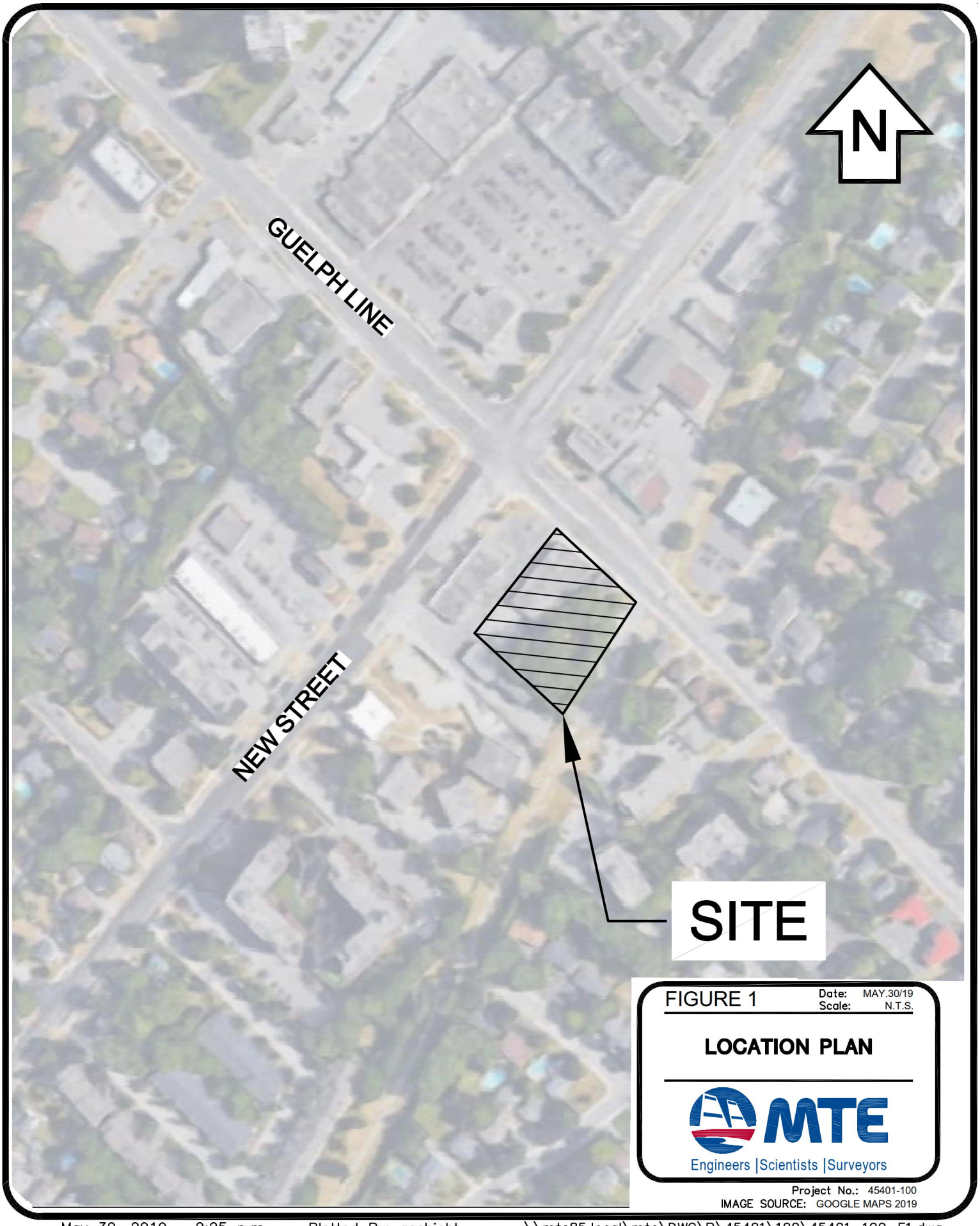


FIGURE 1

Date: MAY.30/19
Scale: N.T.S.

LOCATION PLAN

MTE
Engineers | Scientists | Surveyors

Project No.: 45401-100
IMAGE SOURCE: GOOGLE MAPS 2019

May 30, 2019 — 2:25 p.m. — Plotted By: gschicht

\\mte85.local\mte\DWG\P\45401\100\45401-100-F1.dwg

1.3 Geotechnical Investigation

A geotechnical investigation was prepared by SOLA Engineering dated August 16, 2019. Six (6) boreholes were drilled at depths varying between 5.99m and 10.82m. Paved areas of the site are overlain with an asphaltic concrete layer of thickness 40mm underlain by approximately 150mm to 175mm of granular fill material. Grassed areas consisted of topsoil ranging in thickness between 100mm to 125mm. The subsurface conditions are generally comprised of silty sand to sandy silt fill, silty sand and silty clay till. Below these layers, the natural subsoil consists of Queenston formation shale bedrock interbedded with limestone and occasional clay seams. Shale bedrock was encountered at depths ranging from 6.3m to 7.5m below existing grades. Five (5) wells were installed at the completion of the boreholes and groundwater levels varied between depths of 2.42m to 3.67m. The report notes that groundwater levels can vary due to seasonal fluctuations and precipitation conditions and perched water conditions may arise from accumulation of surface water in the more pervious fill, particularly during wetter periods. Based on the geotechnical investigation, a conservative value of 75 was used for the pervious CN, falling under Hydrologic Soil Group C.

2.0 STORMWATER MANAGEMENT

The following sections will describe the proposed stormwater management (SWM) plan for the site.

2.1 Stormwater Management Criteria

Based on a pre-consultation meeting with the City of Burlington (see Appendix E), the following stormwater management (SWM) criteria will be applied to the site:

Quantity Control
Post development flows are to meet pre development flows by providing on site storage for all storms up to and including the 100 year storm. External flows entering the site are to be confirmed and routed safely under developed conditions without causing any flooding or ponding. Rooftop storage will not count towards the stormwater storage requirements.

Quality Control
Level 1 (Enhanced) quality control is to be provided to achieve 80% Total Suspended Solids Removal. A treatment train approach is to be considered and an Oil Grit Separator (OGS) may only be credited at 50% TSS removal.

2.2 Existing Conditions

Under existing conditions, the site consists of a brick storage building and a residential dwelling with an associated asphalt driveway facing north, fronting Guelph Line. An asphalt parking lot exists to the southwest behind the brick storage building and the majority of the south side of the site contains grassed and vegetated area behind the

residential dwelling. An existing 450mm diameter storm sewer at approximately 1.2% slope flowing southeast with a full flow capacity of 312.2 L/s is located within the Guelph Line right-of-way across the frontage of the site. The existing parking lot, grassed areas, and residential dwelling roof currently drain south to the Waterfront Trail. The brick storage building roof and asphalt driveway of the residential dwelling drain northeast to the Guelph Line right-of-way. The existing site does not have any known on-site stormwater management quantity or quality controls.

Under existing conditions, two (2) catchment areas have been used to define the drainage conditions for the site. Table 2.1 provides a brief description of the catchment area and lists the size and percent impervious cover used in the hydrologic model.

TABLE 2.1 – EXISTING CONDITIONS CATCHMENT AREAS

Catchment ID	Description	Area (ha)	% Impervious	Runoff Coefficient
101	Parking Lot, Grassed Areas, and Residential Dwelling Roof to Waterfront Trail	0.2687	28	0.40
102	Brick Storage Building Roof and Asphalt Driveway to Guelph Line	0.1130	98	0.89
	Total Area (Site)	**0.3817**	**49**	**0.54**

The existing conditions were assessed using the SWMHYMO hydrologic modelling program developed by J.F. Sabourin & Associates for the 2-year to 100-year City of Burlington 4-hour Chicago design storms. Appendix A contains detailed hydrologic modelling parameters and Appendix B contains input/output printouts for the existing conditions. Table 2.2 summarizes the pre-development conditions peak discharge rates for each outlet. Figure 2 illustrates the existing conditions drainage area.

TABLE 2.2 – ALLOWABLE RELEASE RATES FOR THE SITE

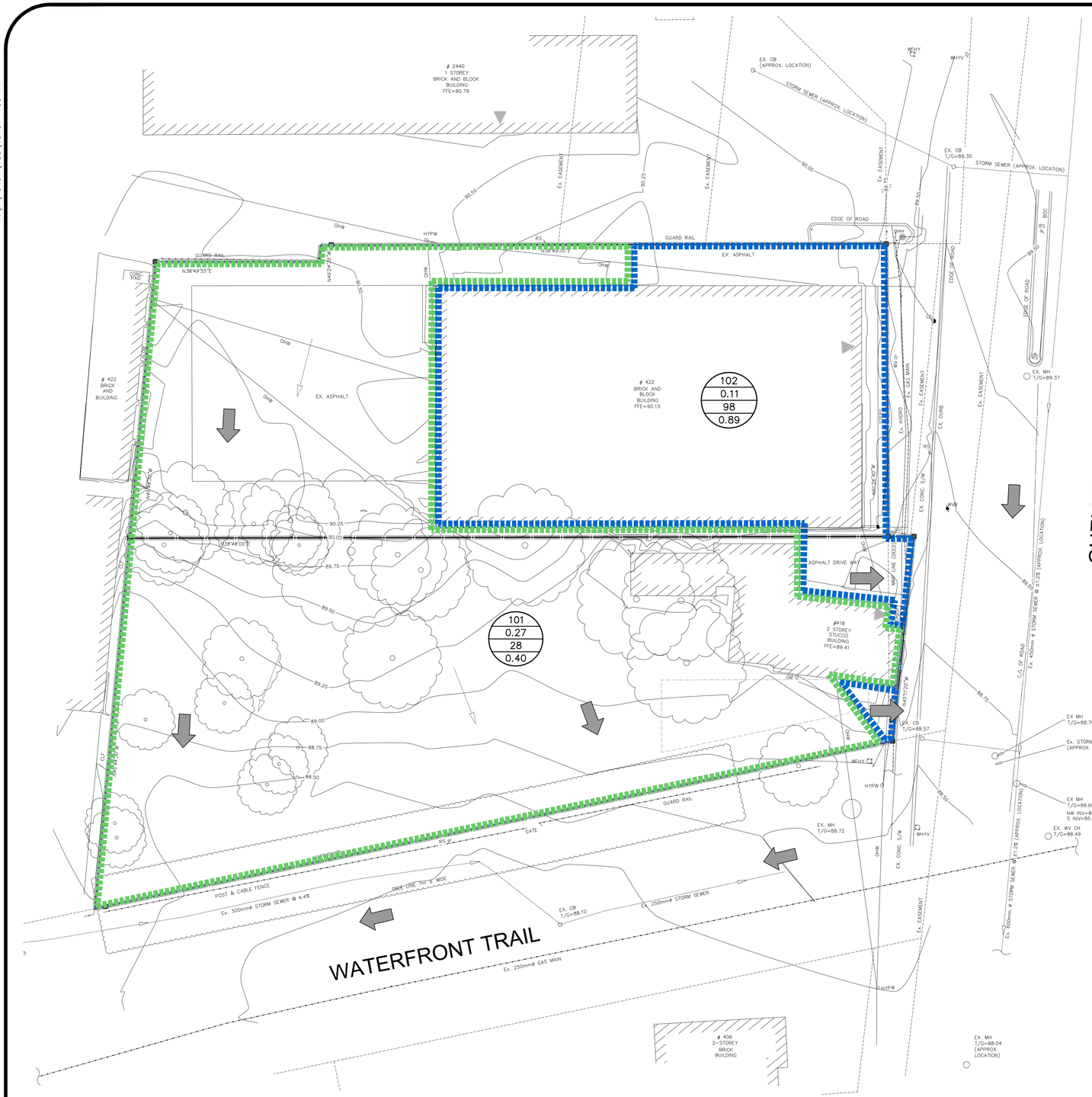
Storm Event	To Waterfront Trail (Catchment 101) (m^3/s) [A]	To Guelph Line (Catchment 102) (m^3/s) [A]
2-yr	0.015	0.021
5-yr	0.022	0.027
10-yr	0.027	0.031
25-yr	0.035	0.036
50-yr	0.040	0.040
100-yr	0.047	0.044
[A] Peak discharge rates taken from SWMHYMO Output (See Appendix B)		

45401-100-F2.0

MTE FILE No.

PRE-DEVELOPMENT CATCHMENT AREAS PLAN

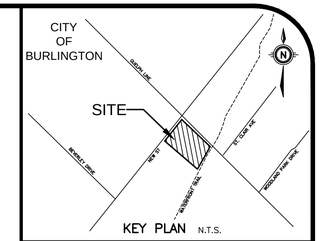
P:\P\45401\100\45401-100-F1



LEGEND

- SITE BOUNDARY
- EXISTING CONTOURS (89.00)
- OVERLAND FLOW ROUTE (MAJOR STORM)
- EXISTING DIRECTION OF DRAINAGE
- EXISTING STORM SEWER (Ex. 450mmø STM, Ex. MH)
- CATCHMENT 101
- CATCHMENT 102

101 / 0.27 / 28 / 0.40 — ID No. / AREA (Ha) / % IMP / RUNOFF COEFFICIENT



GEODETIC BM ELEV. = 80.809m

CITY OF BURLINGTON BENCHMARK No. 273

BRASS CAP IN TOP OF CURB AT THE NORTHERLY END OF THE RAMP LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF LAKESHORE ROAD AND GUELPH LINE. THE MONUMENT IS LOCATED 5.5 METRES FROM THE END OF THE CURB RETURN ON THE SOUTHEAST CORNER OF THE INTERSECTION, 2.68 METRES FROM A NAIL IN THE FACE OF A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHEAST CORNER, AND 19.2 METRES FROM A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHWEST CORNER OF THE INTERSECTION.

SITE BENCHMARK ELEV. = m

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

No.	REVISION	BY	YYYY-MM-DD
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR ZBA	KRR	NOV.05/2019

MTE
Engineers | Scientists | Surveyors
(905) 639-2552 www.mte85.com

NOT FOR CONSTRUCTION

CLIENT
WALDEMAR LIMITED
3410 SOUTH SERVICE ROAD, SUITE G5 BURLINGTON, ON

PROJECT
418 & 422 GUELPH LINE
13 STOREY APARTMENT BUILDING
418 & 422 GUELPH LINE BURLINGTON, ON

DRAWING
PRE-DEVELOPMENT CATCHMENT AREAS PLAN

Project Manager: K. RAMSEWAK	Project No.: 45401-100
Design By: RDZ	Checked By: KRR
Drawn By: GXS	Checked By: KRR
Surveyed By: OTHERS	Drawing No.: F2.0
Date: May.08/19	
Scale: 1:200	Sheet 1 of 2

November 5, 2019 11:35 a.m. Plotted By: rzhou

2.3 Proposed Conditions

Under proposed conditions, the proponent plans to construct a new thirteen storey residential building covering the majority of the site and will be comprised of a podium with a green roof and above grade and underground parking within and a residential apartment above the podium. The development will include two underground levels of parking, concrete walks, and an asphalt driveway on the east side of the site to provide access to the building and parking via Guelph Line. The remaining perimeter of the site will consist of landscaped areas. The proposed building will have 170 units that range from one-bedroom to three-bedroom units.

2.3.1 Proposed Storm Catchment Areas

Three (3) catchments have been defined to describe the proposed conditions drainage areas. Table 2.3 provides a brief description of each catchment and lists the size and impervious cover associated with each. Figure 3 illustrates the proposed conditions catchment areas.

TABLE 2.3 – PROPOSED CONDITIONS CATCHMENT AREAS

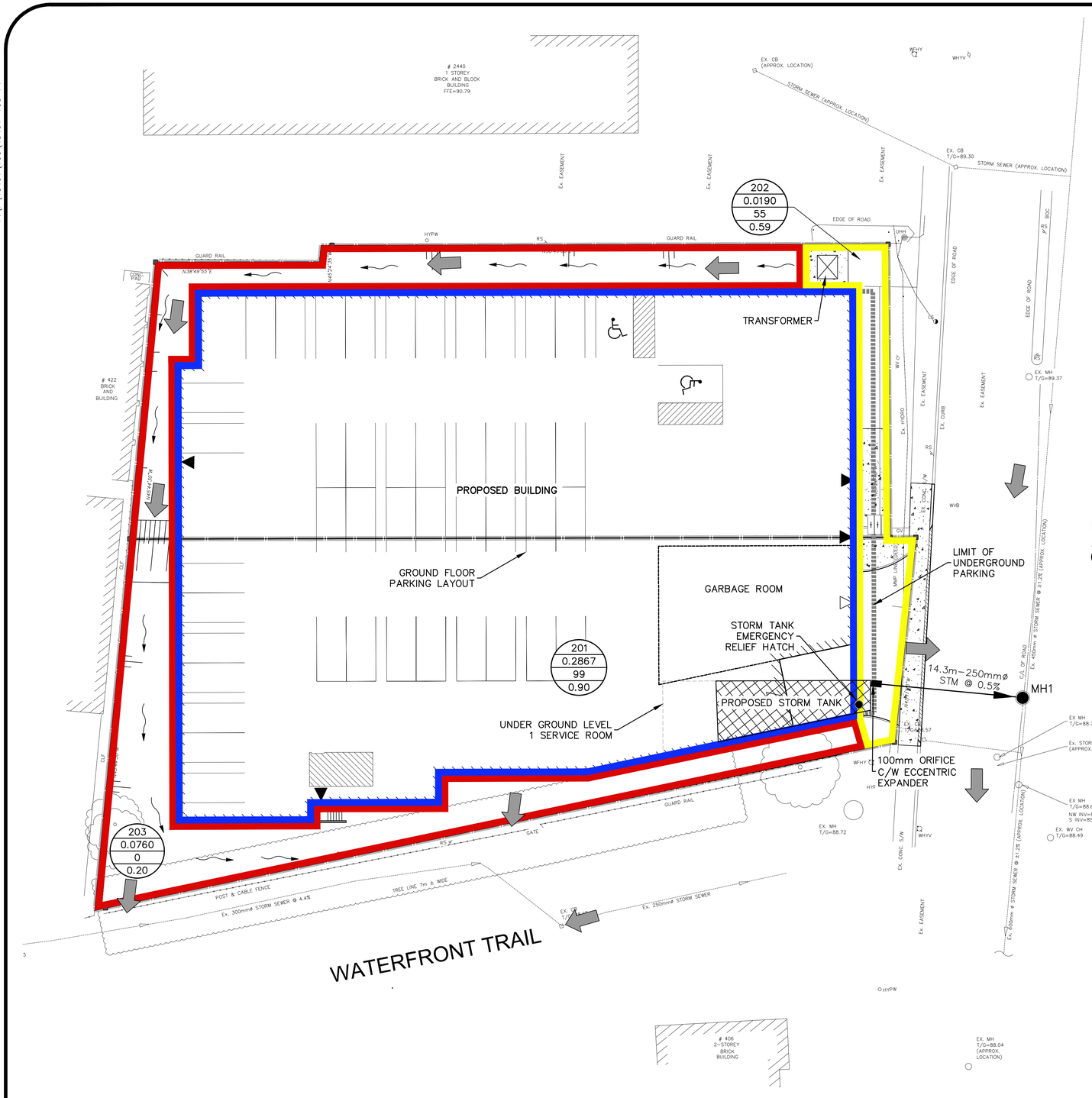
Catchment ID	Description	Area (ha)	% Impervious	Runoff Coefficient
201	Proposed Podium Green Roof and Apartment Roof to Guelph Line (controlled)	0.2867	99	0.90
202	Proposed asphalt driveway, concrete walks, and landscaped area to Guelph Line (uncontrolled)	0.0190	55	0.59
203	Remaining perimeter landscaped areas to Waterfront Trail (uncontrolled)	0.0760	0	0.20
	Total Area (Site)	**0.3817**	**77**	**0.74**

45401-100-F3.0

M.T.E. FILE No.

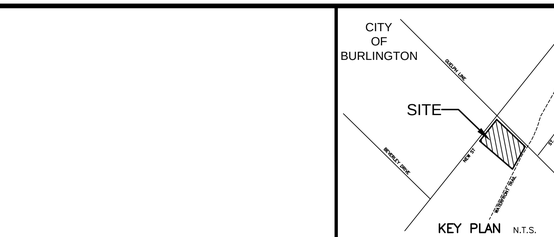
POST-DEVELOPMENT CATCHMENT AREAS PLAN

P:\P\45401\100\45401-100-F1



LEGEND

- SITE BOUNDARY
- PROPOSED BUILDING
- EXISTING STORM SEWER (Ex. 450mmø STM, Ex. MH)
- STORM SEWER (MH, 21.3m–300mmø STM @ 1.3%)
- CATCHMENT 201
- CATCHMENT 202
- CATCHMENT 203
- 101 / 0.27 / 28 / 0.40 — ID No., AREA (Ha), % IMP, RUNOFF COEFFICIENT
- OVERLAND FLOW ROUTE (MAJOR STORM)
- DIRECTION OF SWALE
- (TOP) 3:1 (BOTTOM) — EMBANKMENT (SLOPE AS NOTED)



GEODETIC BM ELEV. = 80.809m

CITY OF BURLINGTON BENCHMARK No. 273

BRASS CAP IN TOP OF CURB AT THE NORTHERLY END OF THE RAMP LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF LAKESHORE ROAD AND GUELPH LINE. THE MONUMENT IS LOCATED 5.5 METRES FROM THE END OF THE CURB RETURN ON THE SOUTHEAST CORNER OF THE INTERSECTION, 2.68 METRES FROM A NAIL IN THE FACE OF A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHEAST CORNER, AND 19.2 METRES FROM A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHWEST CORNER OF THE INTERSECTION.

SITE BENCHMARK ELEV. = m

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

No.	REVISION	BY	YYYY-MM-DD
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR ZBA	KRR	NOV.5/2019

MTE
Engineers | Scientists | Surveyors
(905) 639-2552 www.mte85.com

NOT FOR CONSTRUCTION

CLIENT
WALDEMAR LIMITED
3410 SOUTH SERVICE ROAD, SUITE G5 BURLINGTON, ON

PROJECT
418 & 422 GUELPH LINE
13 STOREY APARTMENT BUILDING
418 & 422 GUELPH LINE BURLINGTON, ON

DRAWING
POST-DEVELOPMENT CATCHMENT AREAS PLAN

Project Manager: K. RAMSEWAK	Project No.: 45401-100
Design By: RDZ	Checked By: KRR
Drawn By: GXS	Checked By: KRR
Surveyed By: OTHERS	Drawing No.: F3.0
Date: May.08/19	
Scale: 1:200	Sheet 1 of 2

November 5, 2019 1:14 p.m. Plotted By: rzhou

Catchment 201

Catchment 201 represents the green roof of the podium as well as the apartment building roof. Stormwater runoff from this area will be collected by an internal storm piping system within the building that will capture and convey flows to the existing 450mm diameter storm sewer on Guelph Line. A proposed storm tank complete with orifice controls within the underground level of the proposed building will be implemented to control proposed conditions discharge rates to the existing conditions discharge rates. Details of the storm tank will be discussed in section 2.3.2.

Catchment 202

Catchment 202 represents the northern perimeter of the proposed building. This area includes the asphalt driveway and concrete walks as well as landscaped areas. Storm runoff from the asphalt driveway and concrete walks will drain uncontrolled via overland sheet flow to Guelph.

Catchment 203

Catchment 203 represents the remainder of the landscaped areas on the north, south, and west perimeters of the proposed building. This area will continue to drain uncontrolled to the Waterfront Trail via overland sheet flow due to grading constraints.

2.3.2 Proposed Water Quantity Controls

Stormwater Tank and Orifice Control

As discussed above, runoff from Catchment 201 will be captured and conveyed to the proposed underground storm tank coupled with an orifice control located within the underground level of the proposed building. The underground storm tank will provide sufficient storage volume to retain stormwater runoff up to the 100-year storm event prior to being released into the existing 450mm diameter storm sewer on Guelph Line. The stormwater runoff will be controlled by a 100mm diameter short orifice tube located at the outlet of the tank at an invert elevation of 87.35m. A backwater valve is to be installed within the building for the proposed storm service to ensure flood protection. The tank will also extend outside the building footprint sufficiently to provide an emergency overflow hatch to prevent flooding in the building. Please refer to Drawing C2.2 and the calculation sheets located in Appendix A for further details.

Table 2.4 summarizes the stage-storage-discharge relationship for the underground storm tank. This information is used in the hydrologic model.

TABLE 2.4 – STAGE-STORAGE-DISCHARGE CALCULATIONS FOR UNDERGROUND STORM TANK

Elevation (m)	Head, H (m)	Storage Volume (m^3) [A]	Discharge, Q (m^3/s) [B]	Comments
87.35	0.00	0	0.0000	Inside Bottom of Tank/Orifice Invert
87.40	0.00	4	0.0000	C/L of Orifice
87.60	0.20	20	0.0098	
87.80	0.40	36	0.0139	
88.00	0.60	52	0.0170	
88.30	0.90	76	0.0208	
88.60	1.20	100	0.0240	Inside Top of Tank

[A] Storage volume based on a tank with internal footprint of $80m^2$ and an internal height of 1.25m for an overall internal storage volume of $100m^3$. See Appendix A for more details.
[B] From orifice equation $Q = CA(2gH)^{0.5}$ for a 100 mm diameter short orifice tube
Where: C = 0.63, A=cross-sectional area, g=9.81, H=pressure head

2.3.3 Post-Development Modelling Analysis

The proposed conditions were assessed using the SWMHYMO hydrologic modelling program developed by J.F. Sabourin & Associates for the 2-year to 100-year City of Burlington 4-hour Chicago design storms. Appendix A contains detailed hydrologic modelling parameters and Appendix B contains input and output printouts for the proposed conditions. Table 2.5 summarizes the storage volume requirements for the proposed underground storm tank for the 2-year to 100-year storm events.

TABLE 2.5 – PROPOSED CONDITIONS STORAGE VOLUME REQUIREMENTS SUMMARY (STORMWATER TANK)

Storm Event	Stormwater Tank (Catchments 201)	
	Storage Volume Required (m^3) [A]	Storage Volume Provided (m^3) [B]
2-yr	40.48	100
5-yr	53.08	
10-yr	61.95	
25-yr	73.34	
50-yr	81.81	
100-yr	90.32 (Water Elevation= 88.48)	

[A] See SWMHYMO Output in Appendix B
[B] See Table 2.4

During the 100-year storm event, the water level within the proposed storm tank will reach an elevation of 88.48m with 0.12m of freeboard within the tank.

Tables 2.6 and 2.7 summarize the proposed conditions peak discharge rates for the two site outlets. A comparison is then made to the existing conditions peak discharge rates for the 2-year to 100-year storm events.

TABLE 2.6 – PROPOSED CONDITIONS SITE PEAK DISCHARGE RATES TO GUELPH LINE

Storm Event	Proposed Conditions Peak Discharge Rates to Guelph Line (Catchment 201+202) (m^3/s) [A]	Existing Conditions Peak Discharge Rates to Guelph Line (Catchment 102) (m^3/s) [B]
2-yr	0.016	0.021
5-yr	0.019	0.027
10-yr	0.021	0.031
25-yr	0.023	0.036
50-yr	0.025	0.040
100-yr	0.027	0.044

[A] Total Peak Discharge Rate (Controlled + Uncontrolled) taken from SWMHYMO Output (See Appendix B)
[B] See Table 2.2

TABLE 2.7 – PROPOSED CONDITIONS SITE PEAK DISCHARGE RATES TO WATERFRONT TRAIL

Storm Event	Proposed Conditions Peak Discharge Rates to Waterfront Trail (Catchment 203) (m^3/s) [A]	Existing Conditions Peak Discharge Rates to Waterfront Trail (Catchment 101) (m^3/s) [B]
2-yr	0.001	0.015
5-yr	0.002	0.022
10-yr	0.003	0.027
25-yr	0.004	0.035
50-yr	0.005	0.040
100-yr	0.006	0.047

[A] Peak Discharge Rate taken from SWMHYMO Output (See Appendix B)
[B] See Table 2.2

The analysis indicates the following:

- Under proposed conditions, the 2-year to 100-year peak discharge rates for the two outlets of the site are less than the existing conditions release rates (2-year to 100-year storm events) for the site as shown in Tables 2.6 and 2.7.
- Under proposed conditions, the 100-year peak discharge rate to the existing Guelph Line storm sewer (catchment 201+202) is equal to the 5-year pre-development peak discharge rate that the sewer is designed for.
- Sufficient storage volume is provided within the underground storm tank to contain the 100-year storm event for the contributing catchment area 201 with 0.1m of free board provided during the 100-year storm event.

2.3.4 Private Storm Service Connection

A proposed 250mm diameter private storm sewer service at a slope of 0.5% will outlet into a proposed manhole in the right of way and discharge to the existing 450mm diameter storm sewer under Guelph Line. The proposed storm sewer will have a full flow capacity of approximately 42L/s which is greater than the 100-year controlled peak discharge rate of 23L/s (see Appendix B) from the proposed orifice. Therefore, the proposed storm sewer will have sufficient capacity to convey the proposed 100-year controlled peak flow from the site. In addition, the 100-year peak discharge rate to the existing Guelph Line sewer is equal to the 5-year pre-development peak discharge rate (27L/s) that the sewer is designed for. Therefore, the existing storm sewer will have sufficient capacity to convey the proposed 100-year peak discharge rate from the site. Please see Drawing C2.2 for further site servicing details.

2.3.5 Proposed Water Quality Controls

Due to grading constraints and the nature of the proposed development with the building taking up the majority of the subject site, there are limited opportunities for proposed low impact development (LID) features on the site. However, a green roof will be implemented on the podium of the proposed building and the majority of the perimeter of the site will consist of landscaped areas.

Stormwater runoff generated from rooftop and landscaped areas can generally be considered clean. As such, no water quality controls are proposed for this site as the development will have a negligible impact on water quality for downstream receivers.

2.4 Sediment and Erosion Control

Sediment and erosion control measures will be implemented on site during construction. These measures will include:

- Installation of silt control fencing at strategic locations around the perimeter of the site.
- Preventing silt or sediment laden water from entering inlets (catchbasins / catchbasin manholes) by wrapping the inlet grates with filter fabric or installing silt sacks.
- Maintaining sediment and erosion control structures in good repair (including periodic cleaning as required) until such time that the Engineer or City of Burlington approves their removal. Erosion control measures to be inspected weekly and after any rainfall event.

Additional details will be provided on the engineering drawings at the time of detailed design.

3.0 SANITARY SEWER SERVICING

3.1 Existing Conditions

An existing 300mm diameter sanitary sewer at a 0.9% slope flowing southeast is located within the Guelph Line right of way adjacent to the site. This sanitary sewer ultimately discharges to the existing 1800mm diameter trunk sanitary sewer at a 0.1% slope flowing south along Waterfront Trail. The 300mm diameter sewer has a full flow capacity of approximately 91.7L/s and the 1800mm diameter trunk sanitary sewer has a full flow capacity of approximately 3793.2L/s.

3.2 Sanitary Demands

The anticipated sanitary discharge from the proposed residential development was estimated using Region of Halton criteria, Ontario Building Code criteria, and conservative population densities based on the type of development being proposed. Table 3.1 summarizes the sanitary sewer discharge rates from the site. See Appendix C for detailed calculations.

TABLE 3.1 – SANITARY DISCHARGE RATES FROM THE SITE

Location	Area / # Units	Population Density [A]	Population (people)	Average Demand (L/s) [B]	Infiltration Flow (L/s)	Peak Demand (L/s) [C]
1 Bedroom	131 Units	2ppu	262	0.834	--	3.343
2 Bedroom	35 Units	4ppu	140	0.446	--	1.786
3 Bedroom	4 Units	6ppu	24	0.076	--	0.306
Proposed Site	0.3817ha [D]	--	--	--	0.109 [E]	--
Total Peak Sanitary Demand from Proposed Site						**5.545 [F]**

[A] Population Density based on OBC Section 3.1.17.1, Clause 1(b). 2 persons per bedroom. See Appendix C for detailed population calculations. Total population calculated as 426 people.
[B] Average Demand based on 275 L/c/day, as outlined in the Region of Halton W/WW Design Manual.
[C] Based on a Harmon Peaking Factor (PF) = $1 + 14/(4 + P^{0.5}) = 1 + 14/(4 + (426/1000)^{0.5}) = 4.0$
(Where P is the design population in thousands)
Peak Demand = (Avg. Demand)*(PF).
[D] Area reflects site area (0.3817 ha).
[E] Infiltration based on 0.286 L/s/ha, as outlined in the Region of Halton W/WW Design Manual.
I = 0.286*0.3817 = 0.109 L/s.
[F] Total Sanitary Demand = Peak Residential Demand + Infiltration Allowance.

3.3 Proposed Sanitary Servicing Plan and Capacity Analysis

As calculated in Table 3.1, the total sanitary sewer discharge from the proposed site is 5.545L/s. The proposed building will be serviced by a 150 mm diameter sanitary service at a 1.0% slope (full flow capacity = 15.2L/s) that will be connected to the existing 300mm diameter sanitary sewer in the Guelph Line right-of-way (to the existing manhole, see Drawing C1.2). The calculated sanitary discharge rate of 5.545L/s (per Table 3.1) is less than the capacity of the 300mm diameter sanitary sewer (91.7L/s) and the 1800mm trunk sanitary sewer (3793.2L/s). The sanitary discharge from the site represents only 0.15% of the total sewer capacity of the trunk sanitary sewer and thus is considered a negligible increase to the existing system. Backup prevention measures are recommended in the form of a backwater valve and should be located within the proposed building as indicated in Drawing C2.2.

Due to grading constraints, the FFE for the proposed building is stepped and ranges from elevations of 89.15m to 89.40m. The level 2 underground FFE is proposed at 82.69m and the level 1 underground FFE is proposed at 85.74m while the proposed sanitary stub at the building is 85.71m. As such, depth is sufficient for gravity drainage of the proposed sanitary sewer in some areas of the level 1 underground and above. However, the majority of the level 1 underground parking and all of the level 2 underground will require pumping.

4.0 DOMESTIC AND FIRE WATER SUPPLY SERVICING

4.1 Existing Conditions

The existing municipal water distribution system around the site consists of a 300mm diameter watermain located within the Guelph Line right of way. There is an existing municipal fire hydrant located at the southeast corner of the site fronting Guelph Line. There are no existing fire hydrants within the proposed development area.

4.2 Domestic Water Demands

The expected domestic water demand for the proposed development was estimated using Region of Halton design criteria. Table 4.1 summarizes the domestic water demand requirements for the Average Day, Maximum Day and Peak Hour demand scenarios and detailed calculations are provided in Appendix D.

TABLE 4.1 – DOMESTIC WATER DEMAND

Apartment Usage (Residential)		
Population:	426 people (see Table 3.1)	
Average Day Demand:	275L/c/d x 426 people =	**1.356L/s**
Max. Day Peaking Factor:	2.25	
Peak Hour Peaking Factor:	4.0	
Maximum Day Demand:	2.25 x 1.299L/s =	**3.051L/s**
Peak Hour Demand:	4.0 x 1.299L/s =	**5.424L/s**
Total Residential Usage		
Total Maximum Day Demand:		**3.051L/s**

4.3 Fire Flow Demands

Fire flow demands for the proposed development were determined using the methodology outlined in *Water Supply for Public Fire Protection* (Fire Underwriters Survey (FUS), 1999). The fire demand for the building is summarized in Table 4.2, and detailed calculations are provided in Appendix D.

TABLE 4.2 – FIRE FLOW REQUIREMENTS

Building	Fire Underwriters Survey (FUS) Flow Rate
Building 'A'	**333L/s**

4.4 Proposed Water Servicing Plan and Analysis

Water servicing for the site will include the installation of a dual 100mm diameter domestic and 200mm diameter fire service tapped off the existing 300mm diameter watermain on Guelph Line. The proposed water service will be required to feed directly into the mechanical/water meter room, which at the time of this report has not been finalized, but has been assumed to be located below the retail space.

The MECP and City of Burlington require water distribution systems to maintain a minimum residual pressure of 20psi (140kPa) when subject to Maximum Day + Fire Flow demands. A hydrant flow test was completed by Jackson Waterworks dated July 18, 2019 for the hydrant located near the corner of Guelph Line and New Street (See Appendix D). The Max. Day + Fire demand for the proposed site is 336.38L/s (3.051L/s + 333L/s, see Tables 4.1 and 4.2). When the watermain is subject to the Max. Day + Fire Flow demand, the calculated residual pressure at the proposed building is 39.4psi (250kPa) which exceeds the minimum 20psi pressure requirement. See Appendix D for the fire flow analysis worksheet.

As well, based on the above, achieving a minimum domestic operating pressure of 40psi required by the MECP will not be an issue. However, booster pumps may be required within the proposed building to satisfy domestic consumption needs at the upper levels.

The building's fire department connection will be within 45m of the existing municipal fire hydrant located near the south east corner of the site fronting Guelph Line.

5.0 IMPACT TO EXTERNAL UNDERGROUND INFRASTUCTURE

Within the Waterfront Trail immediately south of the development, there exists a 250mm diameter storm sewer, an 1800mm diameter Regional trunk sanitary main, a 600mm diameter trunk water main, and a 250mm diameter Transnorthern Pipeline gas main. The underground level of the development will extend approximately 6m vertically down from the outside finished grade with a 3.0m horizontal setback from the property line in close proximity to the above underground infrastructure. As such, the Region of Halton has requested a minimum of three (3) cross sectional profiles to assess the impact of the development on the external underground infrastructure adjacent to the site. The utilities and mains were located using hydrovac excavation by Super Sucker and surveyed by MMP Surveyors Ltd. on September 26, 2019. Please refer to Drawing C2.3 for the cross-sectional profiles.

Based on the cross sections, the building underground will not have an adverse effect on adjacent underground infrastructure within Waterfront Trail. Please note that the 1800mm diameter sanitary main was extremely deep and the contractor was not able to expose the sewer due to collapsing of test pits and safety concerns. As such, Regional as-constructed drawing B-12495 was used to estimate the vertical position of the sanitary trunk main.

6.0 GROUND WATER

Based on the Phase II ESA report by EXP and the Geotechnical Investigation by SOLA Engineering (Ref. 10 & 11), ground water within the site sits an approximate average geodetic elevation of 87.00 and a maximum geodetic elevation of 87.65 recorded on May 21, 2019. The proposed building underground levels 1 and 2 will have floor elevations of 85.74 and 82.69, respectively. As such, the building will be constructed to be water tight and designed to withstand hydrostatic pressures. Groundwater will not be collected by the storm or sanitary systems on-site.

In regards to groundwater quality, a risk assessment is being completed under separate cover. Please refer to the Phase II ESA report by EXP for a detailed chemical analysis and description of potentially contaminating activities.

A permit to take water (PTTW) will likely be required during construction due to the depth of the underground levels of the proposed building. This will be assessed by a qualified hydrogeological consultant at the time of detailed design and prior to construction. As the building will be constructed to be water tight and designed to withstand the hydrostatic pressures of the groundwater, no ground water discharge is proposed post-construction.

7.0 CONCLUSIONS AND RECOMMENDATIONS

Based on the information provided herein, it is concluded that the development can be constructed to meet the requirements of the City of Burlington. Therefore, it is recommended and concluded that:

- An underground stormwater tank be used in conjunction with an orifice control to control proposed conditions site peak discharge rates to the existing conditions release rates for the site as described in Section 2.3 of this report;
- Erosion and sediment controls be installed and maintained as described in Section 2.4 of this report;
- Sanitary servicing for the development be installed as described in Section 3.3 of this report;
- Water servicing for the development be installed as described in Section 4.4 of this report;
- Based on the cross sectional profiles developed, the building underground will not have an adverse effect on adjacent underground infrastructure within Waterfront Trail;
- A risk assessment is being prepared under separate cover to assess groundwater quality as described in Section 6.0 of this report;
- No ground water discharge is proposed post-construction. However, a PTTW will likely be required during construction as described in Section 6.0 of this report; and
- The proposed stormwater management plan presented in this report and the site servicing works described in this report and as shown on the preliminary grading and servicing Drawings C2.1, C2.2, and C2.3 be accepted in support of the Zoning Bylaw Application.

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

All of which is respectfully submitted,

MTE CONSULTANTS INC.



Rui Da Zhou
Designer

Kayam Ramsewak, C.E.T., P.Eng
Manager, Civil Engineering

KRR:rdz

APPENDIX A

STORMWATER MANAGEMENT INFORMATION

418 & 422 GUELPH LINE
BURLINGTON, ONTARIO
STORMWATER MANAGEMENT

PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING PARAMETERS

Catchment ID	Catchment Description	Hydrograph Method	Area (ha)	Perv. CN	Perv. Ia (mm)	Impervious (%)		Flow Length (m)		Manning "n"		Slope (%)		Time to Peak Tp (hrs)
						TIMP	XIMP	Perv.	Imperv.	Perv.	Imperv.	Perv.	Imperv.	
101	Discharge to Waterfront Trail	STANDHYD	0.2687	75	5.00	28	28	30	25	0.250	0.013	5.0	2.0	
102	Discharge towards Guelph Line ROW	STANDHYD	0.1130	75	5.00	98	98	3.5	20	0.250	0.013	8.0	3.0	
		TOTAL	**0.3817**			**49**								

POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING PARAMETERS

Catchment ID	Catchment Description	Hydrograph Method	Area (ha)	Perv. CN	Perv. Ia (mm)	Impervious (%)		Flow Length (m)		Manning "n"		Slope (%)		Time to Peak Tp (hrs)
						TIMP	XIMP	Perv.	Imperv.	Perv.	Imperv.	Perv.	Imperv.	
201	Controlled Discharge from Building Roof	STANDHYD	0.2867	75	5.00	99	99	10	10	0.250	0.013	1.0	1.0	
202	Uncontrolled Discharge from north perimeter	STANDHYD	0.0190	75	5.00	55	55	5	5	0.250	0.013	2.0	4.0	
203	Uncontrolled Discharge from remainder landscaped perimeter	NASHYD	0.0760	75	5.00	0								0.20
		TOTAL	**0.3817**			**77**								

Notes:

For NASHYD Commands:
- DT=1
- DWF=0
- N=3

For STANDHYD Commands:
- Pervious Initial Abstraction (Perv. Ia) = 5mm per Conservation Halton Request
- Depression Storage over Impervious areas (DPSI) = 1.0 mm
- Roof tops area flat and are assumed to be sloped at 1%

418 & 422 GUELPH LINE
BURLINGTON, ONTARIO
STORMWATER MANAGEMENT

Time to Peak Calculations

Time to peak (Tp) values derived from time of concentration (Tc) calculations based on the Airport Method Equation:

$$T_c = \frac{3.26\,(1.1-C)\,L^{0.5}}{S_w^{\,0.33}}$$ *(MTO Drainage Manual Design Chart 1.12)*

T_c = Overland flow time of concentration (min)
L = Flow travel length
S = Basin slope (%)
C = Runoff coefficient

From this, **Time-to-peak (Tp) = 0.67 Tc**

The time to peak values used in the NASHYD command for both the pre-development and post-development conditions hydrologic modeling are shown below:

Catchment ID	Area (ha)	Length (m)	"C"	Slope (m/m)	Tc (min)	Tp (min)	Tp (hrs)
203	0.0760	50	0.20	0.015	18.15	12.16	0.20

418 & 422 GUELPH LINE
BURLINGTON, ONTARIO
STORMWATER MANAGEMENT

Design Storm Information

Design storm information used in the hydrologic modeling was based on City of Burlington Chicago storm Intensity-Duration-Frequency (IDF) equations in the form:

$$i = \frac{A}{(t + B)^C}$$

Where: i = Rainfall intensity (mm/hr)
t = Time of duration (min)
A, B and C = Constant (see below)

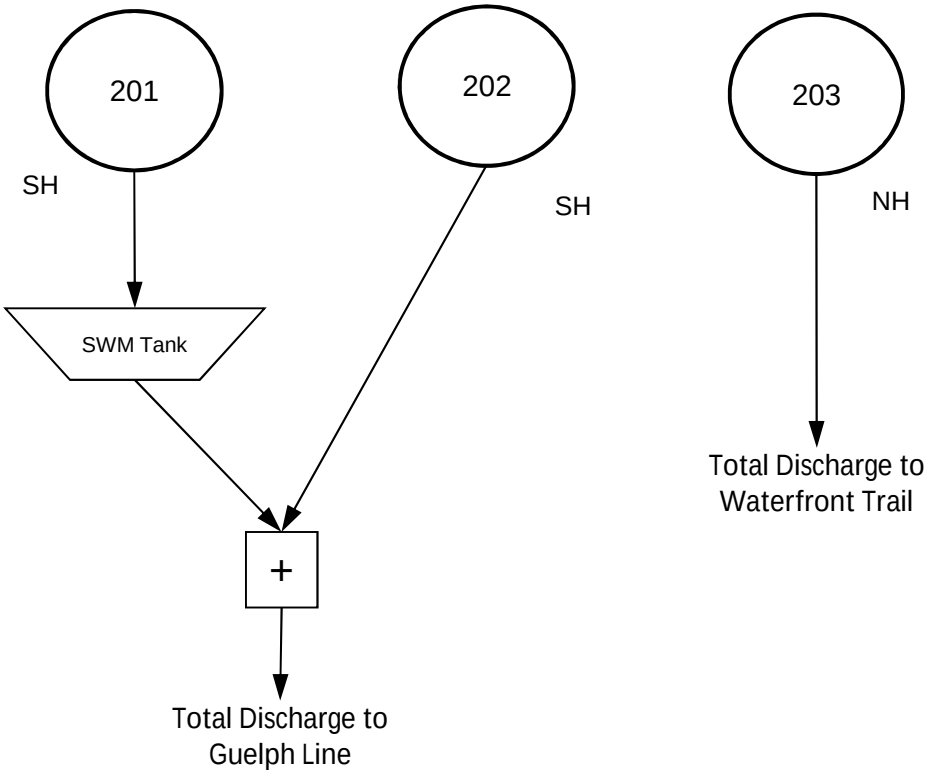
The value of the parameters for the various storm events is provided below:

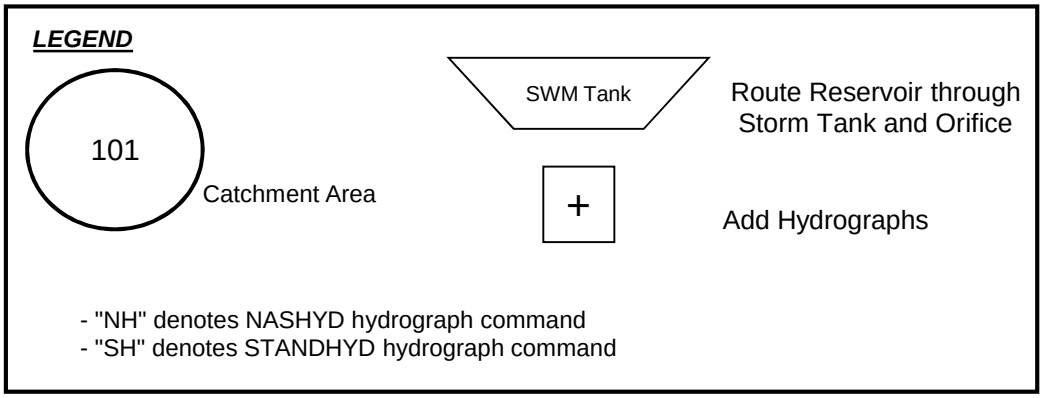
Constant	2-Yr.	5-Yr.	10-Yr.	25-Yr.	50-Yr.	100-Yr.
A	592.60	697.40	798.50	926.90	1019.40	1114.20
B	6	5	5	5	5	5
C	0.780	0.764	0.763	0.762	0.761	0.761

Note: IDF equations used to generate rainfall files with Duration (TD) = 4 hours

418 & 422 GUELPH LINE
BURLINGTON, ONTARIO
STORMWATER MANAGEMENT

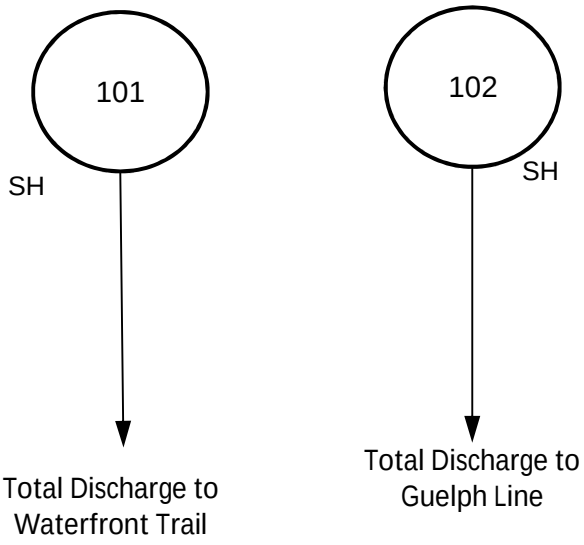
PRE-DEVELOPMENT CONDITIONS MODEL SCHEMATIC

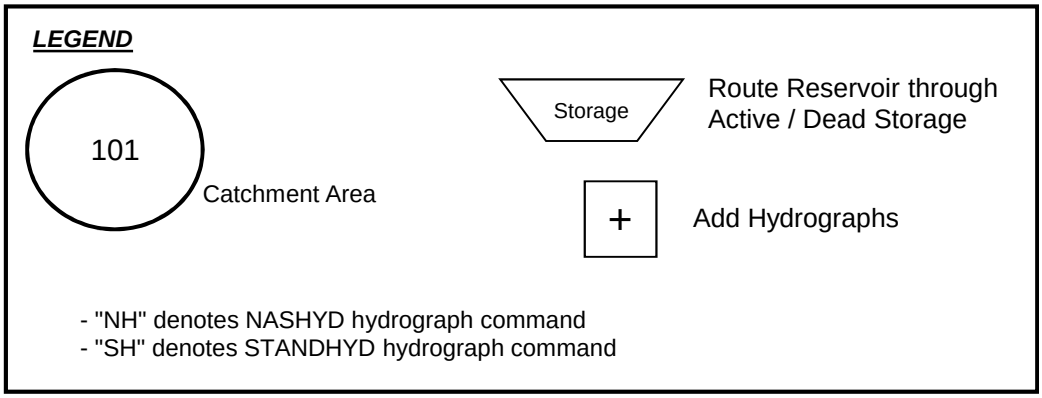




418 & 422 GUELPH LINE
BURLINGTON, ONTARIO
STORMWATER MANAGEMENT

PRE-DEVELOPMENT CONDITIONS MODEL SCHEMATIC





418 & 422 GUELPH LINE
BURLINGTON, ONTARIO
STORMWATER MANAGEMENT

Outlet Device No. 1 (Quantity)

Type:	Short Orifice Tube
Diameter (mm)	100
Area (m^2)	0.00785
Invert Elev. (m)	87.35
C/L Elev. (m)	87.40
Disch. Coeff. (C_d)	0.63
Discharge (Q) =	$C_d A (2 g H)^{0.5}$
Number of Orifices:	1

		SWM Storage Volumes				Outlet No. 1		Total
	Elevation m	Area m^2	Increm. Volume m^3	Cumulative Volume m^3		Head m	Discharge m^3/s	Discharge m^3/s
Inside Bottom of Tank/outlet invert	87.35	-	-	0		0.000	0.0000	0.0000
CL of orifice	87.40	-	4	4		0.000	0.0000	0.0000
	87.60	-	16	20		0.200	0.0098	0.0098
	87.80	-	16	36		0.400	0.0139	0.0139
	88.00	-	16	52		0.600	0.0170	0.0170
	88.30	-	24	76		0.900	0.0208	0.0208
Inside Top of Tank	88.60	-	24	100		1.200	0.0240	0.0240

Stormwater Tank Details	
Inside Dimensions in Tank	
Surface area (m^2)	80.0
height (m)	1.25
Vol provided (m^3)	100

APPENDIX B

SWMHYMO INPUT / OUTPUT FILES

```
2     Metric units
*#*************************************************************************|
*#  Project Name: 418-422 Guelph Line Development
*#  JOB NUMBER  : 45401-100
*#  Date        : OCTOBER 2019
*#  Modeller    : RDZ
*#  Company     : MTE CONSULTANTS
INC.
*#  File        : RoselandBowl.dat
*#*************************************************************************|
*#
*# !!! NOTE - THIS MODEL CONTAINS BOTH PRE AND POST DEVELOPMENT MODELING !!!
*#
*#*************************************************************************|
*#
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[002]
                    BURL_002.stm
*
READ STORM          STORM_FILENAME "STORM.001"
*
*#*************************************************************************|
*#
*#                   PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#                   ==============================================
*#
*#*************************************************************************|
*
*# CATCHMENT AREA 101 - EXISTING CONDITIONS DRAINING TO WATERFRONT TRAIL
CALIB STANDHYD      ID=[1], NHYD=["101"], DT=[1](min), AREA=[0.2687](ha),
                    XIMP=[.28], TIMP=[.28], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[75],
                    Pervious   surfaces: IAper=[5](mm), SLPP=[5.0](%),
                                         LGP=[30](m), MNP=[0.250], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[2.0](%),
                                         LGI=[25](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*# CATCHMENT AREA 102 - EXISTING CONDITIONS DRAINING TO GUELPH LINE STM SEWER
CALIB STANDHYD      ID=[2], NHYD=["102"], DT=[1](min), AREA=[0.1130](ha),
                    XIMP=[.98], TIMP=[.98], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[75],
                    Pervious   surfaces: IAper=[5](mm), SLPP=[8.0](%),
                                         LGP=[3.5](m), MNP=[0.250], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[2.0](%),
                                         LGI=[20](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------|
*# TOTAL EXISTING FLOW FROM SITE
ADD HYD             IDsum=[3], NHYD=["101+102"], IDs to add=[1 2]

*%-----------------|-------------------------------------------------------|
*#*************************************************************************|
*#
*#                POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#                ==============================================
*#
*#*************************************************************************|
*
*# CATCHMENT 201 - CONTROLLED DISCHARGE FROM BUILDING ROOF TO GUELPH LINE SEWER
CALIB STANDHYD      ID=[1], NHYD=["201"], DT=[1](min), AREA=[0.2867](ha),
                    XIMP=[.99], TIMP=[.99], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[75],
                    Pervious   surfaces: IAper=[5](mm), SLPP=[1.0](%),
                                         LGP=[10](m), MNP=[0.250], SCP=[0](min),
```

```
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[1.0](%),
                                         LGI=[10](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*#Route CATCHMENT 201 Through ORIFICE + SWM TANK
ROUTE RESERVOIR     IDout=[2],   NHYD=["TANK-SWM"],  IDin=[1],
                    RDT=[1](min),
                          TABLE of ( OUTFLOW-STORAGE ) values
                                    [ 0,0 ]
                                    [ 0,0.0004 ]
                                    [ 0.0098,0.0020 ]
                                    [ 0.0139,0.0036 ]
                                    [ 0.017,0.0052 ]
                                    [ 0.0208,0.0076 ]
                                    [ 0.024,0.0100 ]
                                   [   -1  ,  -1  ]  (max twenty pts)
                          IDovf=[4], NHYDovf=["TANK-OVF"]
*%-----------------|-------------------------------------------------------------|
*# CATCHMENT 202 - UNCONTROLLED DISCHARGE FROM PERIMETER OF SITE TO GUELPH LINE
CALIB STANDHYD      ID=[5], NHYD=["202"], DT=[1](min), AREA=[0.0190](ha),
                    XIMP=[.55], TIMP=[.55], DWF=[0](cms), LOSS=[2],
                    SCS curve number CN=[75],
                    Pervious   surfaces: IAper=[5](mm), SLPP=[2.0](%),
                                         LGP=[5](m), MNP=[0.250], SCP=[0](min),
                    Impervious surfaces: IAimp=[1.0](mm), SLPI=[4.0](%),
                                         LGI=[5](m), MNI=[0.013], SCI=[0](min),
                    RAINFALL=[ ,  ,  ,  , ](mm/hr) ,  END=-1
*%-----------------|-------------------------------------------------------------|
*# TOTAL FLOW TO GUELPH LINE
ADD HYD             IDsum=[6], NHYD=["201+202"], IDs to add=[2 4 5]
*%-----------------|-------------------------------------------------------------|
*# CATCHMENT 203 - UNCONTROLLED DISCHARGE TO WATERFRONT TRAIL
CALIB NASHYD        ID=[7], NHYD=["203"], DT=[1]min, AREA=[0.0760](ha),
                    DWF=[0](cms),  CN/C=[75], IA=[5](mm),
                    N=[3], TP=[0.20]hrs,
                    RAINFALL=[ ,  ,  ,  , ](mm/hr),  END=-1
*%-----------------|-------------------------------------------------------------|
*# TOTAL FLOW FROM SITE (CONTROLLED+UNCONTROLLED)
ADD HYD             IDsum=[8], NHYD=["TOTALSITE"], IDs to add=[6 7]
*%-----------------|-------------------------------------------------------------|

*****************************************************************************
*RUN REMAINING DESIGN STORMS (BURLINGTON CHICAGO 5 TO 100-YR)
*
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[005]
                    BURL_005.stm
*
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[010]
                    BURL_010.stm
*
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[025]
                    BURL_025.stm
*
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[050]
                    BURL_050.stm
*
START               TZERO=[0.0],  METOUT=[2],  NSTORM=[1],  NRUN=[100]
                    BURL_100.stm
*
*%-----------------|-------------------------------------------------------------|
FINISH
```

```
================================================================================

   SSSSS  W   W  M   M  H   H  Y   Y  M   M   OOO        999    999    =========
   S      W W W  MM MM  H   H   Y Y   MM MM  O   O      9   9  9   9
   SSSSS  W W W  M M M  HHHHH    Y    M M M  O   O  ##  9   9  9   9   Ver  4.05
       S   W W   M   M  H   H    Y    M   M  O   O       9999   9999   Sept 2011
   SSSSS   W W   M   M  H   H    Y    M   M   OOO           9      9    =========
                                                         9   9  9   9   # 3053466
        StormWater Management HYdrologic Model           999    999    =========

 ********************************************************************************
 ***************************** SWMHYMO Ver/4.05  ********************************
 *********  A single event and continuous hydrologic simulation model  *********
 *********     based on the principles of HYMO and its successors      *********
 *********                  OTTHYMO-83 and OTTHYMO-89.                 *********
 ********************************************************************************
 ********* Distributed by:  J.F. Sabourin and Associates Inc.          *********
 *********                  Ottawa,  Ontario: (613) 836-3884           *********
 *********                  Gatineau, Quebec: (819) 243-6858           *********
 *********                  E-Mail: swmhymo@jfsa.Com                   *********
 ********************************************************************************

 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
 +++++++++ Licensed user: MTE Consultants Inc.                          +++++++++
 +++++++++                Burlington           SERIAL#:3053466        +++++++++
 +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++

 ********************************************************************************
 *********           ++++++ PROGRAM ARRAY DIMENSIONS ++++++            *********
 *********           Maximum value for ID numbers  :     10           *********
 *********           Max. number of rainfall points: 105408           *********
 *********           Max. number of flow points    : 105408           *********
 ********************************************************************************


 **********************   D E T A I L E D   O U T P U T   **********************
 ********************************************************************************
 *         DATE: 2019-10-18     TIME: 13:05:03     RUN COUNTER: 001346          *
 ********************************************************************************
 * Input   filename: Q:\45401\100\SWM\SWMHYMO\ROSELA~1.DAT                       *
 * Output  filename: Q:\45401\100\SWM\SWMHYMO\ROSELA~1.out                       *
 * Summary filename: Q:\45401\100\SWM\SWMHYMO\ROSELA~1.sum                       *
 * User comments:                                                               *
 * 1:_____________________________________________________________________      *
 * 2:_____________________________________________________________________      *
 * 3:_____________________________________________________________________      *
 ********************************************************************************

--------------------------------------------------------------------------------
001:0001--------------------------------------------------------------------------
*#*****************************************************************************|
*#  Project Name: 418-422 Guelph Line Development
*#  JOB NUMBER  : 45401-100
*#  Date        : OCTOBER 2019
*#  Modeller    :
RDZ
*#  Company     : MTE CONSULTANTS
INC.
*#  File        : RoselandBowl.dat
*#*****************************************************************************|
*#
*# !!! NOTE - THIS MODEL CONTAINS BOTH PRE AND POST DEVELOPMENT MODELING !!!
*#
*#*****************************************************************************|
```

```
*#
  ** END OF RUN :   1

*******************************************************************************




-------------------
| START           |  Project  dir.:
Q:\45401\100\SWM\SWMHYMO\
-------------------  Rainfall dir.:
Q:\45401\100\SWM\SWMHYMO\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 002
    NSTORM=   1
           #  1=BURL_002.stm
-------------------------------------------------------------------------------------------
002:0002-----------------------------------------------------------------------------------
*#*****************************************************************************|
*#  Project Name: 418-422 Guelph Line Development
*#  JOB NUMBER  : 45401-100
*#  Date        : OCTOBER 2019
*#  Modeller    :
RDZ
*#  Company     : MTE CONSULTANTS
INC.
*#  File        : RoselandBowl.dat
*#*****************************************************************************|
*#
*# !!! NOTE - THIS MODEL CONTAINS BOTH PRE AND POST DEVELOPMENT MODELING !!!
*#
*#*****************************************************************************|
*#
-------------------------------------------------------------------------------------------
002:0002-----------------------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: 2-YR BURLINGTON CHICAGO STORM (4-HR DURA
| Ptotal=  32.34 mm|    Comments: 2-YR BURLINGTON CHICAGO STORM (4-HR DURA
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .17   2.193 |   1.17  17.083 |   2.17   5.221 |   3.17   2.635
               .33   2.511 |   1.33  68.163 |   2.33   4.444 |   3.33   2.448
               .50   2.955 |   1.50  22.413 |   2.50   3.884 |   3.50   2.289
               .67   3.627 |   1.67  11.979 |   2.67   3.459 |   3.67   2.151
               .83   4.775 |   1.83   8.270 |   2.83   3.126 |   3.83   2.031
              1.00   7.239 |   2.00   6.374 |   3.00   2.857 |   4.00   1.925

-------------------------------------------------------------------------------------------
002:0003-----------------------------------------------------------------------------------
*
*#*****************************************************************************|
*#
*#                  PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#                  ==============================================
*#
*#*****************************************************************************|
*
*# CATCHMENT AREA 101 - EXISTING CONDITIONS DRAINING TO WATERFRONT TRAIL
----------------------
```

```
| CALIB STANDHYD     |   Area    (ha)=     .27
| 01:101    DT= 1.00 |   Total Imp(%)=   28.00   Dir. Conn.(%)=   28.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .08          .19
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      25.00        30.00
     Mannings n             =      .013         .250

     Max.eff.Inten.(mm/hr)=      68.16         9.53
               over (min)        1.00        13.00
     Storage Coeff.  (min)=       1.05 (ii)   12.60 (ii)
     Unit Hyd. Tpeak (min)=       1.00        13.00
     Unit Hyd. peak  (cms)=       1.04          .09
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .01          .00          .015 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.53         1.333
     RUNOFF VOLUME    (mm)=      31.34         6.67        13.581
     TOTAL RAINFALL   (mm)=      32.34        32.34        32.342
     RUNOFF COEFFICIENT   =        .97          .21          .420

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

--------------------------------------------------------------------------------
002:0004--------------------------------------------------------------------------
*# CATCHMENT AREA 102 - EXISTING CONDITIONS DRAINING TO GUELPH LINE STM SEWER
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .11
| 02:102    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   98.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .11          .00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         8.00
     Length            (m)=      20.00         3.50
     Mannings n             =      .013         .250

     Max.eff.Inten.(mm/hr)=      68.16        15.19
               over (min)        1.00         3.00
     Storage Coeff.  (min)=        .92 (ii)    3.22 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.13          .36
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .02          .00          .021 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.35         1.333
     RUNOFF VOLUME    (mm)=      31.34         6.67        30.849
     TOTAL RAINFALL   (mm)=      32.34        32.34        32.342
     RUNOFF COEFFICIENT   =        .97          .21          .954

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

--------------------------------------------------------------------------------
002:0005--------------------------------------------------------------------------
*# TOTAL EXISTING FLOW FROM SITE
-----------------------
```

```
| ADD HYD (101+102   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 01:101           .27     .015    1.33  13.58    .000
                     +ID2 02:102           .11     .021    1.33  30.85    .000
                      ============================================================
                      SUM 03:101+102       .38     .036    1.33  18.69    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0006---------------------------------------------------------------------
*#*****************************************************************|
*#
*#               POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#               ==============================================
*#
*#*****************************************************************|
*
*# CATCHMENT 201 - CONTROLLED DISCHARGE FROM BUILDING ROOF TO GUELPH LINE SEWER
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .29
| 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .28           .00
     Dep. Storage     (mm)=       1.00          5.00
     Average Slope     (%)=       1.00          1.00
     Length            (m)=      10.00         10.00
     Mannings n           =       .013          .250

     Max.eff.Inten.(mm/hr)=      68.16         10.58
               over (min)         1.00         10.00
     Storage Coeff.  (min)=        .75 (ii)   10.04 (ii)
     Unit Hyd. Tpeak (min)=       1.00         10.00
     Unit Hyd. peak  (cms)=       1.25           .11
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .05           .00          .054 (iii)
     TIME TO PEAK    (hrs)=       1.33          1.48         1.333
     RUNOFF VOLUME    (mm)=      31.34          6.67        31.096
     TOTAL RAINFALL   (mm)=      32.34         32.34        32.342
     RUNOFF COEFFICIENT   =        .97           .21          .961

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

-------------------------------------------------------------------------------
002:0007---------------------------------------------------------------------
*#Route CATCHMENT 201 Through ORIFICE + SWM TANK
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(201   )   |
| OUT<02:(TANK-S)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .017  .5200E-02
                           .000  .4000E-03   |     .021  .7600E-02
                           .010  .2000E-02   |     .024  .1000E-01
                           .014  .3600E-02   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------        (ha)     (cms)     (hrs)       (mm)
```

```
     INFLOW >01: (201    )        .29      .054     1.333     31.096
     OUTFLOW<02: (TANK-S)        .29      .015     1.500     29.700
    OVERFLOW<04: (TANK-O)        .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   27.433
                  TIME SHIFT OF PEAK FLOW         (min)=    10.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.4048E-02

      *** WARNING: Outflow volume is less than inflow volume.
-------------------------------------------------------------------------------
002:0008---------------------------------------------------------------------------
*# CATCHMENT 202 - UNCONTROLLED DISCHARGE FROM PERIMETER OF SITE TO GUELPH LINE
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .02
| 05:202    DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=   55.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .01          .01
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      4.00         2.00
     Length            (m)=      5.00         5.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     68.16        13.88
               over (min)        1.00         5.00
     Storage Coeff.  (min)=       .33 (ii)    4.79 (ii)
     Unit Hyd. Tpeak (min)=      1.00         5.00
     Unit Hyd. peak  (cms)=      1.62          .23
                                                        *TOTALS*
     PEAK FLOW       (cms)=       .00          .00          .002 (iii)
     TIME TO PEAK    (hrs)=      1.23         1.38         1.333
     RUNOFF VOLUME    (mm)=     31.34         6.67        20.242
     TOTAL RAINFALL   (mm)=     32.34        32.34        32.342
     RUNOFF COEFFICIENT   =       .97          .21          .626

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

-------------------------------------------------------------------------------
002:0009---------------------------------------------------------------------------
*# TOTAL FLOW TO GUELPH LINE
------------------------
| ADD HYD (201+202   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 02:TANK-SWM        .29      .015    1.50  29.70    .000
                   +ID2 04:TANK-OVF        .00      .000     .00    .00    .000  **DRY**
                   +ID3 05:202             .02      .002    1.33  20.24    .000
                    ================================================================
                    SUM 06:201+202         .31      .016    1.33  29.11    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
002:0010---------------------------------------------------------------------------
*# CATCHMENT 203 - UNCONTROLLED DISCHARGE TO WATERFRONT TRAIL
----------------------
```

```
| CALIB NASHYD       |   Area    (ha)=     .08   Curve Number   (CN)=75.00
| 07:203    DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=     .015

     PEAK FLOW       (cms)=     .001 (i)
     TIME TO PEAK    (hrs)=    1.583
     RUNOFF VOLUME    (mm)=    6.669
     TOTAL RAINFALL   (mm)=   32.342
     RUNOFF COEFFICIENT   =     .206

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
002:0011--------------------------------------------------------------------------
*# TOTAL FLOW FROM SITE (CONTROLLED+UNCONTROLLED)
------------------------
| ADD HYD (TOTALSITE ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 06:201+202         .31     .016    1.33  29.11    .000
                     +ID2 07:203             .08     .001    1.58   6.67    .000
                      ============================================================
                      SUM 08:TOTALSITE       .38     .017    1.50  24.64    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
002:0012--------------------------------------------------------------------------
********************************************************************************
*RUN REMAINING DESIGN STORMS (BURLINGTON CHICAGO 5 TO 100-YR)
*
  ** END OF RUN :   4

********************************************************************************




--------------------
| START            |  Project  dir.:
Q:\45401\100\SWM\SWMHYMO\
--------------------  Rainfall dir.:
Q:\45401\100\SWM\SWMHYMO\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 005
    NSTORM=   1
           #  1=BURL_005.stm
--------------------------------------------------------------------------------
005:0002--------------------------------------------------------------------------
*#*************************************************************************|
*#  Project Name: 418-422 Guelph Line Development
*#  JOB NUMBER  : 45401-100
*#  Date        : OCTOBER 2019
*#  Modeller    :
RDZ
*#  Company     : MTE CONSULTANTS
INC.
*#  File        : RoselandBowl.dat
*#*************************************************************************|
*#
*# !!! NOTE - THIS MODEL CONTAINS BOTH PRE AND POST DEVELOPMENT MODELING !!!
```

```
*#
*#**************************************************************************|
*#
--------------------------------------------------------------------------------
005:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: 5-YR BURLINGTON CHICAGO STORM (4-HR DURA
| Ptotal=  41.70 mm|    Comments: 5-YR BURLINGTON CHICAGO STORM (4-HR DURA
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .17   2.963 |   1.17  21.285 |   2.17   6.805 |   3.17   3.535
               .33   3.374 |   1.33  88.094 |   2.33   5.834 |   3.33   3.293
               .50   3.946 |   1.50  27.774 |   2.50   5.128 |   3.50   3.087
               .67   4.803 |   1.67  15.072 |   2.67   4.590 |   3.67   2.908
               .83   6.247 |   1.83  10.561 |   2.83   4.165 |   3.83   2.751
              1.00   9.295 |   2.00   8.234 |   3.00   3.820 |   4.00   2.612

--------------------------------------------------------------------------------
005:0003----------------------------------------------------------------------
*
*#**************************************************************************|
*#
*#                  PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#                  =============================================
*#
*#**************************************************************************|
*
*# CATCHMENT AREA 101 - EXISTING CONDITIONS DRAINING TO WATERFRONT TRAIL
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .27
| 01:101    DT= 1.00 |   Total Imp(%)=   28.00   Dir. Conn.(%)=   28.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .08          .19
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         5.00
     Length             (m)=     25.00        30.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=      88.09        18.74
               over (min)         1.00        10.00
     Storage Coeff.  (min)=        .95 (ii)    9.77 (ii)
     Unit Hyd. Tpeak (min)=       1.00        10.00
     Unit Hyd. peak  (cms)=       1.11          .12
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .02          .01          .022 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.47         1.333
     RUNOFF VOLUME    (mm)=      40.70        11.10        19.384
     TOTAL RAINFALL   (mm)=      41.70        41.70        41.696
     RUNOFF COEFFICIENT   =        .98          .27          .465

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

--------------------------------------------------------------------------------
005:0004----------------------------------------------------------------------
*# CATCHMENT AREA 102 - EXISTING CONDITIONS DRAINING TO GUELPH LINE STM SEWER
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .11
```

```
| 02:102    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   98.00
---------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .11          .00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         8.00
     Length            (m)=      20.00         3.50
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      88.09        25.91
               over (min)        1.00         3.00
     Storage Coeff.  (min)=        .83 (ii)    2.68 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.19          .40
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .03          .00          .027 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.35         1.333
     RUNOFF VOLUME    (mm)=      40.70        11.10        40.104
     TOTAL RAINFALL   (mm)=      41.70        41.70        41.696
     RUNOFF COEFFICIENT   =        .98          .27          .962

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

--------------------------------------------------------------------------------
005:0005----------------------------------------------------------------------
*# TOTAL EXISTING FLOW FROM SITE
------------------------
| ADD HYD (101+102   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:101            .27     .022    1.33  19.38    .000
                    +ID2 02:102            .11     .027    1.33  40.10    .000
                     ============================================================
                     SUM 03:101+102        .38     .049    1.33  25.52    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0006----------------------------------------------------------------------
*#*****************************************************************************|
*#
*#               POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#               ==============================================
*#
*#*****************************************************************************|
*
*# CATCHMENT 201 - CONTROLLED DISCHARGE FROM BUILDING ROOF TO GUELPH LINE SEWER
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .29
| 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .28          .00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=      10.00        10.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=      88.09        20.91
               over (min)        1.00         8.00
     Storage Coeff.  (min)=        .68 (ii)    7.75 (ii)
```

```
      Unit Hyd. Tpeak (min)=       1.00         8.00
      Unit Hyd. peak  (cms)=       1.31          .15
                                                          *TOTALS*
      PEAK FLOW       (cms)=        .07          .00          .070 (iii)
      TIME TO PEAK    (hrs)=       1.33         1.43         1.333
      RUNOFF VOLUME    (mm)=      40.70        11.10        40.400
      TOTAL RAINFALL   (mm)=      41.70        41.70        41.696
      RUNOFF COEFFICIENT   =        .98          .27          .969

        (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
            CN* =  75.0    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.

--------------------------------------------------------------------------------
005:0007---------------------------------------------------------------------------
*#Route CATCHMENT 201 Through ORIFICE + SWM TANK
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(201   )   |
| OUT<02:(TANK-S)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .017  .5200E-02
                            .000  .4000E-03   |     .021  .7600E-02
                            .010  .2000E-02   |     .024  .1000E-01
                            .014  .3600E-02   |     .000  .0000E+00

      ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
      --------------------       (ha)     (cms)     (hrs)       (mm)
      INFLOW >01: (201   )        .29      .070     1.333     40.400
      OUTFLOW<02: (TANK-S)        .29      .017     1.517     39.005
     OVERFLOW<04: (TANK-O)        .00      .000      .000       .000

                    TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                    CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                    PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   24.677
                    TIME SHIFT OF PEAK FLOW         (min)=    11.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.5308E-02

       *** WARNING: Outflow volume is less than inflow volume.
--------------------------------------------------------------------------------
005:0008---------------------------------------------------------------------------
*# CATCHMENT 202 - UNCONTROLLED DISCHARGE FROM PERIMETER OF SITE TO GUELPH LINE
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .02
| 05:202    DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=   55.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
      Surface Area     (ha)=        .01          .01
      Dep. Storage     (mm)=       1.00         5.00
      Average Slope     (%)=       4.00         2.00
      Length            (m)=       5.00         5.00
      Mannings n           =       .013         .250

      Max.eff.Inten.(mm/hr)=      88.09        24.97
                over (min)        1.00         4.00
      Storage Coeff.  (min)=        .29 (ii)    3.82 (ii)
      Unit Hyd. Tpeak (min)=       1.00         4.00
      Unit Hyd. peak  (cms)=       1.64          .29
```

```
                                                                  *TOTALS*
     PEAK FLOW       (cms)=        .00          .00           .003 (iii)
     TIME TO PEAK    (hrs)=       1.23         1.37          1.333
     RUNOFF VOLUME    (mm)=      40.70        11.10         27.376
     TOTAL RAINFALL   (mm)=      41.70        41.70         41.696
     RUNOFF COEFFICIENT   =        .98          .27           .657

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

--------------------------------------------------------------------------------
005:0009---------------------------------------------------------------------------
*# TOTAL FLOW TO GUELPH LINE
------------------------
| ADD HYD (201+202   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 02:TANK-SWM        .29     .017    1.52  39.00    .000
                     +ID2 04:TANK-OVF        .00     .000     .00    .00    .000  **DRY**
                     +ID3 05:202             .02     .003    1.33  27.38    .000
                      ============================================================
                      SUM 06:201+202         .31     .019    1.33  38.28    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0010---------------------------------------------------------------------------
*# CATCHMENT 203 - UNCONTROLLED DISCHARGE TO WATERFRONT TRAIL
----------------------
| CALIB NASHYD       |   Area    (ha)=     .08   Curve Number   (CN)=75.00
| 07:203    DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=     .015

     PEAK FLOW       (cms)=     .002 (i)
     TIME TO PEAK    (hrs)=    1.550
     RUNOFF VOLUME    (mm)=   11.090
     TOTAL RAINFALL   (mm)=   41.696
     RUNOFF COEFFICIENT   =     .266

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
005:0011---------------------------------------------------------------------------
*# TOTAL FLOW FROM SITE (CONTROLLED+UNCONTROLLED)
------------------------
| ADD HYD (TOTALSITE ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 06:201+202         .31     .019    1.33  38.28    .000
                     +ID2 07:203             .08     .002    1.55  11.09    .000
                      ============================================================
                      SUM 08:TOTALSITE       .38     .020    1.50  32.87    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
005:0012---------------------------------------------------------------------------
********************************************************************************
*RUN REMAINING DESIGN STORMS (BURLINGTON CHICAGO 5 TO 100-YR)
*
--------------------------------------------------------------------------------
```

```
005:0002--------------------------------------------------------------------------------
*
  ** END OF RUN :   9

********************************************************************************




-------------------
| START            |  Project  dir.:
Q:\45401\100\SWM\SWMHYMO\
-------------------  Rainfall dir.:
Q:\45401\100\SWM\SWMHYMO\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 010
    NSTORM=   1
           #  1=BURL_010.stm
--------------------------------------------------------------------------------
010:0002--------------------------------------------------------------------------------
*#*****************************************************************************|
*#  Project Name: 418-422 Guelph Line Development
*#  JOB NUMBER  : 45401-100
*#  Date        : OCTOBER 2019
*#  Modeller    :
RDZ
*#  Company     : MTE CONSULTANTS
INC.
*#  File        : RoselandBowl.dat
*#*****************************************************************************|
*#
*# !!! NOTE - THIS MODEL CONTAINS BOTH PRE AND POST DEVELOPMENT MODELING !!!
*#
*#*****************************************************************************|
*#
--------------------------------------------------------------------------------
010:0002--------------------------------------------------------------------------------
*
-------------------
| READ STORM       |    Filename: 10-YR BURLINGTON CHICAGO STORM (4-HR DUR
| Ptotal=  48.00 mm|    Comments: 10-YR BURLINGTON CHICAGO STORM (4-HR DUR
-------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .17   3.423 |   1.17  24.501 |   2.17   7.852 |   3.17   4.083
               .33   3.898 |   1.33 101.139 |   2.33   6.733 |   3.33   3.805
               .50   4.558 |   1.50  31.955 |   2.50   5.920 |   3.50   3.567
               .67   5.545 |   1.67  17.363 |   2.67   5.300 |   3.67   3.360
               .83   7.210 |   1.83  12.175 |   2.83   4.810 |   3.83   3.179
              1.00  10.719 |   2.00   9.497 |   3.00   4.413 |   4.00   3.019

--------------------------------------------------------------------------------
010:0003--------------------------------------------------------------------------------
*
*#*****************************************************************************|
*#
*#                  PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#                  ==============================================
*#
*#*****************************************************************************|
*
*# CATCHMENT AREA 101 - EXISTING CONDITIONS DRAINING TO WATERFRONT TRAIL
```

```
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .27
| 01:101    DT= 1.00 |   Total Imp(%)=   28.00   Dir. Conn.(%)=   28.00
---------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .08          .19
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      2.00         5.00
     Length            (m)=     25.00        30.00
     Mannings n             =    .013         .250

     Max.eff.Inten.(mm/hr)=    101.14        27.95
               over (min)        1.00         8.00
     Storage Coeff.  (min)=      .90 (ii)    8.41 (ii)
     Unit Hyd. Tpeak (min)=     1.00         8.00
     Unit Hyd. peak  (cms)=     1.14          .14
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .02          .01          .027 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.43         1.333
     RUNOFF VOLUME    (mm)=    47.00        14.49        23.590
     TOTAL RAINFALL   (mm)=    48.00        48.00        48.004
     RUNOFF COEFFICIENT   =      .98          .30          .491

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

--------------------------------------------------------------------------------
010:0004--------------------------------------------------------------------------
*# CATCHMENT AREA 102 - EXISTING CONDITIONS DRAINING TO GUELPH LINE STM SEWER
---------------------
| CALIB STANDHYD     |   Area    (ha)=     .11
| 02:102    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   98.00
---------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .11          .00
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      2.00         8.00
     Length            (m)=     20.00         3.50
     Mannings n             =    .013         .250

     Max.eff.Inten.(mm/hr)=    101.14        35.13
               over (min)        1.00         2.00
     Storage Coeff.  (min)=      .79 (ii)    2.43 (ii)
     Unit Hyd. Tpeak (min)=     1.00         2.00
     Unit Hyd. peak  (cms)=     1.22          .49
                                                    *TOTALS*
     PEAK FLOW       (cms)=      .03          .00          .031 (iii)
     TIME TO PEAK    (hrs)=     1.33         1.33         1.333
     RUNOFF VOLUME    (mm)=    47.00        14.49        46.353
     TOTAL RAINFALL   (mm)=    48.00        48.00        48.004
     RUNOFF COEFFICIENT   =      .98          .30          .966

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

--------------------------------------------------------------------------------
010:0005--------------------------------------------------------------------------
*# TOTAL EXISTING FLOW FROM SITE
```

```
-----------------------
| ADD HYD (101+102   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:101            .27      .027    1.33  23.59    .000
                    +ID2 02:102            .11      .031    1.33  46.35    .000
                     ============================================================
                     SUM 03:101+102        .38      .059    1.33  30.33    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
010:0006---------------------------------------------------------------------------
*#*****************************************************************************|
*#
*#               POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#               ==============================================
*#
*#*****************************************************************************|
*
*# CATCHMENT 201 - CONTROLLED DISCHARGE FROM BUILDING ROOF TO GUELPH LINE SEWER
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .29
| 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .28          .00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=      10.00        10.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     101.14        29.25
               over (min)         1.00         7.00
     Storage Coeff.  (min)=        .64 (ii)    6.82 (ii)
     Unit Hyd. Tpeak (min)=       1.00         7.00
     Unit Hyd. peak  (cms)=       1.34          .16
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .08          .00          .080 (iii)
     TIME TO PEAK    (hrs)=       1.32         1.42         1.333
     RUNOFF VOLUME    (mm)=      47.00        14.49        46.679
     TOTAL RAINFALL   (mm)=      48.00        48.00        48.004
     RUNOFF COEFFICIENT   =        .98          .30          .972

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

-------------------------------------------------------------------------------
010:0007---------------------------------------------------------------------------
*#Route CATCHMENT 201 Through ORIFICE + SWM TANK
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(201   )   |
| OUT<02:(TANK-S)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .017  .5200E-02
                            .000  .4000E-03   |     .021  .7600E-02
                            .010  .2000E-02   |     .024  .1000E-01
                            .014  .3600E-02   |     .000  .0000E+00

     ROUTING RESULTS           AREA     QPEAK     TPEAK       R.V.
```

```
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (201   )        .29      .080     1.333     46.679
     OUTFLOW<02: (TANK-S)        .29      .019     1.517     45.283
    OVERFLOW<04: (TANK-O)        .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   23.246
                  TIME SHIFT OF PEAK FLOW         (min)=    11.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.6195E-02

      *** WARNING: Outflow volume is less than inflow volume.
--------------------------------------------------------------------------------
010:0008----------------------------------------------------------------------
*# CATCHMENT 202 - UNCONTROLLED DISCHARGE FROM PERIMETER OF SITE TO GUELPH LINE
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .02
| 05:202    DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=   55.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .01          .01
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      4.00         2.00
     Length            (m)=      5.00         5.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    101.14        34.03
               over (min)        1.00         3.00
     Storage Coeff.  (min)=       .28 (ii)    3.40 (ii)
     Unit Hyd. Tpeak (min)=      1.00         3.00
     Unit Hyd. peak  (cms)=      1.65          .35
                                                    *TOTALS*
     PEAK FLOW       (cms)=       .00          .00          .004 (iii)
     TIME TO PEAK    (hrs)=      1.23         1.35         1.333
     RUNOFF VOLUME    (mm)=     47.00        14.49        32.370
     TOTAL RAINFALL   (mm)=     48.00        48.00        48.004
     RUNOFF COEFFICIENT   =       .98          .30          .674

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

--------------------------------------------------------------------------------
010:0009----------------------------------------------------------------------
*# TOTAL FLOW TO GUELPH LINE
------------------------
| ADD HYD (201+202   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 02:TANK-SWM        .29      .019    1.52  45.28    .000
                    +ID2 04:TANK-OVF        .00      .000     .00    .00    .000  **DRY**
                    +ID3 05:202             .02      .004    1.33  32.37    .000
                     ================================================================
                     SUM 06:201+202         .31      .021    1.33  44.48    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
010:0010----------------------------------------------------------------------
*# CATCHMENT 203 - UNCONTROLLED DISCHARGE TO WATERFRONT TRAIL
```

```
---------------------
| CALIB NASHYD       |   Area    (ha)=     .08   Curve Number   (CN)=75.00
| 07:203    DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
---------------------   U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=     .015

     PEAK FLOW       (cms)=     .003 (i)
     TIME TO PEAK    (hrs)=    1.550
     RUNOFF VOLUME    (mm)=   14.480
     TOTAL RAINFALL   (mm)=   48.004
     RUNOFF COEFFICIENT   =     .302

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

------------------------------------------------------------------------------
010:0011----------------------------------------------------------------------
*# TOTAL FLOW FROM SITE (CONTROLLED+UNCONTROLLED)
------------------------
| ADD HYD (TOTALSITE ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                   (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 06:201+202         .31     .021    1.33  44.48    .000
                     +ID2 07:203             .08     .003    1.55  14.48    .000
                      ============================================================
                      SUM 08:TOTALSITE       .38     .023    1.50  38.51    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
010:0012----------------------------------------------------------------------
*****************************************************************************
*RUN REMAINING DESIGN STORMS (BURLINGTON CHICAGO 5 TO 100-YR)
*
------------------------------------------------------------------------------
010:0002----------------------------------------------------------------------
*
------------------------------------------------------------------------------
010:0002----------------------------------------------------------------------
*
  ** END OF RUN :  24

*****************************************************************************




-------------------
| START            |  Project  dir.:
Q:\45401\100\SWM\SWMHYMO\
-------------------  Rainfall dir.:
Q:\45401\100\SWM\SWMHYMO\
    TZERO =   .00 hrs on        0
    METOUT=   2 (output = METRIC)
    NRUN  = 025
    NSTORM=   1
           #  1=BURL_025.stm
------------------------------------------------------------------------------
025:0002----------------------------------------------------------------------
*#*************************************************************************|
*#  Project Name: 418-422 Guelph Line Development
*#  JOB NUMBER  : 45401-100
*#  Date        : OCTOBER 2019
*#  Modeller    :
```

```
RDZ
*#  Company     : MTE CONSULTANTS
INC.
*#  File        : RoselandBowl.dat
*#**************************************************************************|
*#
*# !!! NOTE - THIS MODEL CONTAINS BOTH PRE AND POST DEVELOPMENT MODELING !!!
*#
*#**************************************************************************|
*#
--------------------------------------------------------------------------------
025:0002----------------------------------------------------------------------
*
--------------------
| READ STORM       |    Filename: 25-YR BURLINGTON CHICAGO STORM (4-HR DUR
| Ptotal=  56.03 mm|    Comments: 25-YR BURLINGTON CHICAGO STORM (4-HR DUR
--------------------
              TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
               hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
               .17   4.010 |   1.17  28.592 |   2.17   9.185 |   3.17   4.782
               .33   4.566 |   1.33 117.720 |   2.33   7.879 |   3.33   4.457
               .50   5.337 |   1.50  37.274 |   2.50   6.929 |   3.50   4.178
               .67   6.491 |   1.67  20.279 |   2.67   6.204 |   3.67   3.937
               .83   8.435 |   1.83  14.230 |   2.83   5.632 |   3.83   3.725
              1.00  12.531 |   2.00  11.105 |   3.00   5.167 |   4.00   3.538

--------------------------------------------------------------------------------
025:0003----------------------------------------------------------------------
*
*#**************************************************************************|
*#
*#                  PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#                  ==============================================
*#
*#**************************************************************************|
*
*# CATCHMENT AREA 101 - EXISTING CONDITIONS DRAINING TO WATERFRONT TRAIL
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .27
| 01:101    DT= 1.00 |   Total Imp(%)=   28.00   Dir. Conn.(%)=   28.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .08          .19
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         5.00
     Length            (m)=      25.00        30.00
     Mannings n             =      .013         .250

     Max.eff.Inten.(mm/hr)=     117.72        39.48
               over (min)         1.00         7.00
     Storage Coeff.  (min)=        .85 (ii)    7.39 (ii)
     Unit Hyd. Tpeak (min)=       1.00         7.00
     Unit Hyd. peak  (cms)=       1.18          .16
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .02          .01          .035 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42         1.333
     RUNOFF VOLUME    (mm)=      55.03        19.19        29.226
     TOTAL RAINFALL   (mm)=      56.03        56.03        56.030
     RUNOFF COEFFICIENT   =        .98          .34          .522

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

------------------------------------------------------------------------------
025:0004--------------------------------------------------------------------------
*# CATCHMENT AREA 102 - EXISTING CONDITIONS DRAINING TO GUELPH LINE STM SEWER
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .11
| 02:102    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   98.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .11          .00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         8.00
     Length            (m)=      20.00         3.50
     Mannings n             =      .013         .250

     Max.eff.Inten.(mm/hr)=     117.72        46.65
               over (min)         1.00         2.00
     Storage Coeff.  (min)=        .74 (ii)     2.20 (ii)
     Unit Hyd. Tpeak (min)=       1.00         2.00
     Unit Hyd. peak  (cms)=       1.26          .52
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .04          .00          .036 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33         1.333
     RUNOFF VOLUME    (mm)=      55.03        19.19        54.314
     TOTAL RAINFALL   (mm)=      56.03        56.03        56.030
     RUNOFF COEFFICIENT   =        .98          .34          .969

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

------------------------------------------------------------------------------
025:0005--------------------------------------------------------------------------
*# TOTAL EXISTING FLOW FROM SITE
------------------------
| ADD HYD (101+102   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 01:101             .27      .035    1.33  29.23    .000
                   +ID2 02:102             .11      .036    1.33  54.31    .000
                    ==========================================================
                    SUM 03:101+102         .38      .071    1.33  36.65    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

------------------------------------------------------------------------------
025:0006--------------------------------------------------------------------------
*#*****************************************************************************|
*#
*#               POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#               ==============================================
*#
*#*****************************************************************************|
*
*# CATCHMENT 201 - CONTROLLED DISCHARGE FROM BUILDING ROOF TO GUELPH LINE SEWER
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .29
| 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .28          .00
     Dep. Storage     (mm)=       1.00         5.00
```

```
     Average Slope     (%)=       1.00         1.00
     Length            (m)=      10.00        10.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=     117.72        41.03
               over (min)         1.00         6.00
     Storage Coeff.  (min)=        .60 (ii)    6.00 (ii)
     Unit Hyd. Tpeak (min)=       1.00         6.00
     Unit Hyd. peak  (cms)=       1.38          .19
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .09          .00           .093 (iii)
     TIME TO PEAK    (hrs)=       1.32         1.40          1.333
     RUNOFF VOLUME    (mm)=      55.03        19.19         54.672
     TOTAL RAINFALL   (mm)=      56.03        56.03         56.030
     RUNOFF COEFFICIENT   =        .98          .34           .976

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

--------------------------------------------------------------------------------
025:0007----------------------------------------------------------------------
*#Route CATCHMENT 201 Through ORIFICE + SWM TANK
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(201   )   |
| OUT<02:(TANK-S)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .017  .5200E-02
                            .000  .4000E-03   |     .021  .7600E-02
                            .010  .2000E-02   |     .024  .1000E-01
                            .014  .3600E-02   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------        (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (201   )        .29      .093     1.333     54.672
     OUTFLOW<02: (TANK-S)        .29      .020     1.517     53.277
    OVERFLOW<04: (TANK-O)        .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   21.903
                  TIME SHIFT OF PEAK FLOW         (min)=    11.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.7334E-02

      *** WARNING: Outflow volume is less than inflow volume.
--------------------------------------------------------------------------------
025:0008----------------------------------------------------------------------
*# CATCHMENT 202 - UNCONTROLLED DISCHARGE FROM PERIMETER OF SITE TO GUELPH LINE
---------------------
| CALIB STANDHYD    |   Area    (ha)=     .02
| 05:202    DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=   55.00
---------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .01          .01
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      4.00         2.00
     Length            (m)=      5.00         5.00
```

```
     Mannings n          =       .013         .250

     Max.eff.Inten.(mm/hr)=     117.72        45.32
               over (min)         1.00         3.00
     Storage Coeff.  (min)=        .26 (ii)     3.04 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.66          .37
                                                          *TOTALS*
     PEAK FLOW       (cms)=        .00          .00          .004 (iii)
     TIME TO PEAK    (hrs)=       1.30         1.35         1.333
     RUNOFF VOLUME    (mm)=      55.03        19.19        38.902
     TOTAL RAINFALL   (mm)=      56.03        56.03        56.030
     RUNOFF COEFFICIENT   =        .98          .34          .694

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

--------------------------------------------------------------------------------
025:0009----------------------------------------------------------------------------
*# TOTAL FLOW TO GUELPH LINE
------------------------
| ADD HYD (201+202   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 02:TANK-SWM       .29     .020    1.52  53.28    .000
                     +ID2 04:TANK-OVF       .00     .000     .00    .00    .000  **DRY**
                     +ID3 05:202            .02     .004    1.33  38.90    .000
                      ============================================================
                      SUM 06:201+202        .31     .023    1.33  52.38    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
025:0010----------------------------------------------------------------------------
*# CATCHMENT 203 - UNCONTROLLED DISCHARGE TO WATERFRONT TRAIL
----------------------
| CALIB NASHYD       |   Area    (ha)=     .08   Curve Number   (CN)=75.00
| 07:203    DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=     .015

     PEAK FLOW       (cms)=     .004 (i)
     TIME TO PEAK    (hrs)=    1.550
     RUNOFF VOLUME    (mm)=   19.185
     TOTAL RAINFALL   (mm)=   56.030
     RUNOFF COEFFICIENT   =     .342

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
025:0011----------------------------------------------------------------------------
*# TOTAL FLOW FROM SITE (CONTROLLED+UNCONTROLLED)
------------------------
| ADD HYD (TOTALSITE ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 06:201+202        .31     .023    1.33  52.38    .000
                     +ID2 07:203            .08     .004    1.55  19.19    .000
                      ============================================================
                      SUM 08:TOTALSITE      .38     .026    1.50  45.77    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.
```

```
1199
1200  ------------------------------------------------------------------------------
1201  025:0012--------------------------------------------------------------------------
1202  ******************************************************************************
1203  *RUN REMAINING DESIGN STORMS (BURLINGTON CHICAGO 5 TO 100-YR)
1204  *
1205  ------------------------------------------------------------------------------
1206  025:0002--------------------------------------------------------------------------
1207  *
1208  ------------------------------------------------------------------------------
1209  025:0002--------------------------------------------------------------------------
1210  *
1211  ------------------------------------------------------------------------------
1212  025:0002--------------------------------------------------------------------------
1213  *
1214    ** END OF RUN :  49
1215
1216  ******************************************************************************
1217
1218
1219
1220
1221
1222  --------------------
1223  | START            |  Project  dir.:
      Q:\45401\100\SWM\SWMHYMO\
1224  --------------------  Rainfall dir.:
      Q:\45401\100\SWM\SWMHYMO\
1225      TZERO =   .00 hrs on        0
1226      METOUT=   2 (output = METRIC)
1227      NRUN  = 050
1228      NSTORM=   1
1229             #  1=BURL_050.stm
1230  ------------------------------------------------------------------------------
1231  050:0002--------------------------------------------------------------------------
1232  *#*************************************************************************|
1233  *#  Project Name: 418-422 Guelph Line Development
1234  *#  JOB NUMBER  : 45401-100
1235  *#  Date        : OCTOBER 2019
1236  *#  Modeller    :
      RDZ
1237  *#  Company     : MTE CONSULTANTS
      INC.
1238  *#  File        : RoselandBowl.dat
1239  *#*************************************************************************|
1240  *#
1241  *# !!! NOTE - THIS MODEL CONTAINS BOTH PRE AND POST DEVELOPMENT MODELING !!!
1242  *#
1243  *#*************************************************************************|
1244  *#
1245  ------------------------------------------------------------------------------
1246  050:0002--------------------------------------------------------------------------
1247  *
1248  --------------------
1249  | READ STORM       |    Filename: 50-YR BURLINGTON CHICAGO STORM (4-HR DUR
1250  | Ptotal=  61.96 mm|    Comments: 50-YR BURLINGTON CHICAGO STORM (4-HR DUR
1251  --------------------
1252               TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
1253                hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
1254                .17   4.451 |   1.17  31.613 |   2.17  10.180 |   3.17   5.306
1255                .33   5.067 |   1.33 129.819 |   2.33   8.734 |   3.33   4.946
1256                .50   5.921 |   1.50  41.194 |   2.50   7.683 |   3.50   4.637
1257                .67   7.198 |   1.67  22.439 |   2.67   6.881 |   3.67   4.369
1258                .83   9.350 |   1.83  15.757 |   2.83   6.247 |   3.83   4.135
```

```
              1.00  13.879 |   2.00  12.303 |   3.00   5.733 |   4.00   3.927

--------------------------------------------------------------------------------
050:0003----------------------------------------------------------------------
*
*#*************************************************************************|
*#
*#                  PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#                  ==============================================
*#
*#*************************************************************************|
*
*# CATCHMENT AREA 101 - EXISTING CONDITIONS DRAINING TO WATERFRONT TRAIL
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .27
| 01:101    DT= 1.00 |   Total Imp(%)=   28.00   Dir. Conn.(%)=   28.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .08          .19
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         5.00
     Length             (m)=     25.00        30.00
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=     129.82        47.58
               over (min)         1.00         7.00
     Storage Coeff.  (min)=        .81 (ii)    6.89 (ii)
     Unit Hyd. Tpeak (min)=       1.00         7.00
     Unit Hyd. peak  (cms)=       1.20          .16
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .03          .02          .040 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.42         1.333
     RUNOFF VOLUME    (mm)=      60.96        22.91        33.564
     TOTAL RAINFALL   (mm)=      61.96        61.96        61.962
     RUNOFF COEFFICIENT   =        .98          .37          .542

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

--------------------------------------------------------------------------------
050:0004----------------------------------------------------------------------
*# CATCHMENT AREA 102 - EXISTING CONDITIONS DRAINING TO GUELPH LINE STM SEWER
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .11
| 02:102    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   98.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .11          .00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       2.00         8.00
     Length             (m)=     20.00         3.50
     Mannings n            =       .013         .250

     Max.eff.Inten.(mm/hr)=     129.82        55.67
               over (min)         1.00         2.00
     Storage Coeff.  (min)=        .71 (ii)    2.08 (ii)
     Unit Hyd. Tpeak (min)=       1.00         2.00
     Unit Hyd. peak  (cms)=       1.28          .55
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .04          .00          .040 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.33         1.333
```

```
     RUNOFF VOLUME    (mm)=      60.96        22.91        60.201
     TOTAL RAINFALL   (mm)=      61.96        61.96        61.962
     RUNOFF COEFFICIENT   =        .98          .37          .972

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

---------------------------------------------------------------------------------
050:0005---------------------------------------------------------------------------
*# TOTAL EXISTING FLOW FROM SITE
------------------------
| ADD HYD (101+102   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:101            .27     .040    1.33  33.56    .000
                    +ID2 02:102            .11     .040    1.33  60.20    .000
                     ============================================================
                     SUM 03:101+102        .38     .081    1.33  41.45    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------------
050:0006---------------------------------------------------------------------------
*#*****************************************************************************|
*#
*#               POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#               ==============================================
*#
*#*****************************************************************************|
*
*# CATCHMENT 201 - CONTROLLED DISCHARGE FROM BUILDING ROOF TO GUELPH LINE SEWER
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .29
| 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                            IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .28          .00
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      1.00         1.00
     Length            (m)=     10.00        10.00
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=    129.82        49.34
               over (min)        1.00         6.00
     Storage Coeff.  (min)=       .58 (ii)    5.60 (ii)
     Unit Hyd. Tpeak (min)=      1.00         6.00
     Unit Hyd. peak  (cms)=      1.40          .20
                                                      *TOTALS*
     PEAK FLOW       (cms)=       .10          .00          .103 (iii)
     TIME TO PEAK    (hrs)=      1.32         1.38         1.333
     RUNOFF VOLUME    (mm)=     60.96        22.91        60.581
     TOTAL RAINFALL   (mm)=     61.96        61.96        61.962
     RUNOFF COEFFICIENT   =       .98          .37          .978

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

---------------------------------------------------------------------------------
050:0007---------------------------------------------------------------------------
```

```
*#Route CATCHMENT 201 Through ORIFICE + SWM TANK
--------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(201   )   |
| OUT<02:(TANK-S)   |    =========  OUTLFOW STORAGE TABLE  =========
--------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                          (cms)    (ha.m.)   |    (cms)    (ha.m.)
                           .000  .0000E+00   |     .017  .5200E-02
                           .000  .4000E-03   |     .021  .7600E-02
                           .010  .2000E-02   |     .024  .1000E-01
                           .014  .3600E-02   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     --------------------       (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (201   )        .29      .103     1.333     60.581
     OUTFLOW<02: (TANK-S)        .29      .022     1.517     59.186
    OVERFLOW<04: (TANK-O)        .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00


                  PEAK   FLOW   REDUCTION [Qout/Qin](%)=   21.026
                  TIME SHIFT OF PEAK FLOW         (min)=    11.00
                  MAXIMUM  STORAGE   USED       (ha.m.)=.8181E-02

      *** WARNING: Outflow volume is less than inflow volume.
-------------------------------------------------------------------------------
050:0008---------------------------------------------------------------------------
*# CATCHMENT 202 - UNCONTROLLED DISCHARGE FROM PERIMETER OF SITE TO GUELPH LINE
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .02
| 05:202    DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=   55.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .01          .01
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       4.00         2.00
     Length            (m)=       5.00         5.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     129.82        54.19
               over (min)         1.00         3.00
     Storage Coeff.  (min)=        .25 (ii)    2.84 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.67          .39
                                                    *TOTALS*
     PEAK FLOW       (cms)=        .00          .00          .005 (iii)
     TIME TO PEAK    (hrs)=       1.23         1.35         1.333
     RUNOFF VOLUME    (mm)=      60.96        22.91        43.838
     TOTAL RAINFALL   (mm)=      61.96        61.96        61.962
     RUNOFF COEFFICIENT   =        .98          .37          .708

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

-------------------------------------------------------------------------------
050:0009---------------------------------------------------------------------------
*# TOTAL FLOW TO GUELPH LINE
-----------------------
```

```
| ADD HYD (201+202   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
-----------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 02:TANK-SWM       .29     .022    1.52  59.19    .000
                     +ID2 04:TANK-OVF       .00     .000     .00    .00    .000  **DRY**
                     +ID3 05:202            .02     .005    1.33  43.84    .000
                      ============================================================
                      SUM 06:201+202        .31     .025    1.33  58.23    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0010----------------------------------------------------------------------
*# CATCHMENT 203 - UNCONTROLLED DISCHARGE TO WATERFRONT TRAIL
----------------------
| CALIB NASHYD       |   Area    (ha)=     .08   Curve Number   (CN)=75.00
| 07:203    DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=     .015

     PEAK FLOW       (cms)=     .005 (i)
     TIME TO PEAK    (hrs)=    1.550
     RUNOFF VOLUME    (mm)=   22.904
     TOTAL RAINFALL   (mm)=   61.962
     RUNOFF COEFFICIENT   =     .370

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

--------------------------------------------------------------------------------
050:0011----------------------------------------------------------------------
*# TOTAL FLOW FROM SITE (CONTROLLED+UNCONTROLLED)
------------------------
| ADD HYD (TOTALSITE ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 06:201+202        .31     .025    1.33  58.23    .000
                     +ID2 07:203            .08     .005    1.55  22.90    .000
                      ============================================================
                      SUM 08:TOTALSITE      .38     .028    1.50  51.20    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

--------------------------------------------------------------------------------
050:0012----------------------------------------------------------------------
********************************************************************************
*RUN REMAINING DESIGN STORMS (BURLINGTON CHICAGO 5 TO 100-YR)
*
--------------------------------------------------------------------------------
050:0002----------------------------------------------------------------------
*
--------------------------------------------------------------------------------
050:0002----------------------------------------------------------------------
*
--------------------------------------------------------------------------------
050:0002----------------------------------------------------------------------
*
--------------------------------------------------------------------------------
050:0002----------------------------------------------------------------------
*
  ** END OF RUN :  99

********************************************************************************
```

```
1515
1516
1517    -------------------
1518    | START            |  Project  dir.:
        Q:\45401\100\SWM\SWMHYMO\
1519    -------------------  Rainfall dir.:
        Q:\45401\100\SWM\SWMHYMO\
1520        TZERO =   .00 hrs on        0
1521        METOUT=   2 (output = METRIC)
1522        NRUN  = 100
1523        NSTORM=   1
1524               #  1=BURL_100.stm
1525    ----------------------------------------------------------------------------------------
1526    100:0002--------------------------------------------------------------------------------
1527    *#*************************************************************************|
1528    *#  Project Name: 418-422 Guelph Line Development
1529    *#  JOB NUMBER  : 45401-100
1530    *#  Date        : OCTOBER 2019
1531    *#  Modeller    :
        RDZ
1532    *#  Company     : MTE CONSULTANTS
        INC.
1533    *#  File        : RoselandBowl.dat
1534    *#*************************************************************************|
1535    *#
1536    *# !!! NOTE - THIS MODEL CONTAINS BOTH PRE AND POST DEVELOPMENT MODELING !!!
1537    *#
1538    *#*************************************************************************|
1539    *#
1540    ----------------------------------------------------------------------------------------
1541    100:0002--------------------------------------------------------------------------------
1542    *
1543    --------------------
1544    | READ STORM       |    Filename: 100-YR BURLINGTON CHICAGO STORM (4-HR DU
1545    | Ptotal=  67.72 mm|    Comments: 100-YR BURLINGTON CHICAGO STORM (4-HR DU
1546    --------------------
1547                 TIME    RAIN |   TIME    RAIN |   TIME    RAIN |   TIME    RAIN
1548                  hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr |    hrs   mm/hr
1549                  .17   4.865 |   1.17  34.553 |   2.17  11.126 |   3.17   5.800
1550                  .33   5.538 |   1.33 141.892 |   2.33   9.547 |   3.33   5.406
1551                  .50   6.472 |   1.50  45.024 |   2.50   8.397 |   3.50   5.068
1552                  .67   7.868 |   1.67  24.526 |   2.67   7.521 |   3.67   4.776
1553                  .83  10.219 |   1.83  17.223 |   2.83   6.828 |   3.83   4.519
1554                 1.00  15.170 |   2.00  13.447 |   3.00   6.266 |   4.00   4.292
1555
1556    ----------------------------------------------------------------------------------------
1557    100:0003--------------------------------------------------------------------------------
1558    *
1559    *#*************************************************************************|
1560    *#
1561    *#                  PRE-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
1562    *#                  ==============================================
1563    *#
1564    *#*************************************************************************|
1565    *
1566    *# CATCHMENT AREA 101 - EXISTING CONDITIONS DRAINING TO WATERFRONT TRAIL
1567    ----------------------
1568    | CALIB STANDHYD     |   Area    (ha)=     .27
1569    | 01:101    DT= 1.00 |   Total Imp(%)=   28.00   Dir. Conn.(%)=   28.00
1570    ----------------------
1571                                IMPERVIOUS    PERVIOUS (i)
1572        Surface Area     (ha)=        .08          .19
1573        Dep. Storage     (mm)=       1.00         5.00
1574        Average Slope     (%)=       2.00         5.00
```

```
     Length            (m)=      25.00        30.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     141.89        57.99
               over (min)         1.00         6.00
     Storage Coeff.  (min)=        .79 (ii)    6.40 (ii)
     Unit Hyd. Tpeak (min)=       1.00         6.00
     Unit Hyd. peak  (cms)=       1.22          .18
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .03          .02          .047 (iii)
     TIME TO PEAK    (hrs)=       1.33         1.40         1.333
     RUNOFF VOLUME    (mm)=      66.72        26.69        37.902
     TOTAL RAINFALL   (mm)=      67.72        67.72        67.724
     RUNOFF COEFFICIENT   =        .99          .39          .560

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

---------------------------------------------------------------------------------
100:0004-----------------------------------------------------------------------------
*# CATCHMENT AREA 102 - EXISTING CONDITIONS DRAINING TO GUELPH LINE STM SEWER
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .11
| 02:102    DT= 1.00 |   Total Imp(%)=   98.00   Dir. Conn.(%)=   98.00
----------------------
                             IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=       .11          .00
     Dep. Storage     (mm)=      1.00         5.00
     Average Slope     (%)=      2.00         8.00
     Length            (m)=     20.00         3.50
     Mannings n           =      .013         .250

     Max.eff.Inten.(mm/hr)=     141.89        65.03
               over (min)         1.00         2.00
     Storage Coeff.  (min)=        .69 (ii)    1.97 (ii)
     Unit Hyd. Tpeak (min)=       1.00         2.00
     Unit Hyd. peak  (cms)=       1.30          .56
                                                        *TOTALS*
     PEAK FLOW       (cms)=        .04          .00          .044 (iii)
     TIME TO PEAK    (hrs)=       1.32         1.33         1.333
     RUNOFF VOLUME    (mm)=      66.72        26.69        65.923
     TOTAL RAINFALL   (mm)=      67.72        67.72        67.724
     RUNOFF COEFFICIENT   =        .99          .39          .973

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

---------------------------------------------------------------------------------
100:0005-----------------------------------------------------------------------------
*# TOTAL EXISTING FLOW FROM SITE
------------------------
| ADD HYD (101+102   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                     ID1 01:101            .27     .047    1.33  37.90    .000
                    +ID2 02:102            .11     .044    1.33  65.92    .000
                     ============================================================
                     SUM 03:101+102        .38     .091    1.33  46.20    .000
```

```
   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
100:0006---------------------------------------------------------------------------
*#*****************************************************************************|
*#
*#               POST-DEVELOPMENT CONDITIONS HYDROLOGIC MODELING
*#               ==============================================
*#
*#*****************************************************************************|
*
*# CATCHMENT 201 - CONTROLLED DISCHARGE FROM BUILDING ROOF TO GUELPH LINE SEWER
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .29
| 01:201    DT= 1.00 |   Total Imp(%)=   99.00   Dir. Conn.(%)=   99.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .28          .00
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       1.00         1.00
     Length            (m)=      10.00        10.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     141.89        59.87
               over (min)         1.00         5.00
     Storage Coeff.  (min)=        .56 (ii)    5.20 (ii)
     Unit Hyd. Tpeak (min)=       1.00         5.00
     Unit Hyd. peak  (cms)=       1.42          .22
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .11          .00          .112 (iii)
     TIME TO PEAK    (hrs)=       1.30         1.37         1.333
     RUNOFF VOLUME    (mm)=      66.72        26.69        66.324
     TOTAL RAINFALL   (mm)=      67.72        67.72        67.724
     RUNOFF COEFFICIENT   =        .99          .39          .979

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

-------------------------------------------------------------------------------
100:0007---------------------------------------------------------------------------
*#Route CATCHMENT 201 Through ORIFICE + SWM TANK
---------------------
| ROUTE RESERVOIR   |    Requested routing time step =  1.0 min.
|  IN>01:(201   )   |
| OUT<02:(TANK-S)   |    =========  OUTLFOW STORAGE TABLE  =========
---------------------    OUTFLOW    STORAGE   |  OUTFLOW    STORAGE
                           (cms)    (ha.m.)   |    (cms)    (ha.m.)
                            .000  .0000E+00   |     .017  .5200E-02
                            .000  .4000E-03   |     .021  .7600E-02
                            .010  .2000E-02   |     .024  .1000E-01
                            .014  .3600E-02   |     .000  .0000E+00

     ROUTING RESULTS            AREA     QPEAK     TPEAK       R.V.
     -------------------        (ha)     (cms)     (hrs)       (mm)
     INFLOW >01: (201   )        .29      .112     1.333     66.324
     OUTFLOW<02: (TANK-S)        .29      .023     1.517     64.929
    OVERFLOW<04: (TANK-O)        .00      .000      .000       .000

                  TOTAL NUMBER OF SIMULATED OVERFLOWS  =        0
                  CUMULATIVE TIME OF OVERFLOWS  (hours)=      .00
                  PERCENTAGE OF TIME OVERFLOWING    (%)=      .00
```

```
                    PEAK   FLOW   REDUCTION [Qout/Qin](%)=   20.241
                    TIME SHIFT OF PEAK FLOW         (min)=    11.00
                    MAXIMUM  STORAGE   USED       (ha.m.)=.9032E-02

      *** WARNING: Outflow volume is less than inflow volume.
-------------------------------------------------------------------------------
100:0008---------------------------------------------------------------------
*# CATCHMENT 202 - UNCONTROLLED DISCHARGE FROM PERIMETER OF SITE TO GUELPH LINE
----------------------
| CALIB STANDHYD     |   Area    (ha)=     .02
| 05:202    DT= 1.00 |   Total Imp(%)=   55.00   Dir. Conn.(%)=   55.00
----------------------
                              IMPERVIOUS    PERVIOUS (i)
     Surface Area     (ha)=        .01          .01
     Dep. Storage     (mm)=       1.00         5.00
     Average Slope     (%)=       4.00         2.00
     Length            (m)=       5.00         5.00
     Mannings n           =       .013         .250

     Max.eff.Inten.(mm/hr)=     141.89        63.39
               over (min)         1.00         3.00
     Storage Coeff.  (min)=        .24 (ii)    2.68 (ii)
     Unit Hyd. Tpeak (min)=       1.00         3.00
     Unit Hyd. peak  (cms)=       1.67          .40
                                                      *TOTALS*
     PEAK FLOW       (cms)=        .00          .00          .005 (iii)
     TIME TO PEAK    (hrs)=       1.23         1.33         1.333
     RUNOFF VOLUME    (mm)=      66.72        26.69        48.710
     TOTAL RAINFALL   (mm)=      67.72        67.72        67.724
     RUNOFF COEFFICIENT   =        .99          .39          .719

       (i) CN PROCEDURE SELECTED FOR PERVIOUS LOSSES:
           CN* =  75.0    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.

-------------------------------------------------------------------------------
100:0009---------------------------------------------------------------------
*# TOTAL FLOW TO GUELPH LINE
------------------------
| ADD HYD (201+202   ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                    ID1 02:TANK-SWM        .29      .023    1.52  64.93    .000
                   +ID2 04:TANK-OVF        .00      .000     .00    .00    .000  **DRY**
                   +ID3 05:202             .02      .005    1.33  48.71    .000
                    ================================================================
                    SUM 06:201+202         .31      .027    1.33  63.92    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

-------------------------------------------------------------------------------
100:0010---------------------------------------------------------------------
*# CATCHMENT 203 - UNCONTROLLED DISCHARGE TO WATERFRONT TRAIL
----------------------
| CALIB NASHYD       |   Area    (ha)=     .08   Curve Number   (CN)=75.00
| 07:203    DT= 1.00 |   Ia      (mm)=   5.000   # of Linear Res.(N)= 3.00
----------------------   U.H. Tp(hrs)=    .200

     Unit Hyd Qpeak  (cms)=     .015

     PEAK FLOW       (cms)=     .006 (i)
```

```
     TIME TO PEAK    (hrs)=    1.533
     RUNOFF VOLUME    (mm)=   26.688
     TOTAL RAINFALL   (mm)=   67.724
     RUNOFF COEFFICIENT   =     .394

     (i) PEAK FLOW DOES NOT INCLUDE BASEFLOW IF ANY.

---------------------------------------------------------------------------------
100:0011-----------------------------------------------------------------------
*# TOTAL FLOW FROM SITE (CONTROLLED+UNCONTROLLED)
------------------------
| ADD HYD (TOTALSITE ) | ID: NHYD         AREA     QPEAK   TPEAK   R.V.    DWF
------------------------                  (ha)     (cms)   (hrs)   (mm)   (cms)
                      ID1 06:201+202        .31     .027    1.33  63.92    .000
                     +ID2 07:203            .08     .006    1.53  26.69    .000
                      ============================================================
                      SUM 08:TOTALSITE      .38     .030    1.50  56.51    .000

   NOTE:  PEAK FLOWS DO NOT INCLUDE BASEFLOWS IF ANY.

---------------------------------------------------------------------------------
100:0012-----------------------------------------------------------------------
*********************************************************************************
*RUN REMAINING DESIGN STORMS (BURLINGTON CHICAGO 5 TO 100-YR)
*
---------------------------------------------------------------------------------
100:0002-----------------------------------------------------------------------
*
---------------------------------------------------------------------------------
100:0002-----------------------------------------------------------------------
*
---------------------------------------------------------------------------------
100:0002-----------------------------------------------------------------------
*
---------------------------------------------------------------------------------
100:0002-----------------------------------------------------------------------
*
---------------------------------------------------------------------------------
100:0002-----------------------------------------------------------------------
*
      FINISH
---------------------------------------------------------------------------------
*********************************************************************************
     WARNINGS / ERRORS / NOTES
     ------------------------
 002:0007 ROUTE RESERVOIR
      *** WARNING: Outflow volume is less than inflow volume.
      *** WARNING: Outflow volume is less than inflow volume.
      *** WARNING: Outflow volume is less than inflow volume.
      *** WARNING: Outflow volume is less than inflow volume.
      *** WARNING: Outflow volume is less than inflow volume.
      *** WARNING: Outflow volume is less than inflow volume.
   Simulation ended on 2019-10-18     at 13:05:13
=================================================================================
```

APPENDIX C

SANITARY DEMAND CALCULATIONS

418 & 422 Guelph Line

City of Burlington
Project No: 45401-100
Date: October 2019
By: RDZ

Sanitary Demand Calculations

Location	Residential				Total Residential			
	Units [5]	Population Density [1]	Population (persons)	Demand [2] (L/s)	Total Demand (L/s)	Total Peaked Demand [3] (L/s)	Total Peaked Demand +Infiltration [4] (L/s)	% of Sewer Capacity for the 1500mm diameter Sanitary Sewer within Burlington St. E
1 Bedroom	131	2	262	0.834	0.834	3.343		
2 Bedroom	35	4	140	0.446	0.446	1.786		
3 Bedroom	4	6	24	0.076	0.076	0.306		
Sub Total	**170**		**426**	**1.356**	**1.356**	**5.436**		
								Sewer Capacity = 3793.24 L/s
Totals			**426**	**1.356**	**1.356**	**5.436**	**5.545**	**0.15%**

Sanitary Demand		
Residential Daily Demands	275	L/ca/day
	0.0032	L/ca/sec
Harmon Peaking Factor	4	
Site Area	0.3817	ha
Infiltration Allowance	0.286	L/s/ha
	0.109	L/s

Note 1: Population Density based on OBC Section 3.1.17.1, Clause 1(b). 2 persons per bedroom.
Note 2: Residential Demand based on Halton Region W/WW Design Manual Section 3.2.2
Note 3: Harmon Peaking Factor PF = $1+ 14/(4 + P^{0.5})$
Note 4: Infiltration allowance from Halton Region W/WW Design Manual Section 3.2.4
Note 5: Unit Count taken from Site plan by KNYMH Architects received October 2019

APPENDIX D

WATER DEMAND CALCULATIONS & ANALYSIS

JACKSON WATERWORKS

Telephone: 905.229.3176
Toll Free: 800.734.5732
email: jww@bellnet.ca
Website: www.jacksonwaterworks.ca

Mr. Kyle Bittman
Valour Capital Management Inc.
3410 South Service Road, Suite G5
Burlington Ontario **L7N 3T2**

21 July 2019

Jackson Waterworks has recently completed fire hydrant flow testing at 418-422 Guelph Line in Burlington.

We define the Test Hydrants as the ones being flowed, and the Base Hydrant as the one where static and residual pressures are recorded. Wherever possible, we inspect the secondary valve for the Test Hydrants to make sure it is in the fully open position. Likewise, we count the number of turns needed to open the Test Hydrants (to make sure it is opening completely).

The secondary valve for the Test Hydrant could not be located for inspection at the time of the test.

Testing was completed in accordance with NFPA 291 guidelines.

There were no irregularities to report.

Trusting this meets with your approval, we are...

Yours truly,



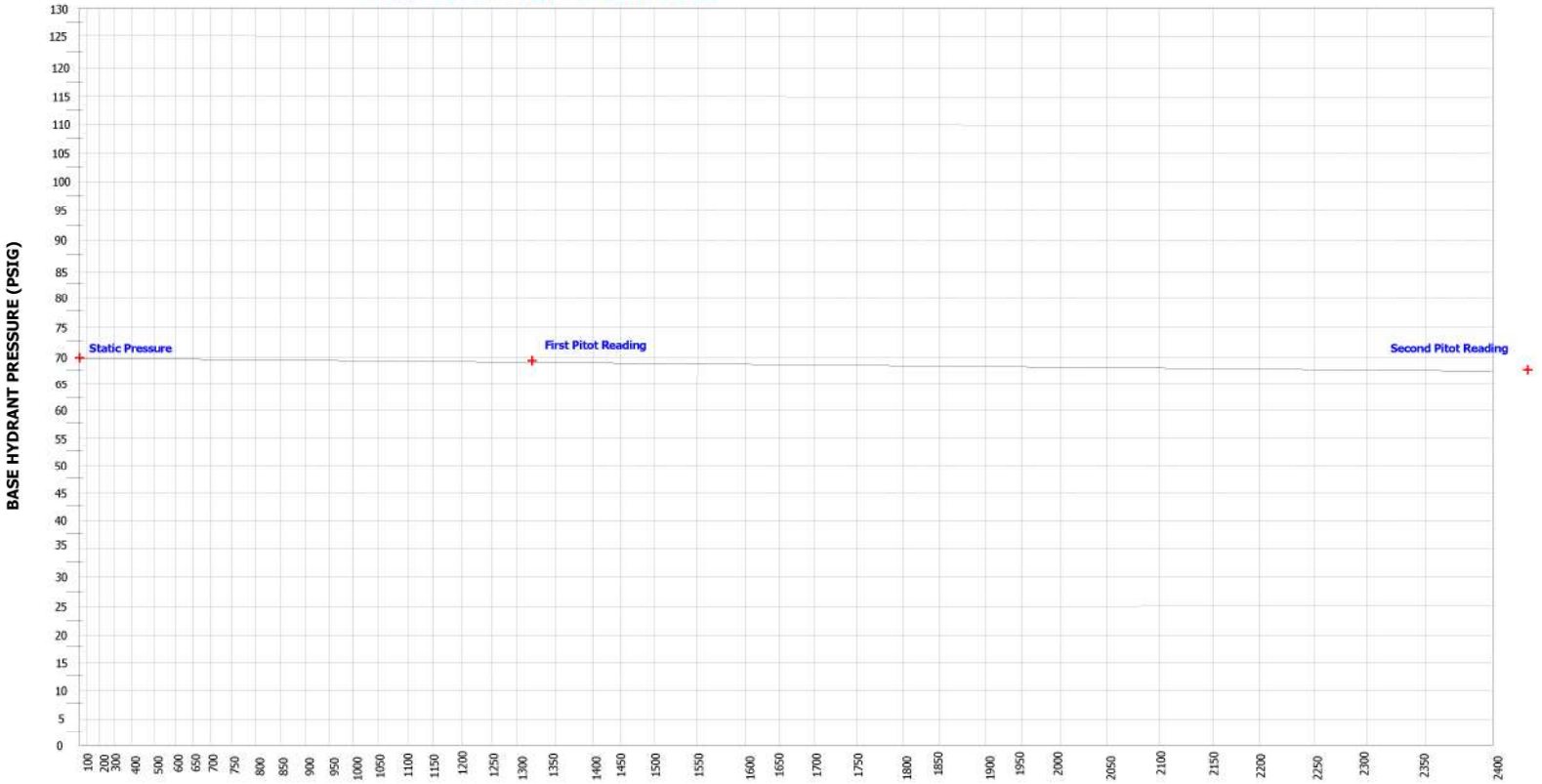
Mark Schmidt
Jackson Waterworks

JACKSON WATERWORKS

Telephone: 905.229.3176
Toll Free: 800.734.5732
email: jww@bellnet.ca
Website: www.jacksonwaterworks.ca

FIRE HYDRANT FLOW TEST RESULTS

TEST #1 of 1



No. of Ports Open	Port Dia. (in)	Pitot Reading (psig)	Pitot Conversion (usgpm) Conversion Factor = 0	Residual Pressure (psig)
1	2.50	62	1321	69
2	2.50	52/52	2420	68
3	2.50			
4	2.50			
THEORETICAL FLOW @ 20psi			10925	

Test Date	18 July 2019
Test Time	08:15am
Pipe Diameter (in)	12
Static Pressure (psig)	70
Secondary Valve Position	Not Located

Site Information

Site Name or Developer Name	Waldemar LP	Engineer/Architect: Valour Capital
Site Address/Municipality	418-422 Guelph Line, Burlington	Test Hydrant Make & Model: Mueller Century
Location of Test Hydrant(s)	Guelph Line, 1st North of New Street	
Location of Base Hydrant	Guelph Line, 1st South of New Street	
Comments	Testing has been completed in accordance with NFPA-291 guidelines wherever and whenever possible and practical. Conversion factors for pitot tube readings may have been used depending on hose nozzle internal design and installation profile. Refer to attached cover letter for additional information.	
Verified By	Mark Schmidt	

7104 Canborough Road, Dunnville, ON N1A 2W1

418 & 422 Guelph Line

City of Burlington
Project No: 45401-100
Date: October 2019
By: RDZ

Peaking Factors[1]:	
Avg. Day	1.0
Max. Day	2.25
Peak Hour	4.0

Water Demand Calculations

	Residential				Final Demand		
Location	Units[5] (ea)	Population Density (2 person/bedroom)[2]	Population (persons)	Demand (L/s)	Avg Day Demand Qavg (L/s)	Max Day Demand Qmax.day (L/s)	Peak Hour Demand[6] Qpeak (L/s)
1 Bedroom	131	2	262	0.834	0.834	1.876	3.336
2 Bedroom	35	4	140	0.446	0.446	1.003	1.782
3 Bedroom	4	6	24	0.076	0.076	0.172	0.306
Sub Total	**170**		**426**	**1.356**	**1.356**	**3.051**	**5.424**
Totals					**1.356**	**3.051**	**5.424**

Water Demand[3]		
Average Residential Daily Demands	275	L/d/person
	0.0032	L/s/person

Fire Flow[4]		
Fire Flow	333	L/s

Max Day + Fire Flow Demand		
Qmax.day+fire	336.38	L/s

Note 1: Peaking factors based on Halton Region Water & Wastewater Linear Design Manual V3.0
Note 2: Population Density based on OBC Section 3.1.17.1, Clause 1(b). 2 persons per bedroom
Note 3: Water Demands based on Halton Region W/WW Design Manual V3.0
Note 4: Fire flows from FUS (1999) - See attached worksheet
Note 5: Information from Site Statistics by KNYMH Design received October 2019
Note 6: Peaking factor for peak hour residential demand = 4.0

418 & 422 Guelph Line

City of Burlington
Project No: 45401-100
Date: October 2019
By: RDZ

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

Fire flow demands for the FUS method is based on information and guidance provided in "Water Supply for Public Protection" (Fire Underwriters Survey, 1999).

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

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

where:

F = the required fire flow in litres per minute
C = coefficient related to the type of construction
= 1.5 for wood frame construction (structure essentially all combustible).
= 1.0 for ordinary construction (brick or other masonry walls, combustible floor and interior)
= 0.8 for non-combustible construction (unprotected metal structural components, masonry or metal walls)
= 0.6 for fire-resistive construction (fully protected frame, floors, roof)
A = Total floor area in square metres

Adjustments to the calculated fire flow can be made based on occupancy, sprinkler protection and exposure to other structures. The table below summarizes the adjustments made to the basic fire flow demand.

			(1)		(2)		(3)		(4)		**Final Adjusted**		
Building	Area "A"	C	Fire Flow "F"		Occupancy		Sprinkler		Exposure		**Fire Flow**		
	(m^2)		(l/min)	(l/s)	%	Adjusted Fire Flow (L/min)	%	Adjustment (L/min)	%	Adjustment (L/min)	**(L/min)**	**Rounded(L/min)**	**(L/s)**
Mix Use Building	14,704	0.8	21,000	350.0	-15	17,850	-40	-7,140	50	8,925	19,635	20,000	**333**

*Total GFA based on correspondence from KNYMH Architects dated October 17, 2019

(2) Occupancy

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

(3) Sprinkler

40% credit for adequately designed system per NFPA 13. Additional 10% if water supply standard for both the system and fire department hose lines.

(4) Exposure

0 to 3m	25%	
3.1 to 10m	20%	Calculate for all
10.1 to 20m	15%	sides. Maximum
20.1 to 30m	10%	charge shall not
30.1 to 45m	5%	exceed 75%

Side	**Distance**	**Exposure**
Left	3.14m	20
Right	36.10m	5
Top	14.12m	15
Bottom	24.10m	10

418 & 422 Guelph Line
City of Burlington
FIRE FLOW ANALYSIS

Project Number: 45401-100
Date: 7/26/2019
Design By: RDZ
File: Q:\45401\100\WTM\45401-100 Water Calcs.xlsx

CALCULATION OF RESIDUAL PRESSURE AT PROPOSED BUILDING

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

	Metric		Imperial		
P0 - Starting Pressure	49.23	*m*	**70**	*psi*	(at Q = 0)
P1 - Pressure at Q1	48.52	*m*	**69**	*psi*	(at Q = 1321 USGPM)
Q1 - From Fire Flow Test	5001	*L/min*	**1321**	*U.S. gal/min*	
Q2 - Required Flow	**20183**	*L/min*	5332	*U.S. gal/min*	***(3.051 l/s Domestic + 333 l/s Fire)***
P-loss 1	0.70	*m*	1	*psi*	
P-loss 2	9.32	*m*	13	*psi*	
P2 - Residual Pressure	**39.91**	***m***	**57**	***psi***	

2. Friction Losses Through Water Service:

Hazen-Williams Equation	Metric		Imperial	
C_{hw} = Pipe Friction Factor	**110**		**110**	
k = conversion factor	10.675		4.727	
n = constant	1.852		1.852	
m = constant	4.8704		4.8704	
Q = Flow	0.336384	m^3/s	5332	*U.S. gal/min*
d = Pipe Diameter	**200**	mm	7.87	in
p = Loss/Length	0.5966	m/m	0.2586	psi/ft
Length	**7**	m	23	ft
Loss	**4.18**	**m**	**5.9**	**psi**
	41	**kPa**		

3. Friction Losses Through Apurtenances:

Apurtenances	Number	K	Velocity *m/s*	Head Loss *m*	Total Loss *m*	Total Loss *psi*
200mm Tee (run)	1	0.280	10.707	1.636	1.636	2.327
200mm Tee (branch)	1	0.840	10.707	4.909	4.909	6.980
Valve - 200mm dia.	2	0.112	10.707	0.654	1.309	1.861
Total Minor Losses					**7.854**	**11.168**

4. Elevation - Elevational differences

	Metric		Imperial	
Elevation at Boundary (connection)	89.18	m	293	ft
Elevation at Building (FFE)	89.40	m	293	ft
Elevation Difference = Loss/Gain	**0.22**	**m**	**0.3**	**psi**

ANALYSIS SUMMARY

Total Losses	**12.250**	**m**		
	120.17	**kPa**	**17.4**	**psi**
Residual Pressure after Losses	**27.66**	**m**		
	271	**kPa**	**39.4**	**psi** **PASS**
Allowabale Residual Pressure	*140*	*kPa*	*20.3*	*psi*

APPENDIX E

CORRESPONDENCE

CITY OF Burlington

DEVELOPMENT APPLICATION PRE-CONSULTATION FORM

Meeting Date: November 21, 2018	**Site Address:** 418 & 422 Guelph Line
Property Owners: 418 Guelph Line - A. McDonagh 422 Guelph Line - M. Bond	**Applicant / Address / Phone / Email** Tony Millington Millington & Associates 3380 South Service Rod. Burlington, ON, L7N 3J5 905-639-3892 millington@allstream.net
Site Area: 0.38 ha	

APPLICATION TYPE (check applicable applications):

Local Official Plan Amendment	x	Zoning By-law Amendment	x	Plan of Subdivision		Parkway Belt Amendment	
Other Application							

1. **Brief description of proposed development:**

   16 storey apartment building with ground floor office

   Access via City bikeway

   180 units, four floors of underground parking

2. **Conformity with Regional Official Plan Designation?** YES **x** NO _____

   Has an application been made to amend the Regional Official Plan: YES _____ NO **x**

3. **Existing Official Plan Designation:** **Neighbourhood Commercial – large scale**

   Conformity with City Official Plan land use designation? YES _____ NO x

   If 'NO' what is the nature of the OP amendment needed? **Mixed Use**

4. **"Grow Bold" Official Plan Designation:** **Secondary Growth Area, Neighbourhood Centre**

5. **Existing Zoning:** **CN1**

   Conformity with existing zoning? YES _____ NO **x**

   If 'NO' what is the nature of the zoning amendment needed? **Height, density, landscaping etc.**

6. **Design Guidelines in effect?** YES __x__ NO _____

Name of Design Guidelines **Tall Building Design Guidelines**

7. **Is the property listed in Municipal Heritage Register, designated under the Ontario Heritage Act or adjacent to a designated property?**

YES _____ NO **x**

8. **Fees Required at Time of Application**

APPLICATION	CITY	REGION	CONSERVATION HALTON	PROVINCE
Official Plan Amendment:	21,119.00	8,215.64	-	-
Rezoning - Base Fee: (70%) Rezoning - Variable Fee:	13,933.50 77,005.00	969.08	-	-
Subdivision - Base Fee: Subdivision - Variable Fee:	-	-	-	-
TOTAL	$112,057.50	$9,184.72	-	-

Separate cheques are payable to City, Region, Conservation Halton and Province (Ministry of Finance.)

9. **Additional Agencies to be contacted:** **Burlington Hydro, TransNorthern PipeLines**

10. **Pre-Submission Neighbourhood Meeting**

Is a pre-submission neighbourhood meeting required?

YES __x__ NO _____

The following steps must be completed if a Pre-Submission Neighbourhood Meeting is required:

- *The neighbourhood meeting is to be organized by the applicant and must be held before the application is submitted.*
- *Circulation of the meeting invitation to residents and tenants within 120 metres of the development site will be completed by the City for a fee. Provide a PDF of the meeting invitation on the applicant's letterhead for distribution. Notice must be sent a minimum of 20 days in advance of the meeting.*
- *Please notify the Ward Councillor, and the Coordinator of Development Review of the date, time and location of the meeting. Be sure your meeting location is accessible and close to the development site.*
- *During the meeting, provide a detailed overview of the development proposal and allow time for questions and comments from the public. Take notes of the discussion.*
- *As part of a complete application, the applicant must provide neighbourhood meeting minutes which include a written summary of public input received at the meeting. As part of the Planning Justification Report, the applicant must explain how this public input was used to modify the development proposal.*

11. **Section 37 Agreement**

Is this an application for increased height and/or density? YES __x__ NO ____

If "YES" a Section 37 Agreement **may be** required.

12. Required Information for Complete Application

Reports, Studies, Plans All identified reports must be submitted in Accessible PDF format with contents as outlined in the Appendix and attached notes before an application is deemed complete.		Number of Paper Copies (plus two in accessible electronic PDF form) If Study is Required	Required Study (Yes/No)
6.1	Planning Justification Report	8	Yes
6.2	Conceptual Site Plan Layout & Site Survey	15	Yes
6.3	Draft Plan of Subdivision	15	No
6.4	Stormwater Management Report	8	Yes
6.5	Functional Servicing Report (Including Water & Wastewater)	9	Yes
6.6	Tree Inventory and Preservation Plan Landscape Concept Plan	9 9	Yes Yes
6.7	Traffic Impact Study	7	Yes
6.8	Top-of-Bank Demarcation	6	No
6.9	Environmental Evaluation Report	7	No
6.10	Noise and/or Vibration Feasibility Study	7	Yes
6.11	Shadow Analysis	3	Yes
6.12	Environmental Site Screening Checklist	5	Yes
6.13	Phase One and Two Environmental Site Assessment/ Record of Site Condition Report (for approval)	5	Yes During Process
6.14	Land Assembly Documents	2	No
6.15	Height Survey of adjacent buildings	2	Yes
6.16	Heritage Impact Statement	3	No
6.17	Archaeological Report	3	No
6.18	Wind Impact Study	3	Yes
6.19	Sensitive Land Use (Risk Assessment) Report	6	No
6.20	Urban Design Advisory Panel Meeting Minutes	4	Yes
6.21	Hydrogeological Assessment	7	No
6.22	Other (specify) Urban Design Brief Grading & Servicing Plans Geotechnical Study including Groundwater Draft Zoning By-law	 5 12 4 2	 Yes Yes Yes Yes

	3D Model of Proposed Building(s)	1	Yes
	Construction & Traffic Management Plan	5	Yes
	Pre-Submission Neighbourhood Meeting Minutes	5	Yes
	Waste Management Report	3	Yes

13. ADDITIONAL REQUIREMENTS: See attached meeting notes & application checklist

NOTES:

1. Notwithstanding the fees noted above, all fees are payable based on the rate in the fee schedule by-law in effect on the date the payment is made. Further fees, such as variable fees may be required at a later date as per the fee schedule by-law.

2. The purpose of this document is to identify the information required to commence processing a complete application as set out in the Planning Act. Pre-consultation does not imply or suggest any decision whatsoever on behalf of City staff or the Corporation of the City of Burlington to either support or refuse the application.

3. This document expires 150 days from the date of signing or at the discretion of the Director of City Building. Please note that development application fees may change during this period and it is the applicant's responsibility to ensure that the correct fees are paid at time of application.

4. The City may require the peer review of a technical report submitted by the applicant. If this is required, the applicant will be advised and will be charged a fee equal to the cost of the peer review.

5. In the event this Pre-consultation Document expires prior to the application being accepted by the City, another document will be required.

6. Application materials submitted without the information identified in this Pre-consultation Document, or without the supporting technical studies prepared in accordance with the direction provided in Appendix 1, the meeting notes, and the Pre-submission checklist attached to this Document, will be returned to the applicant based on insufficient information to properly evaluate the application.

7. Acknowledgement of Public Information:
The applicant acknowledges that the City considers the application forms and all supporting materials, including studies and drawings, filed with any application to be public information and to form part of the public record. With the filing of an application, the applicant consents to the City photocopying and releasing the application and any supporting materials either for its own use in processing the application or at the request of a third party, without further notification to or permission from the applicant. The applicant also hereby states that it has authority to bind its consultants to the terms of this acknowledgement.

8. It may be determined during the review of the application that additional studies or information will be required as a result of issues arising during the processing of the application.

9. The applicant must grant permission for municipal and agency staff to visit and access the property while the application is being processed.

10. There may also be financial requirements arising from the application, including, but not limited to, park dedication, development charges, payment of outstanding property taxes, deferred local improvement charges, costs for lifting 0.3-metre reserves, and reimbursement for road widening acquisition or road improvements.

11. Personal information contained in this form is collected under the authority of the Planning Act, R.S.O. 1990, cP.13, as amended. The information will be used for the purpose of administering the City of Burlington's pre-consultation process on development applications. Questions about this collection can be directed to the Manager of Development Planning, City of Burlington, 426 Brant Street, Burlington, Ontario, L7R 3Z6, 905-335-7600, ex 7638.

12. The applicant requests that the information submitted on this pre-consultation form and associated documents be kept confidential. It is understood; however, that an access request may be filed under the Municipal Freedom of Information and Protection of Privacy Act, and information may be subject to release, notwithstanding the request to keep information confidential.

Staff and Agency Signatures:

Rosalind Minaji	R Minaji	Nov 21, 2018
Planning Staff	Planning Staff (Signature)	Date
Tania Dowhaniuk		Nov. 21, 2018.
Site Engineering Staff	Site Engineering Staff (Signature)	Date
Annette Simpson		Nov 21/18.
Site Engineering Staff	Site Engineering Staff (Signature)	Date
Capital Works Staff	Capital Works Staff (Signature)	Date
Steve Lucas		Nov 21st, 2018
Transportation Staff	Transportation Staff (Signature)	Date
Adam Huycke		Nov 21/18
Regional Staff	Regional Staff (Signature)	Date
John Kisneris		Nov. 21, 2018
Regional Staff	Regional Staff (Signature)	Date
Conservation Halton Staff	Conservation Halton Staff (Signature)	Date

Proponent Signatures:

In signing this agreement, I acknowledge that the drawings, reports and other requirements indicated above must be completed in accordance with the direction in Appendix One and submitted, along with a completed application form, any information or materials required by statute, the required application fees and a copy of this agreement in order for the planning application to be considered complete. In addition, I have read and agreed to the Notes listed above.

Kyle Bittman		Nov 21, 2018
Property Owner ~~c/o~~	Property Owner (Signature)	Date
Millington		Nov. 21/18
Agent	Agent (Signature)	Date

(I have authority to bind the owner)

APPENDIX ONE: REQUIREMENTS FOR REPORTS/STUDIES AND PLANS

6.1 Planning Justification Report
A qualified planner (Registered Professional Planner) must submit a signed report providing planning justification for the proposed amendment in light of the principles, objectives and policies of the City's Official Plan and the technical studies accompanying the application. The goal of the report is to document how the proposed departure from the local policies and regulations represents good planning and is in the public interest. The report must: describe the site context; address applicable provincial and regional policy; describe the proposal in detail including preliminary site plan details if applicable; address applicable local Official Plan policies (e.g. policies relating to compatibility, intensification, redesignation criteria and conversion policies); describe how the proposal meets Council approved Design Guidelines, discuss findings of the technical studies in the context of the Part II Functional Policies of the Official Plan; and other Council policy.

6.2 Conceptual Site Plan Layout & Site Survey
General plan required showing proposed building envelopes, driveways, parking and landscape areas. Survey of site showing PINs, easements, property boundaries etc.

6.3 Draft Plan of Subdivision
The plan of subdivision map is to contain information required under Section 51(17) of the Planning Act, as well as: legend, map scale, boundary of property to be subdivided, north marker, address, registered plan number, lot and concession, date plan prepared and date of any revisions, name of person or firm who prepared the plan, all landowners names, signatures and date, and the Ontario land surveyor's name, signature and date.

6.4 Storm Water Management Report
Required in accordance with Part II, Section 2.11.3 subsections a) & d) of the Official Plan.

6.5 Functional Servicing Report
Required in accordance with Part II, Section 2.11.3 subsection e) of the Burlington Official Plan. Required for all applications in urban areas in accordance with Part III, Sections 87-89 of the Regional Official Plan. Municipal (Urban) Servicing Guidelines are available from the Region of Halton.

6.6 Tree Inventory and Protection Plan
Required when a property under application contains woodlots, tree stands or hedgerows, in accordance with Part II, Section 6.0 of the City's Official Plan and Part IV, Sections 146-147 of the Regional Official Plan. A tree survey must be prepared by a qualified professional, identifying all existing trees, their type, size and condition, those trees proposed to be removed and retained, and the methods to be used to ensure preservation and protection of those trees to be retained.

6.7 Conceptual Landscape Plan:
Required in accordance with Part II, Section 6.0 of the City's Official Plan. The Conceptual Landscape Plan must be prepared by a qualified professional (certified member of the Ontario Association of Landscape Architects), identifying the location and general design intent of the proposed plantings. Minimum required soil volumes must be identified for proposed planting areas."

6.8 Traffic Impact Study
Required for applications as set out in Part II, Subsection 3.2.2 d) of the City's Official Plan and Part IV, Sections 171-173 of the Regional Official Plan. Contact City Transportation Planning staff (City roads) or Regional Public Works staff (Regional roads) for background information and to discuss TIS assumptions. For Regional roads, applicants are referred to the "Guidelines for the Preparation of Traffic Impact Studies". MTO must be contacted for lands near provincial highways

6.9 Top-of-Bank Demarcation
Required for applications on any property containing, or abutting a creek or valley feature, Lake Ontario or Burlington Bay shoreline, in accordance with Part II, Section 9.2.2 subsection b) and Part III, Section 6.4.2, subsections d) and e) of the City's Official Plan. Applicant's surveyor must meet on-site with representatives of the City Capital Works Department and Conservation Halton to survey the top of bank and/or floodline, and this surveyed line shall be incorporated into the applicant's subdivision or site plan. A geotechnical report may be required to identify stable top-of-bank.

6.10 Environmental Evaluation Report
Required for applications as set out in Part II, Section 2.5 of the City's Official Plan, the Regional Official Plan and the Region's Environmental Impact Assessment guidelines. These assessments will be reviewed by the Halton Ecological and Environmental Advisory Committee (EEAC).

6.11 Noise and/or Vibration Feasibility Study
Required for applications as set out in Part II, Section 3.3.2, subsections r), s) and t), and Part II, Section 3.7.2, subsections d), e) and f) of the City's Official Plan, Part IV, Sections 142-143 of the Regional Official Plan, and for all properties abutting arterial roads. In the case of Regional roads, applicants shall refer to the Region's "Noise Attenuation Policy for Regional Roads," dated October 2000.

6.12 Shadow Analysis
Required for all applications where, in the opinion of the City Building Department, the proposal may result in impacts on adjacent properties from sun shadowing, in accordance with Part III, Section 2.5.2, subsection (vii) of the City's Official Plan. Guidelines for this analysis are contained in the City's Site Plan Application Guidelines.

6.13 Environmental Site Screening Checklist
Required for all applications as set out in the "Protocol for Reviewing Development Applications with respect to Contaminated Sites," dated March 2003. Applicants should contact the Region of Halton for historical data and any environmental records.

6.14 Phase One or Two Environmental Site Assessment/Record of Site Condition Report (prepared in accordance with O.Reg. 153/04)
Required to assess site contamination in accordance with Part II, Section 2.4, subsections i) and j) of the City's Official Plan. All requirements of O. Reg. 153/04 must be met for Phase One and Two studies and required Records of Site Condition (RSCs). A letter of reliance from the Environmental Consultant/Qualified Person, confirming the City of Burlington and the Region of Halton can rely on the information contained in the report(s) is required. All reports must be signed by a Qualified Person as defined under O.Reg. 153/04.

6.15 Land Assembly Documents
Required for applications where, in the opinion of the City Building Department, the assembly of additional lands is required to facilitate orderly development of the area. Applicants are required to submit documentation demonstrating that a reasonable, bona fide offer has been made to acquire such lands.

6.16 Height Survey of adjacent buildings
Required for all residential infill and intensification rezoning applications, in accordance with City Council policy. A surveyor's report must identify the highest points of the existing adjoining roofs measured from the existing average grade of the shared property line.

6.17 Heritage Impact Statement
Required as determined by Planning staff for any property designated pursuant to the Ontario Heritage Act, identified on the City's Inventory of Heritage Resources, or for any property located adjacent to a designated or otherwise inventoried property.

6.18 Archaeological Report
Required for all applications in or near areas of archaeological potential, as determined by the Region of Halton. Reports must be completed in accordance with Provincial requirements and the Regional Archaeological Master Plan.

6.19 Wind Impact Study
May be required, as determined by Planning staff, for any building over 6 storeys in height. The report will provide information related to wind comfort conditions for pedestrians both on and around the development.

6.20 Sensitive Land Use (Risk Assessment) Report
Required for applications proposing sensitive land uses in proximity to existing industrial uses, or proposing industrial uses in proximity to existing sensitive uses, in accordance with Part II, Section 2.7.3 subsections n) & o) and Part II, Section 4.3 subsection d) of the City's Official Plan, Part IV, Sections 146-147 of the Regional Official Plan, and the Ministry of the Environment D-6 series guidelines.

6.20 Agricultural Impact Assessment Report
Required for applications as set out in Part II, Subsection 13.3 e) of the City's Official Plan and for certain proposals in certain designations in the Regional Official Plan. Guidelines for these assessments are available from the Region of Halton, and these assessments will be reviewed by the Halton Agricultural Advisory Committee (HAAC).

6.21 Burlington Urban Design Advisory Panel Meeting Minutes
The Burlington Urban Design Advisory Panel (BUD) is an independent advisory body comprised of design professionals that provides urban design advice to the City Building Department on all tall and mid rise buildings (5 storeys or greater) and all public development projects. Advice from BUD will be integrated early in the review process to reinforce the City's expectation for a high standard of design excellence resulting in a more efficient and effective municipal development review. A copy of BUD meeting minutes must be submitted with the application along with a Design Brief explaining how their advice has been incorporated into the development proposal.

6.22 Hydrogeological Assessment
Required for all applications in areas subject to private water and septic services, as set out in Part IV, Subsection 2.1.3 b) and Part IV, Subsection 3.3 d) of the City's Official Plan, the Regional Official Plan and the Region's "Guidelines for Hydrogeological Studies and Standards for Private Services, revised June 2000. Applicants should contact the Halton Health Department for more details regarding site-specific studies, which must be approved by the Region following a peer review.

6.23 Other Any other studies as determined to be necessary to facilitate proper consideration of the application.

Preconsultation Meeting Notes

418 & 422 Guelph Line - November 21, 2018

Attendees:

Rosalind Minaji, Annette Simpson, Tania Dowhaniuk, Steve Lucas, Rob Peachey -City of Burlington
Brian Hudson, John Kisneris, Adam Huycke – Region of Halton
Tony Millington – Millington & Associates
Kyle Bittman – Valor Capital
Ang Cutaia –ACIII Group
Shem Myszkowski – KNYMH Architects

Description of Development Concept:

- 16 storey apartment with 180 units
- Amenity space on ground floor
- four floors of underground parking
- 293 spaces proposed - reduction

Planning Comments:

Current Official Plan

- The property is currently designated as Large Scale Neighbourhood Commercial. This designation applies to sites within and at the periphery of residential neighbourhoods, and is intended to provide for their day to day and weekly shopping needs.
- Large scale neighbourhood commercial areas can consist of several properties and will have a site area of up to 5ha and a maximum building area of 12,500m^2.
- Within the Neighbourhood Commercial designation, residential uses may be permitted on the second and third storeys of retail commercial buildings.

Current Zoning

- The existing zoning is CN1 (Large Scale Neighbourhood Commercial) which permits a range of retail and service commercial, entertainment, office, recreational and automotive uses, as well as residential uses on the second or third storey of a retail building.
- The maximum building height is 3 storeys up to 12m.

Council Adopted New Official Plan

- The adopted Official Plan – Grow Bold identifies this site as "Mixed Use Nodes and Intensification Corridors" in the Urban Structure Section 2.3.1
- Mixed Use Nodes and Intensification Corridors will be a focus of re-urbanization. Development will be guided by the underlying land use designations of the Official Plan. These areas are intended to support the frequent transit corridors and provide focal points of activity and a vibrant pedestian environment.
- The Growth Framework of the new Official Plan communicates the relative priority, degree, type and location of growth among the four Growth Framework areas. This site has been designated as a Secondary Growth Area – which is recognised as a distinct area accomodating growth in accordance with the permissions and densities of the underlying land use designations of the Plan. Secondary Growth areas are expected to transition over time, but will not result in the significant relocation of planned growth outside of the Primary Growth Areas.
- The underlying designation of the subject property is: "Neighbourhood Centre"
- Lands designated as "neighbourhood centre' are intended to provide for the day to day and weekly goods and service needs of residents within the neighbourhood and residential surroundings.
- Any proposed redevelopment of a Neighbourhood Centre site shall retain the planned commercial function of the site. The ground floor of buildings fronting an Urban Avenue (such as Guelph Line) shall consist of retail or service commercial uses and may also contain a limited amount of office uses.

- A maximum floor area ratio of 2.5:1 and maximum building height of six storeys applies to Neighbourhood Centres. To ensure compatibility with adjacent residential areas, the maximum six storey height may not be permitted on sites which are small in size, or have insufficient depth.
- Taller buildings of up to 11 storeys may be permitted, subject to the provision of a significant reduction of parking at grade, and the submission of an urban design brief which demonstrates how the design mitigates for the impact of increased height on public sidewalks, open spaces and adjacent uses.
- Part 7.3.2(1) of the new Official Plan provides urban design policies for development in Secondary Growth Areas. These policies provide direction for the integration of parking areas, appropriate screening, landscape buffering and provision of pedestrian comfort and human scale at the street level, enhancement of the public realm, limiting impacts of sun shadow and wind impacts on the streetscape and on neighbouring properties, etc.
- Section 7.2 contains design policies for the public realm, and Section 7.4 contains policies relating to sustainable design.
- Policies in Section 12.1.1(3)i) provide criteria that must be met for Official Plan Amendments, while policies in Section 12.1.2(2) c) provide criteria for all development applications.

Preliminary Review of Redevelopment Concept:

- The draft new Official Plan policies represent the Planning Department's current position on the most appropriate form of redevelopment in the Neighbourhood Centre designations. Additional height and density will not be supported.
- The proposed 16 storey height will not be supported on this site. The City will consider additional height of between six and twelve storeys subject to a reduction in surface parking and a review of the building design and its relation to the streetscape and the adjacent bikeway.
- The proposed building also represents a major increase in permitted density. The estimated FAR of 6.3:1 greatly exceeds the maximum range of 2.5:1 for the Neighbourhood Centre designation.
- Retail uses are required at grade abutting Guelph Line. An office component can be included, but the planned retail function of this area must be retained. The proposed ground floor amenity space should be replaced with retail uses.
- The proposed design does not consider the pedestrian realm along Guelph Line or the bikeway. Landscape buffers, retention of existing trees and terracing of the building above the podium should be enhanced.
- The City does not support the use of City owned property (Centennial Bikeway) for vehicular access. No driveways will be permitted to access the bikeway or associated parking area. Pedestrian connections are permitted.
- Underground parking areas should be setback from the edges of the site to ensure that trees can be planted and retained around the perimeter of the property even during future maintenance of the parking membrane.
- $25m^2$ of amenity area is required per bedroom. Consider ground level amenity as well as rooftop, interior and balcony spaces to meet this requirement.
- Please consider assembly of the surrounding properties to consolidate the SW corner of New Street and Guelph Line into a comprehensive redevelopment.
- Buildings of 12 storeys or more must conform to Burlington's Tall Building Design Guidelines. A maximum floor plate of $750m^2$ and a tower separation distance of 25 m are required.

Application Requirements

- An Official Plan Amendment and a Rezoning application are required to the current Neighbourhood Commercial designation in order increase the permitted height and density.
- Prior to submitting the application, a Pre-Submission Neighbourhood Meeting is required:
    - The neighbourhood meeting is to be organized by the applicant and must be held before the application is submitted. Please try to avoid holding meetings in December.
    - Circulation of the meeting invitation to residents and tenants within 120 metres of the development site will be completed by the City for a fee. Provide a PDF of the meeting invitation on the applicant's letterhead for distribution. Notice must be sent a minimum of 20 days in advance of the meeting.

- Please notify the Ward Councillor, and the Coordinator of Development Review of the date, time and location of the meeting. Be sure your meeting location is accessible and close to the development site.
- During the meeting, provide a detailed overview of the development proposal and allow time for questions and comments from the public. Take notes of the discussion.
- As part of a complete application, the applicant must provide neighbourhood meeting minutes which include a written summary of public input received at the meeting. As part of the Planning Justification Report, the applicant must explain how this public input was used to modify the development proposal.

- Prior to submitting the application, consultation with the Burlington Urban Design Panel will be required. An Urban Design Brief will be required to explain how the City's Design Guidelines have been addressed and how the comments of BUD have been taken into account. A copy of the BUD meeting minutes must be submitted with the application. BUD Terms of Reference provided.
- A Planning Justification Report is required:
  - to discuss the impact of Provincial, Regional and local planning policy (both the existing and adopted Grow Bold Official Plan) on the proposed development;
  - to explain why the requested change to higher intensity and taller residential use is desirable and represents good planning;
  - to discuss how the results of required technical studies have been used to refine the redevelopment proposal;
  - to explain how input received at the pre-submission neighbourhood meeting and by the BUD Committee has been used to refine the proposal; and
  - to explain how the proposed development is compatible with surrounding land uses including height, setbacks, massing, design and community features.
- Sun shadowing and height survey will be required. An angular plane should show how terracing can address pedestrian comfort.
- A wind study is required to address ground level wind conditions.
- A 3D model of the proposed building is required with the submission to assist with public engagement. Model specifications provided.
- Consult with Burlington Hydro about electrical supply and requirements.
- Consult with TransCanada PipeLines about any setback requirements to the abutting Right of Way.
- Section 37 Benefits will likely be required.
- Please consider sustainable building design in your proposed development, using the City's Sustainable Building and Development Guidelines. An introductory letter from the Burlington Sustainable Development Committee is provided.

Region of Halton Planning Comments:

2009 ROP:

- Designation: Urban Area, Built Boundary. The subject lands are not located within an ROP identified/mapped Intensification Area. New Intensification areas may be subject to an Area Specific Plan.
- Regional Road: Lands are not located adjacent to Regional Road.
- TIS: Regional TIS not required (Local TIS should be circulated to the Region for Information Purposes Only)
- Regional Noise & Air Quality: Not required
- Regional Natural Heritage System: Lands are not located within or adjacent to Key Features forming part of the RNHS.
- Archaeological Potential – Assessment of the subject lands is not required as these lands were previously disturbed.
- Site Contamination: ESSQ. – Phase 1 ESA & Phase 2 ESA (to O.Reg 153/04 standards and with a Letter of Reliance) at the time of initial application (Phase 2 is required as a result of the proposed change in land use to a more sensitive land use). Please refer to the City of Burlington's comments.
- NOTE: a Record of Site Condition is required to facilitate this proposed change in land use.

- Land Use Compatibility: N/A

Waste Management

- A Waste Management Plan is required to address waste collection on-site
- Please reference the Region's Development Design Guidelines for Source Separation of Solid Waste for site design requirements/dimensions

Submission Requirements:

- All submission materials on a USB/CD
- Applicable Regional Fees
- Complete Application forms
- Planning Justification Report
- Functional Servicing report & Existing Services Plan
- Traffic Impact Study should be circulated to the Region for information
- ESSQ & Phase 1 & Phase 2 ESA (to O.Reg 153/04 standards and with a Letter of Reliance)
- Waste Management Plan

Region of Halton Servicing Comments:

- A Halton Region watermain exists within Guelph Line adjacent to the proposed development. Trunk watermains exist within Guelph Line and within the City of Burlington linear parkland immediately adjacent to the south of the property.
- A Halton Region wastewater main exists within Guelph Line adjacent to the proposed development. The Region's major trunk wastewater main is located within the City of Burlington linear parkland immediately adjacent to the south of the property.
- The developer should undertake to locate the size and location of all watermains, water services, water meters, wastewater mains (sanitary sewers), wastewater (sanitary) services, stormwater mains and stormwater services that exist within the road right-of-ways, to the property and within the property and place them on an Existing Site Servicing Plan drawings within their reports. Public and private utility companies can be utilized for this purpose.
- A Functional Servicing Report is required to be prepared by the developer's civil engineering consultant (watermains, water services, fire hydrants, sanitary sewer mains, sanitary sewer services, stormwater mains and stormwater services) to show options for how the property is proposed to be serviced according to City of Burlington and Halton Region standards. Local watermain and wastewater main (sanitary sewer) hydraulic analysis should be completed by the developer's consultant as well for the local sewers and the drainage area down the to the nearest trunk sewer. The consultant should include details about other developments properties in the drainage area in their analysis of the local sewers (if any). The report should speak to the number/type of units proposed and the phasing of the development with respect to the impacts on the Region's water distribution system and wastewater collection system. Phasing, timing of the development, and required/available capacity shall be detailed in the report. The consultant will include details about potential external main upsizing or main extensions to accommodate the development, etc.
- The FSR report should incorporate Fire Flow Rate Testing. The proponent should undertake fireflow rate testing of representative Regional fire hydrants in the area, with the proponent's fireflow contractor and Region forces present. Include within the Report a copy of the fireflow rate testing results, and the Fire Underwriters Survey (FUS) requirements for the development. This information will help to assist in informing the watermain design and watermain hydraulic modelling analysis that is being undertaken by the proponent's consultants.
- Further to the formal hydraulic analysis requirement, the developer's consultant can utilize the Region's current water and wastewater models (if required). The developer's civil consulting engineering firm will be required to enter into a Data License Agreement prior to obtaining any digital information from the Region.
- The FSR should include information related to all other Utilities infrastructure in the area and potential conflicts.

- The FSR should show the existing site services and note how they are proposed to be decommissioned to make way for the development.
- The developer must physically locate the trunk watermain, major trunk wastewater main and private Utility pipelines within the City of Burlington linear parkland immediately adjacent to the south of the property. The developer's Professional Engineer that is preparing the FSR must consult with the Region regarding the proximity of the proposed development to the trunk mains, and the Region's approved set-back of the development from the trunk mains. There shall be not impact from the development on the Region's trunk mains. The Engineer shall prepare at least three cross-section engineering drawings along the south portion of the property and the City's linear parkland, for discussion with the Region. Proposed footings, foundation walls, overhangs, excavation, shoring, tie-backs, municipal mains and utilities will require to be detailed for review by the Region. Cross sections should extend to the oil pipeline. Consult with TransNorthern PipeLines for any additional cross section requirements.
- The developer shall provide the Region with any required permanent water and wastewater easements that the Region may require for the area around the Region's infrastructure.
- New development must be on the basis of full municipal services.
- The developer should be aware of the Region's Multi-Unit Servicing Policy with respect to the number and location of water meters.
- Regional policies state that water and sanitary services cannot cross lot lines, the owner will ensure this throughout the process. Each lot must be independently serviced if it is proposed to be a separate lot.
- Any major servicing works required for this project would fall under the Regional Servicing Agreement process, including securities, Agreement registration, developer's liability insurance and the payment of Agreement fees.
- Servicing of a standard nature is required to go through the Regional Services Permit process.
- The size and scope of, utility trench and road cut, road restoration shall be to the satisfaction of the City of Burlington for local roads.
- Watermain and wastewater main (sanitary) servicing capacity is not guaranteed at the LOPA and ReZoning stage. Servicing of development in the Burlington area of Halton Region is on a first-come-first-serve basis. The owner can pre-consult about servicing capacity with the Region at any time in the future going forward. This current development proposal capacity will be reviewed closely and commented upon at the time of Planning application receipt. Should a servicing capacity issue be identified at that time then it will have to be dealt with, working through it with the Region. Servicing capacity is deemed to be in hand at the issuance of a Regional Servicing Agreement, Special Financial Agreement, and Regional Services Permit, which is reviewed and obtained toward the end of the City's Site Plan approval process, or Regional Servicing Agreement.
- The Region has initiated a Burlington Water Servicing Strategy Review and it is forecast to be completed this year. Please feel free to contact the Region at any time regarding the status of the review.
- As always, acquiring land for development purposes and hiring consultants, at this time, is at the risk of the developer.
- Any water services and sanitary services that currently exist to the property that will not be utilized for any reason will be required to be disconnected right at the respective main by the developer.
- The developer's site servicing consultant can preconsult with the Region at any time regarding their proposed draft site servicing water design, wastewater design and identified utility conflicts (including storm).
- The Region would like to receive confirmation in writing when any required formal land assembly has taken place at the LOPA and ReZoning stage in order for servicing to conform with Regional Policies, that water and wastewater services do not and will not cross lot lines for different property owners.
- The developer should prepare a Solid Waste Management Plan to the satisfaction of the Region. The Plan shall have regard for the Region's Solid Waste Management Guidelines. The Solid Waste Management Guidelines are available on-line at http://www.halton.ca , Regional Official Plan (ROP) Guidelines, Development Design Guidelines for Source Separation of Solid Waste.
- The developer will inform the City, and the Region, whether they will be submitting a Site Plan application at the same time as the LOPA and ReZoning applications for timing purposes and issues identification and resolution purposes.

Capital Works (Parks) Comments:

- Adequate parkland is available to accommodate this development as Centennial Multi Use Trail, is located immediately adjacent to the site and Central Park is located within the 0.8km – 2.4km distance for a city/community park. As such we recommend cash-in-lieu of parkland dedication be applied for this development.
- Trees - Requirements regarding trees are noted under Urban Forestry below.
- The proposed vegetative buffer along the south side of the development is insufficient. A minimum 3 meter buffer is required.
- The pedestrian pathway located in the south east corner is not required as connection is achieved with the existing sidewalk system. Please consider a pathway connection to City lands in the south west quadrant of the site.

Site Engineering Comments:

- TransNorthern Pipeline is located in the Centennial Bike Path property, they will need to be circulated, and very likely a permit will be required; there are strict requirements when working adjacent to pipelines.
- We ask that the applicant pre-consult with Burlington Hydro regarding servicing requirements, there is a hydro pole near the central north property line (will it be removed?), and hydro lines on the municipal property to the south, there may be minimum setbacks required, we would defer to Hydro to confirm. Please also note that all proposed hydro servicing for the development should be underground
- Guelph Line is a City of Burlington owned Road, the deemed Right of Way is 24m, the actual width varies but is a minimum of 24m, no widening would be required
- The Centennial Bike path is to the south of the property, owned by the City of Burlington, our Parks & Open Space group may have requirements regarding pedestrian connections, buffer vegetation, etc.
- There is existing streetscaping (red banding) on Guelph Line, would need to be incorporated into project, enhanced street scaping (different from what exists today) may be required on Guelph Line
- No CH or floodplain, according to our GIS mapping
- There is a significant grade change between the north property line and the south property line; we will be looking closely at the grading drawing to see how it is dealt with. i.e. if retaining walls are needed please show on the drawing.

Comments on SP1 drawing:

  - Are the two amenity spaces on the ground floor amenity for residents or commercial/retail/restaurant uses? If the latter than pedestrian connections to Guelph Line sidewalk is required.
  - At the rear where it says "driveway drive under" is that a vehicle drive through between the stairs and the vestibule lobby? If so, could the proposed vestibule lobby be reduced in size to allow for a sidewalk drop off area with one set of doors at the front not two at the sides, enough room for min. 1.8m sidewalk and room for benches on either side of the door for people waiting for rides
  - Would the ground level barrier free parking spaces be better suited on the west side of the stairs with access to a sidewalk to the rear vestibule entrance? We defer to our Accessibility Coordinator for sizing but typically they are either 4.75m (2.75m parking + 2.0m walkway) or 5.4m (3.4m parking + 2.0m walkway), where they are shown now on the ground floor do not meet either min. dimension.
  - The intake vent cannot be located in a walkway, please ensure there are no conflicts with vents and walkways
  - Is it possible to have a drop off layby at the south lobby entrance, there looks like there is space?
  - Is there any outdoor amenity space for the residents either at ground level or on a rooftop?
  - Provide turning templates on the drawing to ensure vehicles can make the corner into the underground parking and around the drop off at the back lobby entrance

- Underground Level 1 – provide dimension of the barrier free parking spaces and walkway, including dimension from the columns to the wall of the elevator lobby to confirm accessibility. Is there room for bike parking at the SE corner between Tandem 11 and the main electrical room

- Underground Level 2-3 and 4, assuming additional barrier free parking spaces are required, they should be in the same location as the ones on underground level 1, with clear access to the elevator lobby
- Second Floor and 3 to 12 floors – no balconies for units (except for two small ones on east side for suites 11 & 13?
- 13th – 16th floors – not all units have terraces?
- Please considered consider vehicle charging station for the at-grade and underground parking garage, or duct work for future installation.
- Please consider incorporating bike racks at the street level for retail/residential visitor and in parking garage for residents.
- Considering the adjacent buildings are very close to the property line and excavation area for underground parking, we will require a precondition survey of area buildings prior to start of excavation and vibration monitoring for the duration of construction.
- Record of Site Condition is mandatory as it is change of use from commercial to residential, we will require copies of all reports supporting the RSC (Phase 1 & Phase 2 ESA, etc.). To make the application complete we will require BOTH a Phase One ESA AND a Phase Two ESA, both completed in accordance with O. Reg. 153/04 including a letter of Reliance confirming the City (and Region) may rely on the information provided in the reports. IN ADDITION, if the Phase Two ESA indicates remedial works are required, a summary of those works is required, i.e. excavated material must be disposed of at a licensed facility (or not), and if groundwater is contaminated, how will it be outlet, i.e. does it meets municipal requirements for outlet to storm, or does it has to be treated/filtered prior to outlet to the municipal storm system or does it have to outlet to regional sanitary system? Please ensure that test results of the groundwater is included in the report and shared with the civil engineer. Please be advised that if the reports are not in accordance with O. Reg. 153/04, and a summary of remedial works is not included in the application the application will be deemed incomplete.

Stormwater Management Report :

- Umar Malik has provided the following SWM criteria:
  - Enhanced Quality Control achieving 80% Total Suspended Solids Removal. We ask that a treatment train approach be considered, to incorporate Low Impact Development techniques. OGS may only be credited at 50%.
  - Quantity Control -Post development flow to meet Pre development flows by providing onsite storage for all storms up to and including 100 year storm.
  - Erosion control – not applicable
  - External Flows – engineer to confirm any external flows entering the site under the existing conditions. All identified external flows must be routed safely under the developed conditions without causing any flooding or ponding
- Existing infrastructure – a 450mm diameter storm sewer runs along Guelph Line with a manhole structure in the City's ROW close to the end of the proposed development parcel.
- Drainage Patterns – existing drainage directions and patterns should be maintained.
  - Provide storage details and location
  - Report to include full size stamped/signed servicing & grading plan (can be labeled preliminary)
  - For landscape areas over top of underground parking a runoff coefficient of 0.9 is to be used
  - Sewer pipes cannot be located under buildings.
  - Confirm if there is permanent dewatering required for underground parking and incorporate into design, i.e. provide an estimate of the volume of water to be accommodated in the site stormwater management and identify how it would be outletted, i.e. is it clean enough to outlet to the storm sewer? Civil Engineer to consult with Environmental Engineer and Geotechnical Engineer in this regard. Is a permit to take water required?
  - Please note that there should be no surface ponding in accessible parking spaces, and no surface ponding in a 5 year storm.
  - Please clearly show the overland flow route for this address and neighbouring properties to ensure existing drainage patterns are maintained.

- Quantity controls must use an orifice tube (not plates).
- Need to confirm capacity of receiving system
- Need to confirm condition of receiving system (i.e. video inspection)
- Rooftop storage will not count towards the stormwater storage requirements (although allowed for other purposes, i.e. grey water for flushing toilets, irrigation for landscaping, etc.)
- Control structures and their location with cross sectional details
- It's important to determine storage requirements as we need to ensure any tanks in the underground parking are sized correctly at the RZ/OPA stage to avoid having to use up parking spaces later on for an increase in tank size.
- If you have any questions regarding stormwater management criteria please contact us, we are happy to proconsult with the Civil Engineer if they have any questions, (umar.malik@burlington.ca or annette.simpson@burlington.ca)
- We encourage Low Impact Development Stormwater Management techniques, such as rainwater harvesting for irrigation, use of treatment train approach of quality control by using bio and infiltration swales, etc., currently we look to the CVC/TRCA LID guidelines and/or in the future MOECC guidelines.

- Geotechnical Report required – due to the underground parking, the geotechnical engineer needs to assess the groundwater conditions, is temporary dewatering during construction required? Is permanent dewatering required, if so what is the estimated volume that the stormwater management for the site will have to accommodate? Is a permit to take water anticipated to be required for either temporary works or permanently? Alternatively, if a "bathtub" approach to the underground parking is proposed, the geotechnical report will need to provide comment. The geotechnical report would also in address/support of any LID techniques that may be implemented, i.e. infiltration. Please also ensure the geotechnical engineer consults with the environmental engineer to see if there are any concerns with outletting intercepted groundwater into the municipal storm system. I.e. does the groundwater meet storm sewer water criteria? If there is any contamination in the groundwater it may need to be outlet to a sanitary sewer or treated/filtered prior to outlet to storm sewer.
- Detailed Grading and servicing plans, also including:
  - Bordering city trees to be shown on drawing and boundary trees over 100mm in diameter within 3m of the property line), indicate which trees are proposed to be removed.
  - Concept landscape plan (separate plan),
  - Pedestrian connections to Guelph Line
  - Need to include grades on adjacent properties enough to determine existing drainage patterns. The properties look to generally slope north to south, will clearly need to show on the grading plan how drainage will be contained in the development, and not cut off surrounding properties drainage.
  - 100 year storm elevation
  - We would strongly encourage the Applicant's Civil Engineer to daylight the area of the proposed service connections to accurately locate the existing infrastructure (sewers, water, bell, hydro, cable, etc.) and determine inverts before completing detailed design work. This will be a requirement before Site Plan approval (if application proceeds)
  - Although a site plan issue, we need to ensure there is room for snow storage. Our strong preference is to have snow stored on a landscaped (grass) area and then intercepted by catchbasins, this would allow for pretreatment of salty/sandy snow prior to entering the storm system.
  - Another site plan issue, however we ask that the architect and other consultants consider placement of utility meters/piping/vaults/etc. please ensure they do not block walkways or be placed near the main entrances or in the way of barrier free routes, to ensure there is enough room at the design stage of the building.

- Utility furniture (meters, pedestals, boxes, etc.) for private developments cannot be located within the municipal right of way.
- Details of underground parking limits – all elements of the underground parking structure (i.e. walls, foundation drains, shoring, etc.) are required to be within the limits of the subject property

- **Construction and Traffic Management Plan** – please see attached check list for details on requirements to be included on the plan.
- **Noise Feasibility Study – as** per NPC-300, applicant's consultant to use capacity volume of New Street and Guelph Line for STAMSON calculations.
  - Applicant's consultant to also consider the building as a stationary source and detail any mitigation measures required to prevent noise nuisance on adjacent residential. For the development itself and need to see if there are any negative impacts on existing surrounding residential (due to rooftop mechanical, underground parking fans/vents/etc.).
  - Please also consider nearby existing and proposed buildings as potential stationary sources of noise.
  - Please have the noise engineer consult with the architect and structural engineer as to the optimal placement of vents and fans for the underground parking
  - Please advise the noise consultant that reflective surface should be used in Stamson calculations
  - Please also advise the noise consultant that although NPC-300 tables indicate 60dBA in the OLA with warning clauses, it is not acceptable to the City, we request that all possible measures be taken to control the noise in the OLA to 55dBA or less, if not feasible, then we request calculations to confirm what levels could be achieved, i.e. 60dBA would require a 3m noise barrier, 59 a 3.5m, 58dBA a 4.0m, etc. all the way to 55dBA.
  - All STAMSON (or alternate program) calculations should be included in the report
  - Copies of correspondence from the City of Burlington confirming traffic counts/capacity must be included in the brief.
  - Site plan to be included in the report
  - Key plan showing points of reception to be included & a chart referencing the key plan, detailing the estimated noise levels, allowable levels, and mitigated noise levels
  - Area context plan to be included showing potential sources of noise
- Summary for RZ/OPA:
  - Stormwater Management Report
  - Detailed Servicing, Grading & Drainage drawings
  - Construction Management Plan
  - Noise Feasibility Study
  - Geotechnical Report – with groundwater data, volume/flow estimate and chemical analysis
  - Record of Site Condition - Phase One ESA and Phase Two ESA, both in accordance with O. Reg. 153/04 to make the application complete, and if indicated in the Phase Two ESA as summary of remedial works required.
  - Letter of Reliance for ESAs
  - Tree inventory report, including preservation (and removal) plan
- At the Site plan stage will also need:
  - Erosion control plan
  - Construction Management Plan – more detail than the plan for the RZ/OPA- show trades parking, truck staging, sanitary facilities, site trailer, material storage, crane location, hoarding, etc. No trade's parking will be allowed on City streets. No Truck Staging will be allowed on City streets, unless permission/permit is obtained from Transportation. After hours emergency number to be posted on front gate.
  - Utility coordination plan, please no meters/valves/piping/vaults at the front of the building or near main entrances or blocking/encroaching into walkways or accessible routes.
  - Landscape plans – enhanced street-scaping (including lighting) may be required.

- Clearly show pedestrian connections
- Lighting/Photometrics details/drawing, as per City of Burlington Accessibility Design Standards and City of Burlington Outdoor Lighting Guidelines, available on our website
- Snow storage – preferred on a soft surface, i.e. grass, as a pretreatment for quality control.
- Precondition survey of surrounding properties as well as vibration monitoring during construction will be required.
- Mechanical Engineer will need to confirm that they have reviewed the SWM and have designed the internal pipes accordingly.
- Applicant is advised that a new Standard is in effect as of July 12, 2017, S-114-B, requiring any disturbance to the municipally owned ROW asphalt to be restored curb to curb for the entire frontage(s) of the property, it may also mean that a City contractor will complete the works, and the costs borne by the Applicant

Urban Forestry Comments:

Existing Trees

- A Tree Inventory and Preservation Plan is required for all existing trees greater than 10cm DBH on site and on adjacent properties within 3m of the property lines for the OPA/Rezoning application. See the City of Burlington: Pre-Submission Checklist for requirements.
- 418 Guelph Line contains existing trees that should be evaluated for retention. The city does not have a set requirement for replanting on private property, but the Official Plan, Strategic Plan, Urban Forest Management Plan, Site Plan Application Guidelines, Public Tree Bylaw, and our Corporate Public Tree Management Policy serve to inform best practices regarding tree replacement on private sites. These documents refer to a 1:1 caliper replacement, meaning that each caliper removed should be replaced, as determined by the 'aggregate caliper ratio'. Consider the number of replacement trees based on the number of trees proposed to be removed in the Tree Inventory and Replacement Plan.
- The existing trees along the Centennial Bikeway to the south of 418 Guelph Line are city trees. Removal of city trees will require council approval and compensation, to be determined by the Manager of Urban Forestry or delegate. A Tree Permit, including fees and securities will be required.
- Removal or damage to trees on neighbouring properties within 3.0m of the property line and boundary trees (which are protected under the Provincial Forestry Act (RSO 1990) Section 10) will require:
    - The adjacent property owner(s) shall be consulted and made aware of the proposed development and potential impacts to their tree(s) and boundary trees and requested to submit in writing that there are no concerns with proposed treatment of the existing tree(s).

    OR

    - A qualified professional (as defined in the City of Burlington's Pre-submission Checklist) shall be retained to address the potential impacts on the neighbor's trees and/or boundary trees and provide a letter or report confirming in their opinion regarding impacts to the boundary trees from proposed construction. The arborist letter or report shall also include the preservation methods, including pruning and fertilizing, that can be implemented by the owner in order to ensure the health of neighbor's tree and/or boundary trees along mutual lot lines.
- A qualified professional (as defined in the City of Burlington's Pre-submission Checklist) may be required to be retained to address potential impact on the existing trees on site and boundary trees during excavation operations to ensure no damage to the protected trees or their root systems. Requirement to be determined at the Site Plan stage.
- Please do not remove any trees from the site until after the Official Plan Amendment/Rezoning has been approved.

Landscape

- A Landscape Concept Plan will be required, showing what is proposed for landscaped areas, landscape buffers and amenity areas. See the Pre-Submission Checklist for requirements.
- Consider additional landscape buffers to the west and south of the site.
- The Site Plan shows two barrier free parking spaces, one is 4425mm and the other is 4000mm.

- Some clarifications is required about the following on the Site Plan:
    - Trees are shown planted in the parking islands, with the building above.
    - The loading located across the driveway.
    - There is no turning radius to get from the driveway hammer head to the ramp down to the underground parking.
    - There is a note saying "Driveway Drive under" adjacent to the vestibule lobby.
    - There are two amenity spaces labeled. Should these be office/commercial?

Accessibility Comments:

- The required sizes and number of required barrier free parking spaces is as follows:
- Parking sizes:

  Type A – 3400mm width x 5200mm length + 2000mm access aisle = 5400mm total width required
  Type B – 2750mm width x 5200mm length + 2000mm access aisle = 4750mm total width required
- Number required for surface parking:

  One (1) Type A
  One (1) Type B
- Number required for underground parking:

  Four (4) Type A
  Four (4) Type B
- The above listed required numbers of barrier free parking spaces are the minimum, but more are recommended because the proposed development is a Seniors Living Condo.
- Please see the 2016 City of Burlington Accessibility Design Standards: https://www.burlington.ca/en/services-for-you/resources/Accessible%20Services/2016-Burlington-Accessibility-Design-Standards---FINAL.pdf
- Contact Judi Lytle, the city's Accessibility Coordinator at Judi.Lytle@burlington.ca or ext. x7865 if you have any questions.

Transportation Services Comments:

- Full Transportation Impact Study is required for this site, please have your consultant contact us to approve the terms of reference before work begins.
- We expect the parking rates for this proposal to reflect our recent study, and will not consider any rates lower then what is detailed in the results. https://burlingtonpublishing.escribemeetings.com/filestream.ashx?DocumentId=14103

City of Burlington: Pre-Submission Checklist
418 & 422 Guelph Line
November 21, 2018

NOTE: This checklist will be used to ensure that the materials and technical studies submitted in support of a redevelopment application meet minimum standards. If these standards are not met, the materials will be returned and a redevelopment file will not be opened.

1) **General Requirements**

- ☐ Correct application fees (based on most current fee schedule)
- ☐ Correct number of application forms and copies of reports
- ☐ Application form fully completed and commissioned
- ☐ Landowner's authorization and consent to enter property signed
- ☐ Two CDs or flash drives containing electronic copies of all materials
- ☐ Consistency within technical reports in terms of the development concept evaluated, and supporting appendices and drawings.
- ☐ Consultants have coordinated data and conclusions so that reports are consistent between disciplines
- ☐ Clear and legible drawings
- ☐ All electronic file submissions must be named using the following naming protocol: "Address_StudyName_MM-DD-YYYY". If a document is revised and resubmitted the file name should indicate that it is a revised submission and the date of the revision should be noted: "Address_StudyName_Revised_MM-DD-YYYY".
- ☐ Digital plans submitted in Autocad and/or GIS Shapefile format that must be geospatially positioned to match the City of Burlington's Geographic and Projected Coordinate Systems (Geographic Coordinate System: GCS_North_American_1983; Projected Coordinate System: NAD83_UTM_ZONE 17N).
- ☐ Pre-Application Neighbourhood Meeting Notes

2) **Conceptual Site Plan**

- ☐ Legible, metric scale drawing on 24x36 inch paper
- ☐ Clearly identifies all development constraints including easements, MTO setbacks, floodlines & hazard lands, natural heritage buffers etc.

3) **Site Survey**

- ☐ Prepared and signed by an OLS Surveyor
- ☐ Shows any required right-of-way widenings, daylight triangles and any easements, etc.

4) Planning Justification Report

- ☐ Signed by a Registered Professional Planner
- ☐ Contains a written acknowledgement by the RPP that they have reviewed all supporting technical studies in consideration of their planning opinion.
- ☐ Contains a review of the applicable policies of the Provincial Policy Statement.
- ☐ Contains a review of the applicable policies of Places to Grow
- ☐ Contains a review of all other relevant Provincial legislation.
- ☐ Contains a review of the applicable policies of the Region of Halton Official Plan.
- ☐ Contains a detailed explanation of how the proposed development is consistent and/or conforms to all relevant Provincial Plans and policies.
- ☐ Contains a review and analysis of the applicable policies of the City of Burlington Official Plan (2008) and the Council approved Official Plan (Grow Bold 2018).
- ☐ Contains an analysis of the Intensification Criteria in the Burlington Official Plan.
- ☐ Contains a fulsome discussion of the results of the required technical studies and how they have been used to refine the redevelopment proposal.
- ☐ Contains a discussion of how input received at the Pre-submission neighbourhood meeting has been used to refine the redevelopment proposal.
- ☐ Contains a discussion of how input received from the Burlington Urban Design Panel has been used to refine the proposal.
- ☐ Contains an explanation of how the proposed development is compatible with surrounding land uses including height, setbacks, massing and design.
- ☐ Draft Zoning By-law
- ☐ Contains an explanation of why the requested change represents good planning and adheres to Provincial and municipal plans and policies.

5) Urban Design Brief:

- ☐ Contains a description of how the proposed development meets the urban design objectives and policies of the Official Plan and any relevant approved urban design guidelines.
- ☐ Indicates how the proposed development responds to its surrounding context (both existing and planned).
- ☐ Provides a close examination and understanding of the surrounding area including blocks, streets, and buildings that could influence overall site and building design.
- ☐ Describes the overall architectural expression; building relationship to streetscape and adjacent properties; pedestrian, cycling, and transit connections; sustainable building elements; and other urban design features that ensure design excellence.

- ☐ Contains an explanation of how the proposed development is compatible with surrounding land uses including height, setbacks, massing and design.
- ☐ Contains a discussion of how input received from the Burlington Urban Design Panel has been used to refine the proposal.
- ☐ Include the BUD Meeting Minutes as an Appendix.

6) Environmental Site Assessment Report

- ☐ Completed in accordance with Ontario Regulation 153/04 as amended
- ☐ Regional Environmental Site Screen Questionnaire included
- ☐ Prepared, signed and stamped by a Qualified Person
- ☐ Letter of Reliance for City and Regional staff
- ☐ If the Phase One Study recommends a Phase Two Study, then the Phase Two is included with the submission
- ☐ If the Phase Two Study recommends site remediation, then the remediation plan is included to ensure that remediation feasibility has been considered.

7) Stormwater Management Report

- ☐ Refers to the Ministry of the Environment "Stormwater Management Planning and Design Manual" and the TRCA/CVC Low Impact Development Stormwater Management Planning and Design Guide.
- ☐ Is prepared, signed and stamped by a Professional Engineer
- ☐ Includes pre and post development drainage area plans that are legible, plotted to an acceptable metric scale, plotted on 24" by 36" paper and plotted on a consistent base map layer
- ☐ Includes site grading and servicing plans that are legible, plotted to a metric scale of 1:200, 1:250, 1:300 or 1:500, plotted on 24" by 36" paper and plotted on a consistent base map layer
- ☐ Includes digital copies of modeling, modelling program acceptability to be confirmed with City Staff prior to use and prior to submission of Report.
- ☐ Includes a list of all past reports and current technical documents that have been consulted.
- ☐ Includes all calculations, modelling, and parameters (as per City Standard Drawings S-IDF, S-2D, S-3D, etc., as amended)
- ☐ Includes clearly defined stormwater criteria for the site (including source) and demonstrates in report how these criteria will be satisfied.
- ☐ Addresses all interim conditions as well as the ultimate condition
- ☐ Contains engineering details and cross-sections showing existing utility locations if any temporary and/or permanent encroachments are proposed.

- ☐ Provide chemical analysis of groundwater to determine if it satisfies the City's storm sewer discharge criteria for water quality. (including documentation from the Geotechnical or Environmental Engineer in the appendix)
- ☐ If groundwater cannot be directly outletted to the municipal storm system, detail where it will outlet, i.e. treated then outlet to storm or outlet to the sanitary system.
- ☐ Provide an estimate of groundwater flow to be permanently managed in the site storm system (including documentation from the Geotechnical Engineer or Hydro-geologist in the appendix)
- ☐ Provide comment on whether or not it is anticipated a permit to take water would be necessary either temporarily during construction or permanently.

8) Functional Servicing Report

- ☐ Is prepared, signed and stamped by a Professional Engineer.
- ☐ Contains legible drawings , including all dimensions, plotted to a metric scale of 1:200, 1:250, 1:300 or 1:500 on 24x36 inch paper, and on a consistent base map layer .
- ☐ Follows the terms of reference agreed upon by the Regional and City staff in advance of study commencement. Includes a copy of this approved Terms of Reference as an Appendix.
- ☐ Includes digital copies of models.
- ☐ Includes all dimensions in metric, to scale, and on a consistent base map layer.

9) Grading and Servicing Plans

- ☐ Is stamped and signed by a Professional Engineer
- ☐ Contains legible drawings, plotted to a metric scale of 1:200, 1:250, 1:300 or 1:500, on 24" by 36" paper and plotted on a consistent base map layer
- ☐ Identifies property lines, dedications, easements, regulated areas, impermeable surfaces (including curbs, roads, driveways, sidewalks, etc.), buildings and entrances, and other information as needed
- ☐ Identifies the location of all underground, at grade and overhead utilities
- ☐ Identifies the location of all storm water management infrastructure, including swales, sub-drains, catch basins, pipes, and other quality and quantity controls as required
- ☐ Identifies Municipal Benchmark and Horizontal Control

10) Noise & Vibration Feasibility Study

- ☐ Is prepared, signed and stamped by a Professional Engineer.
- ☐ Includes determination of project feasibility
- ☐ Includes assessment of existing and proposed transportation sources of noise and stationary sources of noise and vibration.

- ☐ Includes traffic/train counts confirmed by relevant agencies and includes correspondence from those agencies in an appendix.
- ☐ Includes assessment of outdoor and indoor acoustical environments, including those onsite and on neighbouring noise sensitive land uses
- ☐ Includes clearly defined environmental sound levels for transportation sources of noise and stationary sources of noise as per City's requirements and the MOECC publication NPC-216 and NPC-300 as amended
- ☐ Includes investigation of feasible means of noise impact mitigation, including a chart outlining noise control measures required to achieve sound levels of 55dBA (or as close as possible) for each outdoor living area
- ☐ Includes all calculations and modeling (i.e. STAMSON output)
- ☐ Includes technical details, and clarifies the responsibility for the implementation and maintenance of the required noise control measures.
- ☐ Includes recommendations for warning clauses.

11) Geotechnical Report

- ☐ Is prepared, signed and stamped by a Professional Engineer.
- ☐ Contains legible drawings
- ☐ Includes digital copies of models
- ☐ Includes all dimensions in metric, to scale, and on a consistent base map layer.
- ☐ Includes groundwater information (for example: dewatering during construction vs. permanent dewatering to be accommodated in a stormpond).
- ☐ Contains sufficient quantity and distribution of boreholes to map soil and groundwater conditions for the soil type.
- ☐ Provides sufficient monitoring data to address groundwater level seasonality.
- ☐ Contains results of any geotechnical test completed.
- ☐ Discusses infiltration capabilities if Low Impact Development is proposed.
- ☐ Contains shoring and excavation details (for example: tiebacks, caissons, foundations, forming, piles) if underground parking or encroachments are proposed.
- ☐ Includes cross-sections, and dimensions from property lines and details of over-digging.
- ☐ Contains confirmation of the need for pre-construction surveys of surrounding buildings, to an extent determined by a Professional Engineer specializing in vibration, OR confirmation that pre-construction surveys are not warranted.

12) Traffic Impact Study

- ☐ Confirmation of Scope of Work by Burlington Transportation Services staff
- ☐ Signed by CET or signed and stamped by a Professional Engineer
- ☐ Follows Regional TIS Guidelines for Regional roads
- ☐ Follows MTO Guidelines for sites within MTO permit control area
- ☐ Includes correspondence about traffic projections from City, Region and MTO in an Appendix.
- ☐ Includes SYNCHRO files as an electronic attachment
- ☐ Electronic copy of all signal warrant calculation files
- ☐ Includes all traffic counts and modelling data in an Appendix and electronically
- ☐ Includes a multi-modal approach to transportation analysis
- ☐ Incorporates Travel Demand Measurement measures

13) Tree Inventory and Preservation Plan

- ☐ Is prepared by a qualified professional (e.g. Arborist certified by the International Society of Arboriculture (ISA), including ISA number; qualified by Ministry of Training, Colleges and Universities (MTCU) or Ontario Training and Apprentice Board (OTAB); registered professional Forester in Ontario, etc.)
- ☐ Contains legible drawings on 24x36 or 11x17 inch paper
- ☐ Includes all dimensions in metric, to scale, and on a consistent base map layer
- ☐ Identifies all existing trees (over 10cm diameter at breast height (DBH) measured at 1.4m above the ground) on site and within 3m of the property lines, their common and botanical name, size (DBH and height), structural and physiological condition, ownership, comments and notes, recommendations, and photos
- ☐ Identifies trees proposed to be removed and retained, and the methods to be used to ensure preservation and protection of trees to be retained, including location and detail of tree protection fencing in accordance with the City of Burlington's Tree Protection and Preservation Specification SS12A: www.burlington.ca/en/services-for-you/resources/Forestry%20Operations/Tree_Protection_and_Preservation/Tree_protection_and_preservtion.pdf
- ☐ Tree Preservation reports should describe the scope and methodology of proposed construction works
- ☐ Abbreviations should be defined and industry standard terminology used

14) Landscaping and Restoration Plan/Landscape Concept Plan

- ☐ For sites within Conservation Halton regulated area: incorporates Conservation Halton's Landscape and Tree Preservation Guidelines, April 2010 (www.conservationhalton.ca/policies-and-guidelines)

- ☐ Is stamped and signed by a qualified member of the Ontario Association of Landscape Architects
- ☐ Contains legible drawings on 24x36 inch paper
- ☐ Includes all dimensions in metric, to scale, and on a consistent base map layer
- ☐ Identifies the location and general design intent of the proposed plantings, identifying minimum required soil volumes, and location of any structural soil cell installation areas to achieve minimum soil volumes
- ☐ Identifies property lines, easements, regulated areas, impermeable surfaces (including curbs, roads, driveways, sidewalks, etc.), buildings and entrances, landscaped beds, lawns or other permeable surface areas, other information as needed
- ☐ Identifies the location of all underground, at grade and overhead utilities
- ☐ Identifies the location of any storm water management infrastructure, including swales, sub-drains, catch basins, pipes, and other quality and quantity controls as required

15) Waste Management Report

- ☐ Contains a loading plan showing turning radii for trucks
- ☐ Contains building elevations illustrating vertical clearance for truck access
- ☐ Contains details of layout for waste storage areas
- ☐ If no public waste collection is proposed, includes a letter confirming private pick-up.

16) Construction Management and Mobility Plan:

- ☐ Legible, metric scale drawing on 24" x 36" paper
- ☐ Clearly identify property lines, easements, floodlines & hazard lands, natural heritage buffers, existing trees and vegetation to be retained, etc.
- ☐ Clearly identify limits of above ground development, including buildings, parking, sidewalks, curbs, etc.
- ☐ Clearly identify limits of underground parking structure, including dimensioning distance from property lines
- ☐ Clearly identify limits of all elements of the underground parking structure including foundation drainage system/shoring/tiebacks/etc.
- ☐ Clearly identify limits of temporary perimeter/security fencing, covered sidewalk protection (if proposed) and tree protection fencing
- ☐ Clearly identify proposed temporary (trailers/material storage/fencing/etc.) and/or permanent encroachments (tiebacks/shoring/etc.) into the Right of Way and identify approximate time line of closure

- ☐ Clearly identify any proposed temporary sidewalk and/or lane closures and identify approximate time line of closure.
- ☐ Identify haul route, i.e. what roads are to be used for material deliveries
- ☐ Identify crane location and swing radius – please note that further detail/additional requirements will be provided at the site plan stage
- ☐ Drawing must clearly note that no trades parking or truck staging will be allowed on the Municipal Right of Way
- ☐ The applicant is advised that if the Official Plan Amendment/Re-Zoning application is approved, at the Site Plan stage additional construction management details may be required, including requirement of Road Occupancy and Municipal Consent permits if applicable.

Rui Zhou

From: Gord Alexiuk <GordA@knymh.com>
Sent: Thursday, October 17, 2019 4:08 PM
To: Rui Zhou
Cc: 'Przemyslaw (Shem) Myszkowski'; 'Kyle Bittman'; 'Carson O'Connor'; Kayam Ramsewak
Subject: RE: 18006 Valor Capital - RE: Final FSR and TIS Report - Revisions

Again with this GFA calculation I did not include elevators, stairwells, balconies, terraces, garages, roof, or underground

1st floor – 547.96 sq m
2nd floor - 265.64 sq m
3rd floor – 1,418.78 sq m
4th to 11th floor – 1,319.15 sq m x 8 floors = 10,553.2 sq m
12th floor – 1,004.03 sq m
13th floor – 914.69 sq m (includes 300 sq m of mechanical space)
Total – 14,704.3 sq m

Gord Alexiuk, Architectural Manager
A.T. Dipl., BCIN
GordA@knymh.com

KNYMH Inc.
1006 Skyview Drive, Suite 101, Burlington, Ontario L7P 0V1
Phone: 905.639.6595 ext. 247 | Fax: 905.639.0394
Website: www.knymh.com | General: info@knymh.com

Should you have any questions or concerns please feel free to contact us per below. We look forward to your continued success.

The information contained in this electronic message is legally privileged and confidential, intended only for the use of the individual or entity named above. If the reader of this message is not the intended recipient, you are hereby notified that any use, dissemination, distribution, or copy of this message is strictly prohibited. If you have received this electronic message in error, please immediately contact us by telephone or e-mail per the above and delete the original message.

Please consider the environment before printing this email

From: Rui Zhou [mailto:RZhou@mte85.com]
Sent: October 17, 2019 1:42 PM
To: 'Gord Alexiuk' <GordA@knymh.com>
Cc: 'Przemyslaw (Shem) Myszkowski' <ShemM@knymh.com>; 'Kyle Bittman' <kbittman@valourcapital.com>; 'Carson O'Connor' <coconnor@valourcapital.com>; Kayam Ramsewak <KRAMSEWAK@mte85.com>
Subject: RE: 18006 Valor Capital - RE: Final FSR and TIS Report - Revisions

Thanks Gord,

Could you provide the new gross floor area (GFA) so we can update our water demand calculations?

Rui Zhou | Student Designer
MTE Consultants Inc.
T: 905-639-2552 x2460 | RZhou@mte85.com

APPENDIX F

GEOTECHNICAL REPORT

Drawing on experience...Building on strength.

SOLA ENGINEERING

RE: GEOTECHNICAL INVESTIGATION
PROPOSED RESIDENTIAL DEVELOMENT
418 and 422 GUELPH LINE
BURLINGTON, ONTARIO

FOR: Valour Capital Management Inc.
c/o S2S Environmental Inc
3410 South Service Road, Suite G5 (Garden Level 5)
Burlington, Ontario
L7N 3T2

ATTENTION: Ms. Amy Chiang

REPORT NO.: 2017-10923

DATE: August 16, 2019

DISTRIBUTION:
3 Copies: Valour Capital Management Inc. c/o S2S Environmental Inc
PDF Copy: Valour Capital Management Inc. c/o S2S Environmental Inc
- Ms. Amy Chiang [achiang@s2se.com]
Original: (File No. 10269-S0197-GEO)

TABLE OF CONTENTS

1.0 INTRODUCTION 1
2.0 SITE SETTING 2
2.1 SITE LOCATION 2
2.2 SITE DESCRIPTION 2
2.3 PROPOSED DEVELOPMENT 2
3.0 GROUND INVESTIGATION 2
3.1 FIELD INVESTIGATION 2
3.1.1 Soil Investigation 2
3.1.2 Groundwater Investigation 3
3.2 SURVEY 3
3.3 GEOTECHNICAL FIELD AND LABORATORY TESTING 4
4.0 SUBSURFACE CONDITIONS 4
4.1 SOIL CHARACTERISATION 4
4.1.1 Pavement 4
4.1.2 Topsoil 4
4.1.3 Fill Soils 5
4.1.4 Silty Sand to Silty Clay Till 5
4.1.5 Shale Bedrock 5
4.2 GROUNDWATER 7
5.0 DISCUSSION AND RECOMMENDATIONS 7
5.1 GEOTECHNICAL ISSUES 7
5.2 FROST PROTECTION 8
5.3 CONVENTIONAL SPREAD OR STRIP FOUNDATIONS 8
5.4 EARTHQUAKE CONSIDERATIONS 9
5.5 ENGINEERED FILL 9
5.6 BASEMENT FLOOR SLABS AND PERMANENT DRAINAGE 10
5.7 EXCAVATION AND BACKFILL 11
5.7.1 Excavatability 11
5.7.2 Temporary Shoring Design Considerations 12
5.7.3 Soil Reusability and Disposal 14
5.8 SERVICE INSTALLATION CONSIDERATIONS 15
5.8.1 General 15
5.8.2 Bedding 15
5.8.3 Trench Backfill 16
5.8.4 Rock Squeenze 16
5.9 PAVEMENTS 16
5.10 CONSTRUCTION CONSIDERATIONS 18
5.10.1 Site Preparatory Works 18
5.10.2 General Considerations 18

6.0 MATERIALS TESTING AND INSPECTION 19
7.0 DRAWING REVIEW 19
8.0 CLOSURE 19

TABLES

Table 1: Ground Water Measurement 7
Table 2: Excavatability of Soil 12
Table 3: Soil Parameters for Shoring 14
Table 4: Recommended Pavement Structure Thickness 17

ENCLOSURES

Borehole Location Plan 1
Geotechnical Investigation Borehole Logs ..... 2 to 7
Conceptual Soil Profile 8
Symbols and Terms Used on Borehole Logs 9
Geotechnical Laboratory Testing Results 10

August 16, 2019

REPORT NO.: 2017-10923
FILE NO.: 10269-S0197-GEO

1.0 INTRODUCTION

Sola Engineering Inc. (Sola) was retained by Valour Capital Management Inc. c/o S2S Environmental Inc (*"the Client" or "the Clients"*) to carry out a geotechnical investigation for a proposed new commercial and residential building, located at 418 and 422 Guelph Line, in Burlington, Ontario (the subject site or site). Authorization to proceed with the investigation was received on August 25, 2017 through the acceptance of Sola's Email Proposal No. 2017-1471 dated July 24, 2017 and the subsequent correspondences after August 25, 2017.

It is understood that the Client is planning to redevelop the property into a 20+ storey mixed used (residential from floors 2 to 21, commercial on the first floor) condominium with 2 storey underground parking garage.

This geotechnical investigation was carried out in tandem with the Phase II Environmental Site Assessment, carried out by the Client. All field related protocols, including safety, field testing and sampling procedures were managed by the Client. Sola was only present for the advancement of six (6) of the boreholes for geotechnical design purposes. The log sheets for the non-geotechnical boreholes prepared by the Client were provided to Sola for review. Soil descriptions given on the geotechnical Borehole Log Sheets may differ somewhat from the descriptions given in the Client's non-geotechnical ones, which are based on geological considerations. Therefore, the two reports should be read and interpreted in accordance with their respective purposes.

Geotechnical design parameters and construction considerations are significantly dependent on the field data, i.e. observations, measurements, and engineering interpretations. Careful verification of these data should be carried out during construction. Should any discrepancies in the subsurface conditions be identified in this report, it is requested that they be brought to the attention of this office.

As per the scope of services detailed in Sola's proposal, the purposes of this investigation are:

- To collect information on the soil and groundwater conditions at the site and based on the investigation data, provide pertinent engineering considerations; and,
- To provide recommendations to assist with the design of the proposed building foundations.

This report presents the details of Sola's fieldwork and laboratory testing, outlines the soil and groundwater conditions at the site, and provides recommendations on the aforementioned items.

The Client provided Sola with a conceptual drawing showing the proposed residential building, via email dated August 29, 2017. The drawings provide information pertaining to the layout of the proposed building development.

This report has been prepared for the Client, and their nominated engineers and designers. Third party use or reproduction, in part or in full, of this report is prohibited without written authorization from Sola. This report is also subject to the *Statement of Limitations* which forms an integral part of this document.

2.0 SITE SETTING

2.1 SITE LOCATION

The site of the proposed development is located at at 418 and 422 Guelph Line, in Burlington, Ontario.

2.2 SITE DESCRIPTION

The subject site is bound by a retail store to the south, Roseland Square Plaza to the west, Waterfront Trail to the east and Guelph Line to the north. The subject site is currently occupied by an office building and a commercial building with customer parking lots at south west end. The site is partially paved and generally flat.

2.3 PROPOSED DEVELOPMENT

As per the scope of work approved by the Client through Sola's Email Proposal No. 2017-1471 dated July 24, 2017 and subsequent correspondences, this report addresses the site conditions in relation to the redevelopment of the property into a 20+ storey mixed used (residential from floors 2 to 21, commercial on the first floor) condominium with 2 storey underground parking garage.
No loading details for the proposed development were available at the time of authoring this report.

3.0 GROUND INVESTIGATION

3.1 FIELD INVESTIGATION

3.1.1 Soil Investigation

Prior to undertaking field drilling, clearance of existing public utility services to the site was obtained by the client from all applicable agencies and companies. In addition, private utility locates were also carried out by the client.

The geotechnical investigation was carried out on September 5, 6 and 7, 2017 comprised the following:

- The drilling of six (6) boreholes to depth of 10.7 m or refusal if shallower; and,
- The extension of one (1) boreholes with coring to at least 3.0 m.

All boreholes were advanced using a track-mounted D50 power drill rig equipped with a split spoon sampling equipment. The approximate locations of the boreholes that were advanced for this investigation are shown on the site plan attached as **Enclosure 1**.

All drilling equipment was supplied and operated by Profile drilling of Mississauga, Ontario, and the geotechnical drilling works were completed under the supervision of a qualified Sola Technician.

Standard Penetration Tests (SPTs) split spoon samples were collected in the overburden in all drilled boreholes. Bedrock was cored using a diamond bit core barrel. All soil and rock samples were logged in the field and returned to Sola's laboratory in Vaughan for review and subsequent laboratory testing.

The existing grade elevations (Local) at the borehole locations were obtained from the Client and provided to Sola.

The logs of all boreholes completed, together with their depths relative to local elevation, are presented in **Enclosures 2 through 7.**

3.1.2 Groundwater Investigation

Groundwater level observations were made during drilling and in the open boreholes upon completion of the drilling operations.

The groundwater levels information in the wells installed at BH No's 102, 103, 104, 105, 106 were provided by the client via Email dated October 3, 2017. Details of groundwater observations for each borehole are presented on the respective borehole logs presented in **Enclosures 2 to 7**. Further discussion on groundwater is provided in 4.2 of this report.

3.2 SURVEY

The borehole locations were established with reference to the existing site features (existing building, garages, poles, fence lines, etc.) by the client. The temporary benchmark (TBM) was established on top of sewer grate located at northeast corner of property on the sidewalk of Guleph

Line. The location of the TBM is shown on Plot Plan in **Enclosure 1**. This benchmark has an assumed elevation of 100.00 m (Local).

3.3 GEOTECHNICAL FIELD AND LABORATORY TESTING

Standard Penetration Tests (SPTs) were undertaken at selected intervals with depth using a 50 mm outer diameter and 35 mm inner diameter split barrel sampler driven with an automatic hammer of mass 63.5 kg dropping 760 mm in accordance with the ASTM D 1586-11 test method – "*The Standard Method of Standard Penetration Testing (SPT)*". The results of these tests (SPT "N" values) are presented on the borehole logs in **Enclosures 2 to 7** of this report.

All soil samples were submitted to Sola's laboratory for natural moisture content determination. The results of the moisture content are presented in the borehole logs in **Enclosures 2 to 7**. One soil sample was submitted for grain size analysis and the results are in **Enclosure 10.**

4.0 SUBSURFACE CONDITIONS

4.1 SOIL CHARACTERISATION

4.1.1 Pavement

The site was surfaced with a pavement structure on west side of the existing building where Borehole Nos. 102, 104 and 105 were advanced. The pavement consisted of an approximate 40 mm thick layer of asphaltic concrete (AC) course. Underlying the AC, a granular base consisting of sand and gravel, ranging in thickness from 150 mm to 175 mm, was found.

4.1.2 Topsoil

On east side of the existing building the site was covered with grass and mature trees. Topsoil was initially encountered at Borehole No. 103, 106 and 108 locations. The topsoil ranged in thickness from 100 mm to 125 mm.

It is important to note that topsoil thicknesses may vary throughout the site area, depending upon their location. As such, these findings should not be relied upon for any estimation of fill quantities to be stripped prior to construction.

4.1.3 Fill Soils

Fill (and possible fill) materials were encountered underlying the pavement structure and topsoil at all borehole locations. The fill extended to depths between 0.760 m (BH 103) and 2.89 m (BH102).

Fill materials encountered comprised silty sand to sandy silt. In-situ resistance testing results ranged from 1 to 20 blows per 300 mm of spoon penetration, indicating that the fill was not constructed under engineering control.

The moisture content test results for the fill material ranged approximately from 2.2% (BH106) to 26.4% (BH103), indicating generally moist to wet conditions.

It is important to note that fill thicknesses may vary throughout the site area, depending upon their location. As such, these findings should not be relied upon for any estimation of fill quantities to be stripped prior to construction.

4.1.4 Silty Sand to Silty Clay Till

Native soils were encountered directly below the fill materials in all boreholes. It comprised a layer of silty sand in all boreholes. The silty sand extended to depths of 0.8 mbgs in BH103, 3.0 mbgs in BH102 and 1.3 mbgs in BH104 and BH105. Layer of sandy silt is found 2.2 mbgs in BH 105.

Underlying silty sand, a silty clay till is found in all the boreholes (except in BH 106) prior to encountering shale bedrock. In BH 106, a silty clay was found to underlie the silty sand. The moisture content test results for the native material ranged approximately from 3.8% (BH108) to 23.6% (BH102), indicating generally moist to wet conditions.

Standard penetration tests (SPT) were carried out during the spoon sampling process. SPT "N" values recorded in the sandy silt ranged from 4 to more than 50 blows/300 mm, which is in a loose to very dense condition of the soil; in silty clay till and silty clay, the N-values ranged from 31 to more than 50 blows/300 mm, which is of a hard consistency.

4.1.5 Shale Bedrock

Inferred shale bedrock was observed in BHs 105, 106 and 108 upon refusal to auger drillingranging in Elevations between 93.0 and 94.2 m (Local). Shale bedrock was proven in BHs 102 through 104, ranging in Elevations between 94.4 and 95.4 m (Local). The shale bedrock is of the Queenston Formation. This material is coloured red to grey and features an upper sub-unit. As recognized by many engineers, this sub-unit is about 2 to 5 m thick

and is highly weathered and fractured. It is in turn followed by a less weathered sub-unit of rock which is in poor to fair to good condition.

SPT tests carried out in this sub-unit of the weathered shale bedrock measured N-values of more than 50 blows/300 mm.

The highly weathered sub-unit of the bedrock can be readily penetrated using solid stem augers which indicates that in all likelihood, the material will have the engineering characteristics of a hard clayey till soil. However, localized thicker and harder limestone seams are indicated where refusal to power auger drilling was observed.

Below the highly weathered sub-unit, the results of observations made on rock cores indicate that the condition improves with values of rock quality designation (RQD) in the range from 90 % to 79% being recorded. An RQD of 75 % t0 90 % indicates a rock which is of good quality rocks.

The shale bedrock was found to be interbedded with limestone and occasional clay seams. The limestone seams were found to range from about 10 to 50 mm in the core samples. However, historical data obtained from the Ministry of Transportation (MTO) GeoCres database system indicated that the thickness of the limestone layers can range up to 450 mm. The limestone seams were contacted in both the highly weathered and less weathered sub-units of the bedrock.

The occasional clay seams was found at a depth of 8.53 mbgs and 9.90 mbgs in BH102.
Intact rock core samples can be crushed into crumbles with firm blows of geological hammer. It cannot be peeled readily with a pocket knife.

From BH 102 the intact rock core sample at depth between 9.47 m and 9.55 m was tested for point load strength test. The strength recorded, i.e. Is(50), was 1.121 MPa. In addition the intact sample at depth 9.32 to 9.47 m was tested for Unconfined Compression Strength (UCS) and recorded as 29.7 MPa.

The rock may be regarded as Grade R3 described as medium strong with an unconfined compressive strength ranging from 25 to 50 MPa as per Brown (1981).

Queenston Shale Bedrock can lose its strength considerably when in contact with excessive moistures. Based on the study by K. Y. Lo. on the shale bedrock of southern Ontario, the Queenston Shale has a high potential of swell characteristics, recognized as “rock squeenze”.

4.2 GROUNDWATER

The depth at which groundwater was encountered during drilling is presented on the respective borehole logs in **Enclosures 2 through 7**.

Five (5) wells were installed in BH 102, 103, 104, 105 and BH 106 at the completion of the borehole. Subsequent water level readings were recorded by the client. The groundwater levels were recorded as given below:

Table 1: Ground Water Measurement

BH No	Upon Completion of drilling		Groundwater Level (September 13, 2017)
	Caved at Depth	Water level	
102			3.667
103			2.471
104			3.220
105			3.270
106			2.420
108	2.43	DRY	NA

It should be noted that the groundwater level can vary and is subject to seasonal fluctuations in response to major weather events. It should be also noted that a perched water condition may arise from the accumulation of surface water in the more pervious fill, particularly during wetter periods.

5.0 DISCUSSION AND RECOMMENDATIONS

5.1 GEOTECHNICAL ISSUES

The following geotechnical issues are observed at this site:

- With two or three underground parking level(s), the building foundation will likely be positioned within the shale bedrock. Conventional spread footing is suitable for foundation design.
- Bedrock excavation is expected for installation of foundations and some service lines. Excavation in shale bedrock in the upper sub-unit may be carried out using conventional construction equipment (power backhoe with rock teeth). However, harder and thicker limestone seams may be encountered within the excavation depth.
- Reuse of the excavated bedrock as Subgrade Fill should not be considered.

The following sections outline our recommendations for the design of the proposed residential development, parking lot pavement structure, access road pavement structures and underground service connections.

5.2 FROST PROTECTION

All footings exposed to seasonal freezing conditions must have at least 1.2 metres of soil cover for frost protection. For conventional footings being positioned directly over the shale bedrock, the frost protection depth may be halved.

There is no official rule governing the required founding depth for footings below unheated basement floors. Certainly, it will not be greater than the 1.2 m required in Southern Ontario for exterior footings. Un-monitored experience indicates that a shallower depth ranging from 0.82 to 0.9 m for interior column footings and 0.4 m for wall footings has been successful where 2 or more basement levels apply. The 0.82 m depth is believed to be close to the minimum structural requirement for interior column footings. Adjacent to air shafts and entrance and exit doors, a footing depth of 1.2 m below floor level is required or, alternatively, insulation protection must be provided.

It is also emphasized that underfloor drainage and/or an adequate free draining gravel base is required to minimize the risk of floor dampness. Floor dampness could lead to temporary icing and the risk of accidents.

5.3 CONVENTIONAL SPREAD OR STRIP FOUNDATIONS

The following discussions are provided to advance the design phase of the highrise residential development with two basement levels. For geotechnical design purposes, it is assumed that the footings may be positioned at a depth of approximately 6 to 7 m below the existing grade. The founding stratum at this depth was found to be hard silty clay till (or silty clay) or highly weathered shale bedrock.

If found on hard silty clay till or silty clay, the proposed building with two levels of basement can be supported by spread and strip footings for a bearing capacity of 300 kPa at the serviceability limit states (SLS), and for a factored geotechnical resistance of 450 kPa at the ultimate limit states (ULS). If found on shale bedrock, the proposed building with two levels of basement can be supported by spread and strip footings for a bearing capacity of 500 kPa at the serviceability limit states (SLS), and for a factored geotechnical resistance of 750 kPa at the ultimate limit states (ULS).

Footings founded in the soil stratum designed to the specified bearing capacity at SLS are expected to settle less than 25 mm total and 20 mm differential. In the weathered shale, settlements are approximately half of the magnitude.

Where it is necessary to place footings on soil at different levels, the upper footing must be founded below an imaginary 1 horizontal to 1 vertical line (1H:1V) drawn up from the base of the lower footing. The lower footing must be installed first to help minimize the risk of undermining the upper footing.

Queenston shale bedrock can deteriorate in structure and strength when in contact with excessive moistures. For foundation construction purposes, the prepared rock excavation surfaces may be protected with a layer of mud mat, if necessary.

It should be noted that the recommended bearing capacities have been calculated by Sola from the borehole information for the design stage only. The investigation and comments are necessarily on-going as new information of the underground conditions becomes available. For example, more specific information is available with respect to conditions between boreholes when foundation construction is underway. The interpretation between boreholes and the recommendations of this report must therefore be checked through field inspections provided by Sola to validate the information for use during the construction stage.

5.4 EARTHQUAKE CONSIDERATIONS

Using the information provided by the site investigation, the general subsurface profile may be classified as "Stiff Soil – Site Class C" as defined by Table 4.1.8.4.A "Site Classification for Seismic Site Response" of the Ontario Building Code.

If a higher site class is desired, a in-situ shear wave velocity test must be carried out by a specialist consultant.

5.5 ENGINEERED FILL

On-site excavated, clean inorganic earth (native and/or fill) may be reused as engineered fill material, provided the moisture contents are strictly controlled. Shale of Queenston Formation may deteriorate in structure and strength considerably when in contact with water, therefore, it may not be a good candidate to reused broken shale for engineered fill purposes.

If imported inorganic mineral soils are used for engineered fill construction, they must meet the applicable environmental guidelines, and their moisture contents should preferably be close to their respective optimum water content values.

For the on-site excavated clean fill/native soils, or similar imported soils, heavy compaction equipment should be employed to achieve the specified degree of field density.

Consideration may be also given to backfilling excavations with a well graded, compacted granular soil such as Granular B as it, if thoroughly compacted, would reduce the post construction settlements to an acceptable level and may also expedite the compaction process.

Fill materials required for replacing locally softened soils, or raising grades within the footprint of the structures are to comprise suitably organic free materials approved for use by the Geotechnical Engineer. Fill materials are to be placed in lifts of a maximum thickness of 300 mm and compacted, using appropriate compaction equipment, to 98 % of its Standard Proctor Maximum Dry Density (SPMDD).

Fill located in areas outside of the footprint of any proposed structure or driveway should be compacted to at least 95 % of the material's SPMDD to within 1.0 m of the subgrade level, and then to 98 % of its SPMDD up to the required grade. Imported granular fill used in confined areas should be compacted using only hand held compaction equipment.

Sola recommends that any and all engineered subgrades beneath proposed structures are to be inspected and/or proof rolled prior to construction.

5.6 BASEMENT FLOOR SLABS AND PERMANENT DRAINAGE

The basement floor slab for the proposed residential building can be adequately supported at grade. Any exposed subgrade must be profiled to meet the design requirement. Once the required subgrade has been developed, Sola recommends that the exposed subgrade be inspected and approved by the Geotechnical Engineer prior to the placement of any granular fill or concrete.
It is considered by Sola that completed excavations for floor slabs should not to be left open before pouring concrete for any period longer than 72 hours, particularly if the floor construction works are being completed during the winter months or wet weather periods. The base of any floor slab excavation that is to be left exposed for longer than 72 hours should be suitably covered and protected from water ponding.

A granular layer consisting of at least 200 mm thick layer of 19 mm Crusher Run Limestone (CRL) or OPSS Granular A should be installed under the floor slab as a bedding layer, as well to enhance under slab moisture condition.

Such a layer has been proven to be an effective moisture barrier for conventional floor surfaces. However, if special floor coverings such as sheet PVC with heat sealed seams are considered, either a high efficiency vapour barrier or venting may be added to the granular layer to prevent moisture accumulating between the concrete floor and the PVC flooring.

The design of the concrete slabs on shale bedrock may be made on the basis of a value of modulus of subgrade reaction (k) of 40 MPa/m on the surface of the granular moisture barrier.
The floor slab should be structurally independent from any load bearing structural elements.

Queenston shale bedrock can deteriorate in structure and strength when in contact with excessive moistures. For slab-on-grade construction purposes, the prepared rock excavation surfaces may be protected with a layer of mud mat, if necessary.

5.7 EXCAVATION AND BACKFILL

5.7.1 Excavatability

Given the layout of the proposed development in relation to the site area, it has been assumed that all excavations for the building and utilities will be open cut. In order to enable entry into excavations during the construction process, all excavations must comply with the definitions prescribed by the "Occupational Health and Safety Act" (OHSA), Ontario Regulation 213/91 "Construction Projects".

The borehole data indicate that the native sandy silt till should present as a Type 2 soil as defined in the OHSA and Regulations for Construction Projects (Part III Excavations, Section 226); the fill, Type 3. Weathered shale bedrock should present as Type 1. Excavations in these materials should be constructed in conformance with the regulations. It is noted that the above soil classifications have been estimated based on small, discontinuous samples from boreholes. The excavation conditions must be confirmed and/or modified on the basis of field inspections during construction stage, when large scale observations can be made with ease.

As defined by the OHSA, excavation walls within the Type 3 soils will require battering back at slopes no steeper than 1H (horizontal):1V (vertical). For Type 1 or Type 2, the bottom 1.2 m high of trench wall can be vertical. Depending on the construction feasibility the excavation walls can be supported by temporary shoring systems. During excavations, adjacent existing structures must be protected by proper shoring or sloping.

It is important to realize that the excavation side stability condition in Queenston Shale Formation can deteriarate quickly when in contact with significant amount of water. The excavation in such a condition must be regularly monitored throughout the construction.
Based on the findings of the investigation, it is considered that excavation of the overburden native soils at the site can be carried out using a conventional backhoe excavator.

Using the estimated parameters of degree of weathering, rock strength, joints and bedding spacing, and diggability index rating developed by Scoble and Muftuoglu (2001), it is

anticipated that the rock materials, their ease of digging and typical construction equipment should conform to the following **Table 2:**

Table 2: Excavatability of Soil

Stratigraphic Unit	Class	Ease of Digging	Typical Plant Fitted with Rock Teeth and Ripper which may be used Without Blasting
Weather shale	II	Easy	Hydraulic shovel or Backhoe, e.g., CAT 245
Unweathered shale	III	Moderately	Hydraulic shovel, e.g., CAT 245
Limestone	IV	Difficult	Hydraulic shovel, Short Boom of backhoe e.g., CAT 245, O and K RH 40

It is assumed that the excavations for the building and utilities will be within a depth range from 3 to 6.5 m below existing ground level. Groundwater is reported at a depth of approximately 2.4 to 3.6 m below ground level. However, the water encountered was likely perched water condition. Queenston Formation is recognized to be very fractured and include occasional thin layers of limestone interbeds. Therefore, seepage through fractures and limestone seams is likely. Seepage will likely be controlled by the use of conventional pumping from collection sumps and ditches.

5.7.2 Temporary Shoring Design Considerations

Given that the footings may be positioned at 6 to 7 m below the existing grade and that the proposed building will take up a large portion of the property, it is expected that shoring may be required to facilitate the construction of the proposed building. It should be noted however, that, if shoring is required, a specialist shoring contractor should be consulted to establish the most appropriate design and seating depths for the construction shoring solution.

The shoring system may be designed in accordance with the Canadian Foundation Engineering Manual (CFEM), 4th Edition. Though not a design code, the CFEM design manual provides a comprehensive guide for shoring and anchor design, and still considered the most widely used and accepted design approach in the Greater Toronto Area (herein "GTA").

Shoring subject to unbalanced earth pressures must be designed to resist a pressure distribution that can be calculated as follows:

$$p = K [\gamma (h-hw) + \gamma' hw + q] + \gamma whw$$

where: p = Lateral earth pressure in kPa acting at depth h

K = parameters are provided below

h = the depth below the ground surface (m)

hw = the depth below the ground water level (m)

γ = the bulk unit weight of soil, (kN/m3) use 20.0

γ' = the submerged unit weight of the exterior soil, (γ - 9.8 kN/m3)

q = equivalent value of surcharge on the ground surface in kPa (min 12 kPa)

Where the backfill against the buried structure can be drained effectively to eliminate hydrostatic pressures on the wall, this equation can be simplified to:

$p = K(\gamma h + q)$

The soil parameters estimated to be applicable for this design are as follows:

At Rest Lateral Earth Pressure Coefficient (K): 0.5

Active Earth Pressure Coefficient (Ka): 0.33

Passive Earth Pressure (unfactored) (Kp): 3.0

For a global stability check:

ϕ = 30°

c = 0

γ = 20 kN/m3

Wall friction should be considered negligible.

Design groundwater table should be assumed at a depth of 3.5 m below the ground surface.

The surcharge needs should be determined by the Structural Engineer, but should not be less than 12 kPa.

The earth pressure acting on the buried structure may be evaluated using the earth pressure diagram for design of bracing elements provided as per the CFEM.

Design calculations should be submitted to Sola for geotechnical review.

The soil parameters estimated to be applicable for the shoring design are presented in **Table 3**.

Table 3: Soil Parameters for Shoring

Material	Undrained Shear Strength c_u (kPa)	Effective Cohesion c' (kPa)	Effective Friction Angle ⍰' (deg)	Unit Weight γ (kN/m^3)	Coeff. Of Active Earth Pressure, Ka	Coeff. Of Paasive Earth Pressure, Kp	Coeff. Of At-rest Earth Pressure, Ko
OPSS Granular A or B	–	0	34	22	0.28	3.6	0.44
Fill	–	0	28	19	0.37	2.7	0.53
Native Soil	-	0	30	20	0.33	3.0	0.50
Highly Weathered Shale	-	0	36	21	0.26	3.8	0.41

Movement of the shoring system is considered inevitable. The magnitude of this movement can be controlled by sound construction practices, and it is anticipated that the horizontal movement will be in the range of 0.1 % H to 0.25 % H. Vertical movements increase the horizontal movements to some degree. The shoring design must be carried out to minimize vertical movement of the shoring system.

To ensure that movements of the shoring are within an acceptable range, monitoring must be undertaken throughout the site development process. Vertical and horizontal targets must be located and surveyed before excavation begins. Weekly readings during excavation should show that the movements will be within those predicted; if not, the monitoring results should enable directions to be given to improve the shoring.

In the event that the shoring design is to be incorporated into the structural design of the buildings, i.e. shored basement wall construction, then drainage considerations should also be accommodated at the design stage.

5.7.3 Soil Reusability and Disposal

On site excavated soils, either fill or native, consist of a significant proportion of silt particles. The silty soil is generally poor in its workability. The Contractor should plan appropriately with their construction methodology as well as equipment in the fill placement if silty soils are reused.

Excavated shale bedrock may not be reused.

It is recommended, that the soil to be excavated should be tested for compliance with prevailing Ministry of Environment and Climate Change (MOECC) regulations for off-site disposal.

5.8 SERVICE INSTALLATION CONSIDERATIONS

5.8.1 General

The materials contacted in the boreholes at the expected elevations of the proposed storm sewer trench bottoms generally consist of compact to dense silty sand, or shale bedrock which are suitable for pipeline support.

Prior to placement of bedding, the exposed subgrade at the bottoms of sewer trench excavations should be inspected by a qualified geotechnical engineer, to identify any soft, loose or disturbed base conditions. All disturbed soils/rock resulted from the construction activities should be removed and replaced as above noted.

Details of the storm sewer configuration have not been made available at the time of the preparation of this report. Design and construction consideration for both flexible (PVC) and rigid (concrete) pipes are included in the following sections.

5.8.2 Bedding

The silty sand or prepared shale bedrock, in an undisturbed state will provide adequate support for the proposed service pipes and will allow the use of normal Class B type bedding. The bedding should conform to the current Ontario Provincial Standard Specifications (OPSS 1010) and/or the City of Toronto's standards for bedding stone gradation requirements. The pipes should be placed with a minimum bedding thickness in conformance of OPSD 802.010 (for flexible pipes) or OPSD802.030 (for rigid pipes), though the bedding thickness will be subject to variation and ultimately based on the proposed pipe diameter, bedding specifications used etc.

On completion of the storm sewer pipe installation, a granular surround of the same bedding material should be placed around the pipe to cover it to at least 300 mm above the pipe obvert.

Backfill above the bedding and cover materials may consist of clean, compactable fill which possess similar properties to the existing subgrade soil; based on the borehole data it is anticipated that the local soil material may be used as trench backfill. Some moisture conditioning of the soil may be required to facilitate soil compaction. In the event that an imported soil is used as trench backfill, it must be ensured that the drainage properties of

the subgrade are maintained and that there is no differential frost movement. Trench backfill should be compacted to at least 95% of the material's SPMDD, or City of Toronto's standards, wherever is more stringent.

5.8.3 Trench Backfill

The native soils are, subject to environmental classification, considered suitable for re-use as fill to backfill wider service trenches, provided that heavy compaction equipment (e.g. vibrating impact "sheep's foot" roller) can be used to compact the fill material. In confined areas, consideration may be also given to backfilling the areas with a well graded, compacted granular soil such as Granular 'B' material as such material, if thoroughly compacted, would reduce the post construction settlements to an acceptable level and may also expedite the compaction process.

Each lift should be no greater than 300 mm thick and compacted using a vibrating smooth drum roller to at least 95 % of the material's SPMDD to within 1 m of the top of the sub-grade, and then to 98 % SPMDD up to the required grade.

Exposed, excavated soil stockpiles that are to be re-used as fill on site should be compacted at the surface or temporarily covered during wet weather to help maintain their original moisture content. Such stockpiles are prone to wet weather exposure and, as such, the increased moisture contents will make these materials too wet to achieve the required levels of compaction.

Conversely, if the excavated native soils are too dry to achieve the required levels of compaction, some moisture addition/conditioning by means of water hosing or misting should be expected if the trench excavation works are to be undertaken during the dry seasons.

5.8.4 Rock Squeenze

The Queenston Shale Formation is recognized of its swell characteristics for trench work, known as "Rock Squeeze". The designer should take this phenomenon into consideration if the trench is entirely positioned in the shale bedrock.

5.9 PAVEMENTS

The recommended pavement structures provided in **Table 4** are based upon an estimate of the subgrade soil properties determined from visual examination and textural classification of the soil samples. The values may need to be adjusted based on the city /regional standards. Consequently, the recommended pavement structures should be considered for preliminary design purposes only.

A functional design life of eight to ten years has been used to establish the pavement recommendations. This represents the number of years to the first rehabilitation, assuming regular maintenance is carried out. If required, a more refined pavement structure design can be performed based on specific traffic data and design life requirements and will involve specific laboratory tests to determine frost susceptibility and strength characteristics of the subgrade soils, as well as specific data input from the client.

Table 4: Recommended Pavement Structure Thickness

Pavement Layer	Compaction Requirements	Light Duty (Cars)	Heavy Duty (Delivery Trucks)
Asphaltic Concrete OPSS	97% Marshall Density	40 mm HL 3 40 mm HL 8	40 mm HL 3 80 mm HL 8
OPSS Granular A Base (or 20mm Crushed Limestone)	100% SPMDD*	150 mm	150 mm
OPSS Granular B	100% SPMDD	200 mm	300 mm

* Denotes Standard Proctor Maximum Dry Density, ASTM-D698

The subgrade must be compacted to 98% SPMDD for at least the upper 300 mm unless accepted by Sola Engineering Inc.

OPSS – Ontario Provincial Standard Specifications

The long term performance of the pavement structure is highly dependent upon the subgrade support conditions. Stringent construction control procedures should be maintained to ensure uniform subgrade moisture and density conditions are achieved. In addition, the need for adequate drainage cannot be over-emphasized. The finished pavement surface and underlying subgrade should be free of depressions and should be sloped (preferably at a minimum grade of two percent (2%) to provide effective surface drainage toward catch basins. Surface water should not be allowed to pond adjacent to the outside edges of pavement areas. Subdrains should be installed to intercept excess subsurface moisture and prevent subgrade softening. This is particularly important in heavy-duty pavement areas.

Additional comments on the construction of parking areas and access roadways are as follows:

1. As part of the subgrade preparation, proposed parking areas and access roadways should be stripped of topsoil layers and other obvious objectionable material. Fill required to raise the grades to design elevations should conform to backfill requirements outlined in previous sections of this report. The subgrade should be properly shaped, crowned then proof-rolled in the fulltime presence of a representative of this office. Soft or spongy subgrade areas should be sub-excavated and properly replaced with suitable approved backfill compacted to 98% SPMDD.
2. The locations and extent of sub-drainage required within the paved areas should be reviewed by this office in conjunction with the proposed lot grading. Assuming that satisfactory crossfalls in the order of two percent (2%) have been provided, subdrains extending from and between catch basins may be satisfactory. In the event that

shallower crossfalls are considered, a more extensive system of sub-drainage may be necessary and should be reviewed by Sola Engineering Inc.

3. The most severe loading conditions on light-duty pavement areas and the subgrade may occur during construction. Consequently, special provisions such as restricted access lanes, half-loads during paving, etc., may be required, especially if construction is carried out during unfavourable weather.
4. It is recommended that Sola Engineering Inc. be retained to review the final pavement structure designs and drainage plans prior to construction to ensure that they are consistent with the recommendations of this report.

5.10 CONSTRUCTION CONSIDERATIONS

5.10.1 Site Preparatory Works

The site preparation work should include stripping of asphalt concrete, topsoil and fill in order to develop the required construction or engineered fill subgrades. Stripping depths will likely vary locally and should be adjusted to remove all unsuitable material.

It is recommended that a Geotechnical Engineer monitor the stripping operations to ensure that unsuitable materials have been fully removed prior to construction works or the placement of engineered fill. Unacceptable areas identified are to be remediated as soon as practicable with procedures for which would be dependent upon conditions encountered. This could include additional undercutting of unsuitable materials and replaced with controlled, engineered fill as prescribed in Section 5.6 of this report.

5.10.2 General Considerations

Load bearing soils are susceptible to disturbance from environmental (temperature, moisture change, etc.) and construction activity and, as such, due care should be given to minimizing trafficking of such areas during periods of excavation and the construction of floor slab and footings to minimize disturbance of the bearing soils.

Any excessive disturbances of the load bearing and underlying soils affected during construction works could influence the long term settlement of the structures and will therefore, require further excavation and replacement of such impacted soils with suitably engineered fill.

A representative of Sola should evaluate all subgrade surfaces to confirm that the subgrade and founding conditions are consistent with the recommendations given by this report.

6.0 MATERIALS TESTING AND INSPECTION

It is recommended that a qualified geotechnical firm is appointed to carry out field inspection and material testing during construction to ensure that the construction complies with the design recommendations.

7.0 DRAWING REVIEW

Once the final design drawings for this project are prepared, it is recommended that one (1) set of the drawings should be submitted to Sola for review to make any amendments to our recommendations that may be required, prior to starting construction.

Sola should also be retained for a general review of the final design and specifications to verify that this report has been properly interpreted and implemented. If not accorded the privilege of making this review, Sola will assume no responsibility for interpretation of the recommendations in this report.

The comments given in this report are preliminary and intended only for the guidance of design engineers. Contractors bidding on or undertaking the works should make their own interpretations of the factual borehole results, so that they may draw their own conclusions on how the subsurface conditions may affect them.

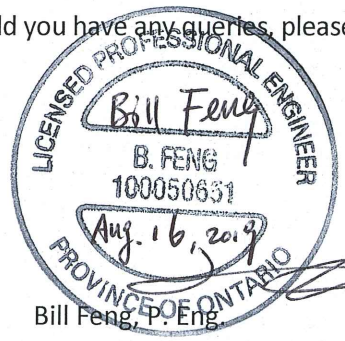
The information in this report in no way reflects on the environmental aspects of the soil conditions at the site and has not been addressed in this report, since this aspect was beyond the scope and terms of reference.

8.0 CLOSURE

This report is subject to the Statement of Limitations which forms an integral part of this document. The Statement of Limitations is not intended to reduce the level of responsibility accepted by Sola, but rather to ensure that all parties who have been given reliance for this report are aware of the responsibilities each assumes in so doing.

We trust that this report meets your needs. Should you have any queries, please contact the Sola office.

Sincerely,
SOLA ENGINEERING INC.



Harjot Gandhi, EIT

Bill Feng, P. Eng.
Chief Engineer

PP

Y:\PROJECTS\10269-(1471)-Valour Capital co S2S-GEO-Highrise-418_422 Guelph-Burlington-Aug\GEO\08 Draft Reports\S0197-10923-Final.docx
Enclosures

STATEMENT OF LIMITATIONS

Standard of Care and Basis of this Report
Sola Engineering Inc. ("Sola Engineering") has prepared this report in a manner consistent with generally accepted engineering and/or environmental practices in the jurisdiction in which the specified services were provided. The information and conclusions set out in this report reflects Sola Engineering's best professional judgment in light of the information available to Sola Engineering at the time of preparation. Sola Engineering disclaims any and all warranties, express or implied, including without limitation any warranty of merchantability and/or fitness for a particular purpose, and makes no representations concerning the legal effect, interpretation or significance of this report or the information, conclusions or recommendations contained in it.

The conclusions and recommendations provided in this report have been prepared in relation to the specified site (the "Site") and the proposed project (the "Project"), as described by the Client to Sola Engineering. Given the nature of the work undertaken by Sola Engineering as part of this report, the Client acknowledges that ground conditions may vary over distances and may change over time. Should there arise any changes to the conditions of the Site or the Project (as to purpose or design), Sola Engineering is to be notified within a reasonable period of time, and in any event within 24 hours of the Client's learning of such changes, so as to give Sola Engineering an opportunity to review and revise this report in light of such changes. Sola Engineering accepts no liability or responsibility for any use of this report or reliance on this report following any changes to the conditions of the Site or the Project.

The scope of professional services provided by Sola Engineering for the Project are as set out in this report. Should such services be limited to those of a geotechnical nature, Sola Engineering shall not be held liable or responsible for any environmental services that may be required, nor shall this report be interpreted to reflect any environmental aspects of the Project. Alternatively, should such services be limited to those of an environmental nature, Sola Engineering shall not be held liable or responsible for any geotechnical services that may be required, nor shall this report be interpreted to reflect any geotechnical aspects of the Project.

This report is not intended to provide recommendations for possible future conditions or use of the Site or adjoining properties. Should the need arise for such recommendations Sola Engineering may need to conduct further investigations.

Use of this Report
This report is intended to be read and used in its entirety. No reliance may be made upon any individual portion or section of this report without reference to the entire report as a whole. In preparing this report, Sola Engineering has relied on information, instructions and communications given by the Client to Sola Engineering, the applicability, truth and accuracy of which is the sole responsibility of the Client.

This report with the information, sampling data, analysis, conclusions and recommendations contained in it (if any), has been prepared for and may only be used by the Client and only for the specific purpose as specified by the Client to Sola Engineering in connection with the Project. Without prior written consent from Sola Engineering, use of this report or any portion thereof by any person or entity other than the Client, or for any purpose other than as communicated by the Client to Sola Engineering, is strictly prohibited. Sola Engineering accepts no liability or responsibility for the unauthorized use of this report. This report and all documents that form part of it are the sole property of Sola Engineering. Sola Engineering relies on and retains any and all intellectual property rights it has in this report, including any copyright to which it is entitled. The Client shall not give, lend or sell this report, or any portion thereof, to any entity, person or association without the express prior written consent of Sola Engineering. This report and the information contained herein shall be treated as strictly confidential.

The contents of this report, inclusive of Sola Engineering's conclusions and recommendations in relation to the Project, are intended only for the guidance of the Client in carrying out the specified services for the Project, as described by the Client to Sola Engineering. Accordingly, Sola Engineering does not accept any liability or responsibility for any inaccuracy contained in this report arising as a result of or in any way connected with any exclusion, oversight or falsification of the information provided to Sola Engineering by the Client. This report, including the effect of the subsurface conditions as described in this report, is to be interpreted at the risk and discretion of the Client and any contractors or others bidding on or undertaking contractual work to be performed as part of the Project who may come into possession of or learn of this report or its contents. It is exigent that all contractors bidding or undertaking the work are to rely on their own interpretations of the data contained in this report in addition to their own investigations and conclusions. Sola Engineering shall not be held liable or responsible for any interpretation of or conclusions that may be drawn from the data or information contained in this report.

The information, recommendations and conclusions presented in this report are based on Sola Engineering's interpretation of conditions revealed through the limited investigation conducted within a defined scope of services. In no event will Sola Engineering be held responsible or liable to the Client or any other person or entity for any special, indirect, incidental, punitive or consequential loss or damage (including, loss of use, lost profits or expenses incurred) resulting from or in any way related to the independent interpretations, interpolations, conclusions or decisions of the Client or any other person or entity, based on the information contained in this report. The restriction of liability includes but is not limited to decisions made to develop, purchase or sell land.

Notwithstanding the exclusions of liability contained herein but without in any way limiting their effect or generality, if there is found to be any finding of liability or responsibility whatsoever on the part of Sola Engineering which in any way relates to or arises from this report, or the information, conclusions or recommendations contained in it, such liability and/or responsibility shall cease and forever be extinguished from and after the date which is two (2) years from the date of this report. In no event shall any liability or responsibility of Sola Engineering exceed the fees charged by Sola Engineering to the Client for the preparation of this report (excluding any arms' length disbursements or expenditures made or incurred by Sola Engineering as a result thereof and reimbursed by the Client).

Site Conditions
The material conditions, classifications, conclusions and recommendations contained in this report were based on the site conditions observed or tested by Sola Engineering or otherwise communicated to Sola Engineering by the Client. The description, identification and classification of soils, rocks, chemical contamination and other materials have been made based on limited investigations, sampling and testing of materials performed by Sola Engineering and its qualified representatives in reliance on the use of relevant or applicable equipment, all in accordance with commonly acceptable standards in the geotechnical and/or environmental disciplines. Accordingly, this report may include assumptions of conditions which are based on discrete sample locations and thus some conditions may not have been detected. The Client accepts all liability and risk for the use of this report and the information and data contained in it. Sola Engineering shall not be held liable or responsible for any conditions beyond the scope of tests conducted on samples of the subsurface and soil conditions of the subject property as set out in this report.

For clarity, the Client acknowledges and accepts that unique risks exist whenever engineering or related disciplines are applied to identify subsurface conditions and even a comprehensive sampling and testing program may fail to detect certain conditions. The environmental, geological, geotechnical, geochemical and hydrogeological conditions that Sola Engineering interprets to exist between sampling points may differ from those that actually exist. As a result, the Client acknowledges and accepts that because of the inherent uncertainties in subsurface evaluations, unanticipated underground conditions may occur or become known subsequent to Sola Engineering's investigation that could affect conclusions, recommendations, total Project cost and/or execution.

Indemnification of Risk
Though Sola Engineering adheres to the highest degree of integrity and employs due diligence in limiting the potential release of toxins and hazardous substances, the risk of accidental release of such substances is a possibility when providing geotechnical and environmental services.

In consideration of the provision of services by Sola Engineering, the Client agrees to defend, indemnify and hold Sola Engineering and its employees and agents harmless from and against any and all claims, liabilities, damages, causes of action, judgments, costs or expenses (including reasonable legal fees and disbursements), resulting from or arising by reason of the death or bodily injury to persons, damage to property, or other loss, whether related to an accidental release of pollutants or hazardous substances occurring as a result of carrying out this Project or otherwise, and whether or not resulting from Sola Engineering's negligent actions or omissions. This indemnification shall include and extend to any and all third party claims brought or threatened against Sola Engineering under any federal or provincial law or statute as a result of Sola Engineering conducting work on the Project. In addition to and notwithstanding the foregoing, the Client further agrees to unconditionally and irrevocably release Sola Engineering from, and not to bring any claims against Sola Engineering in connection with, any of the aforementioned claims or causes.

Subconsultants and Contractor Services
In conjunction with the services provided by Sola Engineering's own employees, external services provided by other persons or entities that are specializing in services other than those offered by Sola Engineering, such as drilling, excavation and laboratory testing, are often employed in order to carry out the defined scope of work. If such external services have been employed for this Project, the Client acknowledges that Sola Engineering is not in any way liable or responsible for any costs, claims or damages in relation to the services rendered by such other persons or entities or payment therefor, nor shall Sola Engineering be liable or responsible for damages for errors, omissions or negligence caused by such other persons or entities while providing such external services.

Work and Job Site Safety
Sola Engineering shall be responsible only for its activities and that of its employees on the Site. Sola Engineering shall not direct any of the fieldwork nor the work of any other person or entity on the Project. The presence of Sola Engineering staff on the Site does not relieve the Client or any contractor on the Site from their responsibilities pertaining to site safety. The Client at all times retains any and all responsibility for the safety of those individuals present on the Site and/or working on the Project, including Sola Engineering's employees.



SOLA ENGINEERING	File No.: 2017-10269	Borehole Locations Plan	The figure provided is for the intended purpose of presenting the approximate borehole locations. This figure should not be used for any other purposes including construction, architecture or for accuracy of dimensions and orientation of objects.	Enclosure No.: 1
	Report Number: 10923-S0197-GEO	Geotechnical Investigation Proposed Highrise Building 418 and 422 Guelph Line, Burlington		
	Date: October 2017	S2S Environmental Inc.		Not to Scale

BOREHOLE LOG

BOREHOLE NO.: 102

ENCLOSURE 2
PAGE 1 **OF** 1

PROJECT NO.: 10269 **DATE:** September 6, 2017
PROJECT: Proposed Residential Development

CLIENT: Valour Capital Managment Inc. c/o S2S Enviromental Inc.
LOCATION: 418 and 422 Guleph Line, Burlington, ON
ELEVATION (M): 101.979 Local **CAVED AT DEPTH (M):** ----
WATER LEVEL DEPTH (M): **DRILLING METHOD:** Hollow Stem
DRILLER: Profile Drilling **DRILL RIG:** D50
LOGGED BY: JA **REVIEWED BY:** HG

LEGEND:

	SS - SPLIT SPOON
	AS - AUGER SAMPLE
	ST - SHELBY TUBE
	CS - CORE SAMPLE
	STABILIZED WATER LEVEL
	CAVED AT
"N"	BLOWS / 0.3 M
M.C.	NATURAL MOISTURE CONTENT (%)
O.V.M	ORGANIC VAPOUR MONITOR
P.L.	PLASTIC LIMIT (%)
L.L.	LIQUID LIMIT (%)

ELEV./ DEPTH (m)	WELL/ PIEZO. DETAIL	SYMBOLS, SAMPLERS TEST DATA	DESCRIPTION	Moisture Content	STANDARD PENETRATION TESTS BLOW COUNTS	STANDARD PENETRATION TESTS "N" VALUE	ELEV./ DEPTH (m)
0			ASPHALTIC CONCRETE - 40 mm	10.1			
		1	GRANULAR BASE - sand and gravel	9.1	4-4-3-3	7	
			FILL - silty sand, trace gravel, dark brown, moist				
		2		9	1-1-1-1-2	2	
100.5 1.5			- trace rootlets				
		3		10.7	2-2-1-1	3	
		4		18.7	2-2-4-8	6	
99 3			SILTY SAND - brown, compact, moist				
		6		23.6	5-7-12-13	19	
97.5 4.5		6		22.9	5-7-7-10	14	
96 6		7	SILTY CLAY TILL - trace shale fragments, brown, hard, moist	9.9	15-38-50***/13	50*	
94.5 7.5		8	- limestone seams	7.7	50**/5	50*	
		R1	SHALE BEDROCK - QUEENSTON FORMATION, trace limestone seams, greyish red, highly weathered to moderately weathered, flat bedded, osccasionally gapped filled with clay lences, weak to medium strong TCR=95%, RQD=90%				
93 9		R2	- TCR=92%, RQD=81%				
91.5 10.5		R3	- TCR=85%, RQD=79%				
			END OF BOREHOLE at TARGETED DEPTH of 10.82 m				

P.L.-L.L. M.C. "N" Value
20 40 60 80

Notes: 50***/13 denotes 50 plus blows for 13 cm of sampler penetration after 1st 30 cm;
50**/5 denotes 50 plus blows for 5 cm of sampler penetration;
RQD denotes rock quality designation

This information pertains only to this borehole and should not be interpreted as being indicative of the site.

ENCLOSURE 3
PAGE 1 OF 1

BOREHOLE LOG

BOREHOLE NO.: 103

SOLA ENGINEERING

PROJECT NO.: 10269 **DATE:** September 5, 2017
PROJECT: Proposed Residential Development

CLIENT: Valour Capital Managment Inc. c/o S2S Enviromental Inc.
LOCATION: 418 and 422 Guleph Line, Burlington, ON
ELEVATION (M): 100.437 Local **CAVED AT DEPTH (M):** ----
WATER LEVEL DEPTH (M): **DRILLING METHOD:** Hollow Stem
DRILLER: Profile Drilling **DRILL RIG:** D50
LOGGED BY: HG **REVIEWED BY:** KB

LEGEND:

	SS - SPLIT SPOON
	AS - AUGER SAMPLE
	ST - SHELBY TUBE
	CS - CORE SAMPLE
	STABILIZED WATER LEVEL
	CAVED AT
"N"	BLOWS / 0.3 M
M.C.	NATURAL MOISTURE CONTENT (%)
O.V.M	ORGANIC VAPOUR MONITOR
P.L.	PLASTIC LIMIT (%)
L.L.	LIQUID LIMIT (%)

ELEV./ DEPTH (m)	WELL/ PIEZO. DETAIL	SYMBOLS, SAMPLERS TEST DATA	DESCRIPTION	Moisture Content	STANDARD PENETRATION TESTS: BLOW COUNTS	STANDARD PENETRATION TESTS: "N" VALUE	ELEV./ DEPTH (m)	P.L.-L.L. / M.C. / "N" Value (20 40 60 80)
0		1	TOPSOIL - 125 mm	26.4				
			FILL - silty sand, trace gravel, trace organic, dark brown, moist	2.5	4-10-10-8	20		
99 1.5		2	SILTY SAND - trace rootlest, dark brown, loose, moist	10.5	1-2-3-4	5		
		3		15.7	2-5-7-8	12		
			- wet					
		4		21.5	6-7-9-8	16		
97.5 3			- brown					
		5		20.3	6-11-12-12	23		
96 4.5		6	SILTY CLAY TILL - trace gravel, brownish grey, hard, moist	13.6	10-13-23-16	36		
94.5 6		7	SHALE BEDROCK - QUEENSTON FORMATION, trace limestone seams, red trace grey, completely to highy weathered, very weak to weak	5.6	50*/8	50*		
93 7.5		8	END OF BOREHOLE upon AUGER REFUSAL at DEPTH of 7.51 m	10.2	50*/5	50*		
91.5 9								
90 10.5								

Notes: 50*/8 denotes more then 50 blows after 8 cm of sampler penetration;
50*/5 denotes more then 50 blows after 5 cm of sampler penetration

This information pertains only to this borehole and should not be interpreted as being indicative of the site.

ENCLOSURE 4
PAGE 1 OF 1

BOREHOLE LOG

BOREHOLE NO.: 104

SOLA ENGINEERING

PROJECT NO.: 10269 **DATE:**
PROJECT: Proposed Residential Development

CLIENT: Valour Capital Managment Inc. c/o S2S Enviromental Inc.
LOCATION: 418 and 422 Guleph Line, Burlington, ON
ELEVATION (M): 101.614 Local **CAVED AT DEPTH (M):** ----
WATER LEVEL DEPTH (M): **DRILLING METHOD:** Hollow Stem
DRILLER: Profile Drilling **DRILL RIG:** D50
LOGGED BY: JA **REVIEWED BY:** HG

LEGEND:

	SS - SPLIT SPOON
	AS - AUGER SAMPLE
	ST - SHELBY TUBE
	CS - CORE SAMPLE
	STABILIZED WATER LEVEL
	CAVED AT
"N"	BLOWS / 0.3 M
M.C.	NATURAL MOISTURE CONTENT (%)
O.V.M	ORGANIC VAPOUR MONITOR
P.L.	PLASTIC LIMIT (%)
L.L.	LIQUID LIMIT (%)

ELEV./ DEPTH (m)	WELL/ PIEZO. DETAIL	SYMBOLS, SAMPLERS TEST DATA	DESCRIPTION	Moisture Content	STANDARD PENETRATION TESTS		ELEV./ DEPTH (m)	P.L.-L.L. M.C. "N" Value 20 40 60 80
					BLOW COUNTS	"N" VALUE		
0			ASPHALTIC CONCRETE - 40 mm					
		1	GRANULAR BASE - sand and gravel	3.1 4.1	4-5-7-6	12		
100.5		2	FILL - silty sand, brown, moist	4.9	3-3-5-7	8		
1.5			POSSIBLE FILL - silty sand, brown, moist					
		3	SILTY SAND - brown, compact, moist	4.7	4-5-6-7	11		
99		4		20.1	5-12-17-19	29		
3			- very dense, wet					
		5		17.1	15-24-26-27	50		
97.5								
4.5		6		18.7	13-26-35-39	61		
96								
6		7	SILTY CLAY TILL - trace gravel, trace shale fragments, redish brown, hard, moist	12.1 2.0	45- 50**/10	50*		
94.5			SHALE BEDROCK - QUEENSTON SHALE FORMATION, red trace grey, completely weathered to highy weathered, very weak to weak, occasional limestone thin seams					
7.5		8			50*/5	50*		
			END OF BOREHOLE upon AUGER REFUSAL at DEPTH of 7.51 m					
93								
9								
91.5								
10.5								

Notes: 50*/5 denotes 50 plus blows for 5 cm of sampler penetration;
50**/10 denotes 50 plus blows for 10 cm of sampler penetration after 1st 15 cm

This information pertains only to this borehole and should not be interpreted as being indicative of the site.

ENCLOSURE 5
PAGE 1 OF 1

BOREHOLE LOG

BOREHOLE NO.: 105

SOLA ENGINEERING

PROJECT NO.: 10269 **DATE:** September 6, 2017
PROJECT: Proposed Residential Development

CLIENT: Valour Capital Managment Inc. c/o S2S Enviromental Inc.
LOCATION: 418 and 422 Guleph Line, Burlington, ON
ELEVATION (M): 101.780 Local **CAVED AT DEPTH (M):** ----
WATER LEVEL DEPTH (M): **DRILLING METHOD:** Hollow Stem
DRILLER: Profile Drilling **DRILL RIG:** D50
LOGGED BY: JA **REVIEWED BY:** HG

LEGEND:

	SS - SPLIT SPOON
	AS - AUGER SAMPLE
	ST - SHELBY TUBE
	CS - CORE SAMPLE
	STABILIZED WATER LEVEL
	CAVED AT
"N"	BLOWS / 0.3 M
M.C.	NATURAL MOISTURE CONTENT (%)
O.V.M	ORGANIC VAPOUR MONITOR
P.L.	PLASTIC LIMIT (%)
L.L.	LIQUID LIMIT (%)

ELEV./ DEPTH (m)	WELL/ PIEZO. DETAIL	SYMBOLS, SAMPLERS TEST DATA	DESCRIPTION	Moisture Content	STANDARD PENETRATION TESTS		ELEV./ DEPTH (m)	P.L.-L.L. M.C. "N" Value 20 40 60 80
					BLOW COUNTS	"N" VALUE		
0			ASPHALTIC CONCRETE - 40 mm	2.3				
		1	GRANULAR BASE - sand and gravel	6.0	3-2-3-4	5		
		4	FILL - silty sand, brown, moist	6.0	1-2-1-2	3		
100.5 1.5			POSSIBLE FILL - silty sand, brown, moist					
		3	SILTY SAND - brown, loose, moist	11.2	1-2-2-1	4		
		4	SANDY SILT -light brown, loose, moist	13.9	1-1-3-3	4		
99 3		5	SILTY SAND - brown, compact, moist	22.9	4-6-9-11	15		
97.5 4.5		6		22.5	5-5-9-9	14		
96 6		7	SILTY CLAY TILL - trace gravel, reddish brown, hard, moist	10.5	18-40-35-42	75		
94.5 7.5		8	- inferred limestone cap	12.7	50***/8	50*		
			END OF BOREHOLE upon AUGER REFUSAL at DEPTH of 7.69 m					
93 9								
91.5 10.5								

Notes: 50***/8 denotes 50 plus blows for 8 cm of sampler penetration

This information pertains only to this borehole and should not be interpreted as being indicative of the site.

ENCLOSURE 6
PAGE 1 **OF** 1

BOREHOLE LOG

BOREHOLE NO.: 106

SOLA ENGINEERING

PROJECT NO.: 10269 **DATE:** Septemner 5, 2017
PROJECT: Proposed Residential Development

CLIENT: Valour Capital Managment Inc. c/o S2S Enviromental Inc.
LOCATION: 418 and 422 Guleph Line, Burlington, ON
ELEVATION (M): 100.433 Local **CAVED AT DEPTH (M):** ----
WATER LEVEL DEPTH (M): **DRILLING METHOD:** Hollow stem
DRILLER: Profile Drilling **DRILL RIG:** D50
LOGGED BY: HG **REVIEWED BY:** KB

LEGEND:

	SS - SPLIT SPOON
	AS - AUGER SAMPLE
	ST - SHELBY TUBE
	CS - CORE SAMPLE
	STABILIZED WATER LEVEL
	CAVED AT
"N"	BLOWS / 0.3 M
M.C.	NATURAL MOISTURE CONTENT (%)
O.V.M	ORGANIC VAPOUR MONITOR
P.L.	PLASTIC LIMIT (%)
L.L.	LIQUID LIMIT (%)

ELEV./ DEPTH (m)	WELL/ PIEZO. DETAIL	SYMBOLS, SAMPLERS TEST DATA	DESCRIPTION	Moisture Content	STANDARD PENETRATION TESTS: BLOW COUNTS	STANDARD PENETRATION TESTS: "N" VALUE	ELEV./ DEPTH (m)
0		1	TOPSOIL - 150 mm	2.2	3-5-7-5	12	
			FILL - silty sand, trace asphalt, trace gravel, brown, moist	12.4			
99 1.5		2		9.3	2-3-3-2	6	
			- trace organic, brownish red				
		3		19.3	3-3-3-2	6	
			SILTY SAND - dark brown, compact, wet				
97.5 3		4		23.5	8-10-13-14	23	
		5	- trace gravel, brown, dense, wet	20.9	11-14-16-17	30	
96 4.5							
		6	SILTY CLAY - trace sand, trace shale fragments, brownish grey, hard, moist	14.6	11-14-17-23	31	
94.5 6							
		7		6.8	31-50**/10	50*	
93 7.5		8	END OF BOREHOLE upon AUGER REFUSAL at DEPTH of 7.51 m		50*/5	50*	
91.5 9							
90 10.5							

P.L.-L.L. M.C. "N" Value
20 40 60 80

Notes: 50**/10 denotes 50 plus blows for 10 cm of sampler penetration after 1st 15 cm;
50*/5 denotes 50 plus blows for 5 cm of sampler penetration

This information pertains only to this borehole and should not be interpreted as being indicative of the site.

ENCLOSURE 7
PAGE 1 **OF** 1

BOREHOLE LOG

BOREHOLE NO.: 108

SOLA ENGINEERING

PROJECT NO.: 10269 **DATE:** September 5, 2017
PROJECT: Proposed Residential Development

CLIENT: Valour Capital Managment Inc. c/o S2S Enviromental Inc.
LOCATION: 418 and 422 Guleph Line, Burlington, ON
ELEVATION (M): 99.714 Local **CAVED AT DEPTH (M):** 2.43
WATER LEVEL DEPTH (M): **DRILLING METHOD:** Hollow Stem
DRILLER: Profile Drilling **DRILL RIG:** D50
LOGGED BY: HG **REVIEWED BY:** KB

LEGEND:

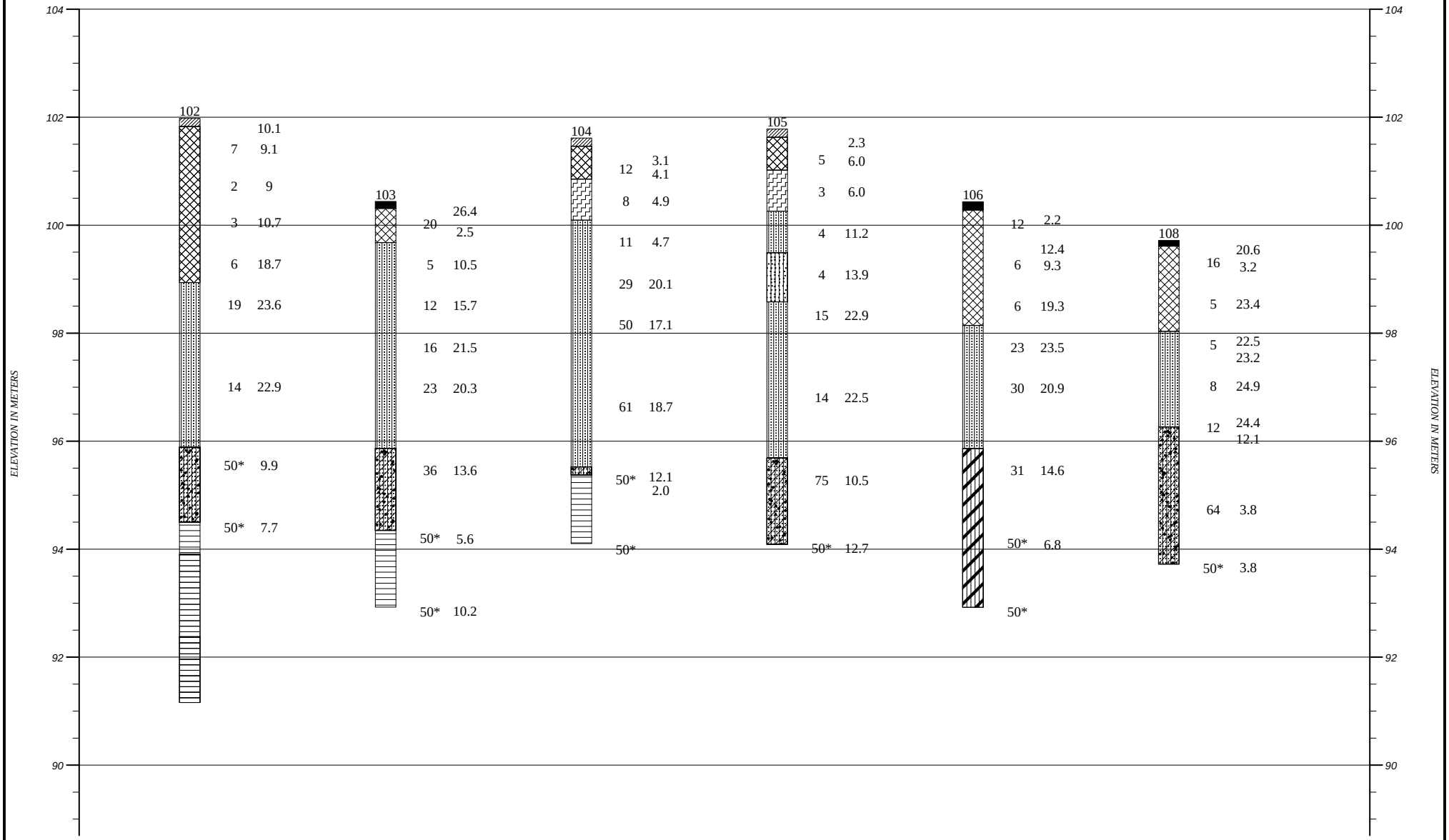
	SS - SPLIT SPOON
	AS - AUGER SAMPLE
	ST - SHELBY TUBE
	CS - CORE SAMPLE
	STABILIZED WATER LEVEL
	CAVED AT
"N"	BLOWS / 0.3 M
M.C.	NATURAL MOISTURE CONTENT (%)
O.V.M	ORGANIC VAPOUR MONITOR
P.L.	PLASTIC LIMIT (%)
L.L.	LIQUID LIMIT (%)

ELEV./ DEPTH (m)	WELL/ PIEZO. DETAIL	SYMBOLS, SAMPLERS TEST DATA	DESCRIPTION	Moisture Content	STANDARD PENETRATION TESTS: BLOW COUNTS	STANDARD PENETRATION TESTS: "N" VALUE	ELEV./ DEPTH (m)
99 / 0			TOPSOIL - 100 mm	20.6			
		1	FILL - silty sand , trace gravel, trace rootlets, trace organic, reddish brown to brown, moist	3.2	2-8-8-10	16	
		2		23.4	2-2-3-4	5	
97.5 / 1.5			- some organic, brownish black, wet				
		3		22.5	2-2-3-4	5	
			SILTY SAND - brown, loose, wet	23.2			
		1					
		4	- dark brown	24.9	3-3-5-8	8	
96 / 3							
		5		24.4	4-5-7-11	12	
			SILTY CLAY TILL - trace gravel, brown, stiff to hard, moist	12.1			
94.5 / 4.5			- trace shale fragments				
		6		3.8	20-28-36-42	64	
93 / 6		7	- inferred limestone cap	3.8	50*/5	50*	
			END OF BOREHOLE upon AUGER REFUSAL at DEPTH of 5.99 m				
91.5 / 7.5							
90 / 9							
88.5 / 10.5							

P.L.-L.L. M.C. "N" Value
20 40 60 80

Notes: 50*/5 denotes 50 plus blows for 5 cm of sampler penetration

This information pertains only to this borehole and should not be interpreted as being indicative of the site.



Plan View

Strata symbols

- Pavement
- Fill
- Silty sand
- Silty clay till
- Shale
- Topsoil
- Possible fill
- Sandy silt
- Silty clay

SOLA ENGINEERING INC.

CONCEPTUAL SOIL PROFILE

HORIZONTAL SCALE:	DRAWN BY/APPROVED BY
VERTICAL SCALE: 1"=100'	

Proposed Residential Development

PROJECT NO. 10269

Enclosure 8

KEY TO SYMBOLS

ENCLOSURE 9

Symbol	Description
Strata symbols	
	**Pavement**
	**Silty sand**
	**Silty clay till**
	**Shale**
	**Topsoil**

Symbol	Description
	**Fill**
	**Possible fill**
	**Sandy silt**
	**Silty clay**
Misc. Symbols	
	Natural Moisture Content
	**Drill Refusal**
	**Cave Depth**

Notes:

Terms describing RELATIVE DENSITY, based on Standard Penetration Test "N"-Value for COURSE GRAINED soils (major portion retained on No. 200 sieve).

DESCRIPTIVE TERM ["N"-Value (blows/0.3m), Relative Density (%)]

- **Very Loose [less than 4, less than 15]**
- **Loose [4 to 10, 15 to 35]**
- **Compact or Medium [10 to 30, 35 to 65]**
- **Dense [30 to 50, 65 to 85]**
- **Very Dense [greater than 50, greater than 85]**

Terms describing CONSISTENCY, based on Standard Penetration Test "N"-Value for FINE GRAINED soils (major portion passing No. 200 sieve)

DESCRIPTIVE TERM [Unconfined Compressive Strength (kPa), "N"-Value (blows/0.3m)]

Very Soft [less than 25, less than 2]
Soft [25 to 50, 2 to 4]
Firm [50 to 100, 4 to 8]
Stiff [100 to 200, 8 to 15]
Very Stiff [200 to 400, 15 to 30]
Hard [greater than 400, greater than 30]

KEY TO SYMBOLS

Symbol **Description**

Soil Samplers



Description not given for: "AS"



Split Spoon



Core Sample

Monitor Well Details

Flush-mount Cover



Pipe Riser



Bentonite Pellets



Silica sand, Blank PVC

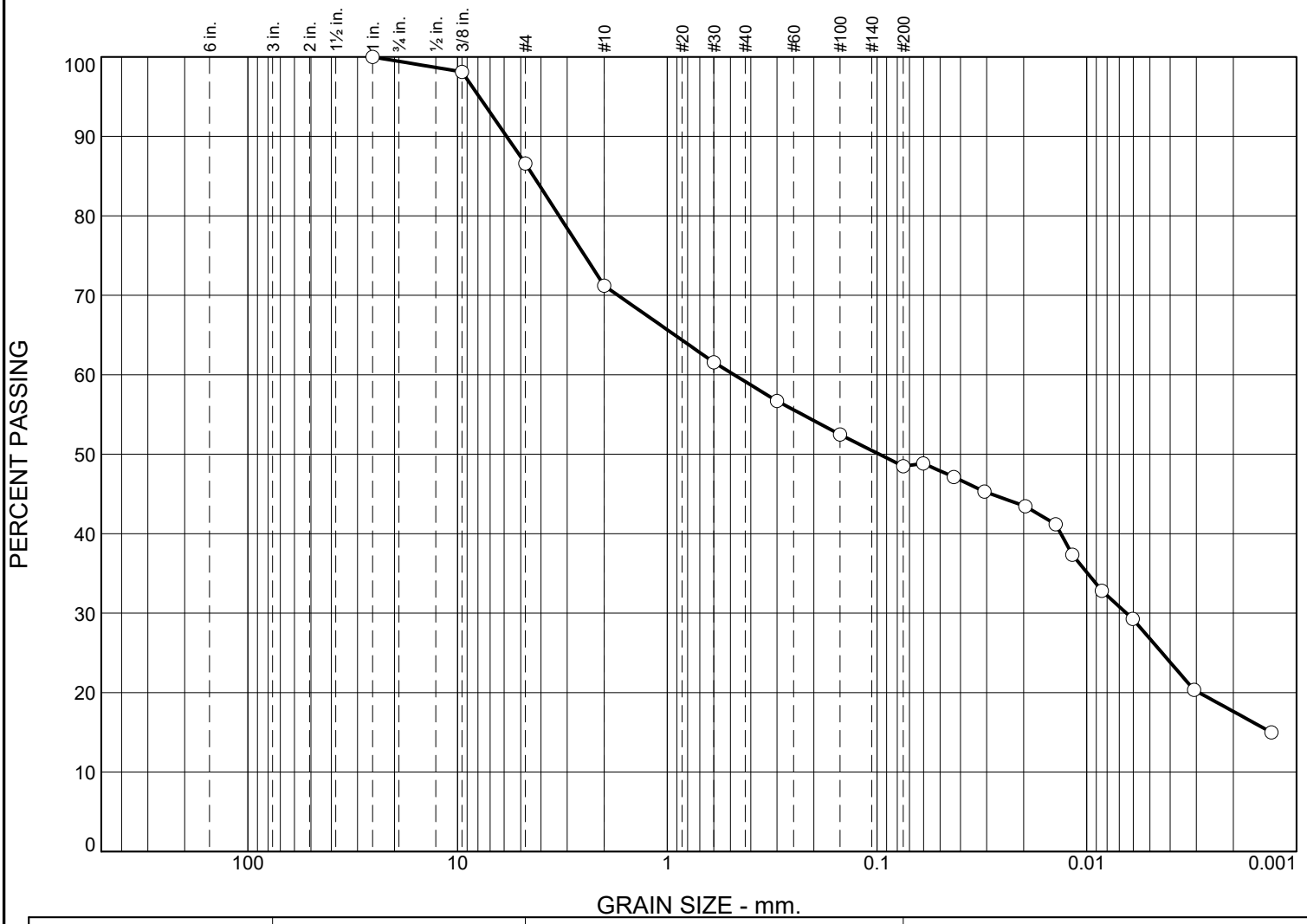


Slotted Pipe w/ Sand



Silica Sand, No Pipe (End Plug)

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines
		Coarse	Fine	Coarse	Medium	Fine	
○	0	1	12	16	12	11	48

	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○	24	13	4.3443	0.4800	0.0976	0.0065	0.0013			

	Material Description	USCS	AASHTO
○	SILTY CLAY TILL (VISUAL MANUAL) SILTY, CLAYEY SAND (LAB)	SC	A-6(2)

Project No. 10269 **Client:** Valour Capital Management

Project: Proposed Residential Development

○ **Location:** BH 105 **Depth:** 20'-22' **Sample Number:** 17-352

Remarks:

○ Sampled by:Harjot

Date: September 5, 2017

Report No: 2017-10923

SOLA ENGINEERING INC.

Enclosure 10

APPENDIX G

PHASE II ESA REPORT

418 & 422 Guelph Line, Burlington, Ontario

Phase Two Environmental Site Assessment

Client:
Waldemar LP
3410 South Service Road
Burlington, ON
L7N 3T2

Attention: Kyle Bittman

Type of Document:
Final

Project Name:
418 and 422 Guelph Line,
Burlington, Ontario
Phase Two Environmental Site Assessment

Project Number:
HAM-00801683-A0

EXP Services Inc.
80 Bancroft Street
Hamilton, ON, L8E 2W5
t: 905.573.4000
f: 905.573.9693

Date Submitted:
2019-10-03

Table of Contents

1. Executive Summary 4
2 Introduction 8
2.1 Site Description 8
2.2 Legal Description and Property Ownership 8
2.3 Current and Proposed future Uses 9
2.4 Applicable Site Condition Standards 9
3 Background Information 12
3.1 Physical Setting 12
3.2 Previous Environmental Investigations 12
4 Scope of Investigation 15
4.1 Overview of Site Investigation 15
4.1.1 Scope of Work 15
4.2 Media Investigated 15
4.3 Phase One Conceptual Site Model 15
4.4 Deviations from Sampling and Analysis Plan 15
4.5 Impediments 16
5. Investigation Method 17
5.1 General 17
5.2 Underground Utilities 17
5.3 Borehole Drilling 17
5.4 Soil: Sampling 17
5.5 Soil: Field Screening Measurements 18
5.6 Groundwater: Monitoring Well Installation 18
5.7 Groundwater: Monitoring Well Development 19
5.8 Groundwater: Purging and Field Measurements of Water Quality Parameters 19
5.9 Groundwater: Sampling 20
5.10 Sediment Sampling 20
5.11 Analytical Testing 20

5.12 Residue Management Procedures 20
5.13 Elevation Survey 20
5.14 Quality Assurance and Quality Control Measures 21
6. Review and Evaluation 22
6.1 Geology 22
6.1.1 Surface Material 22
6.1.2. Fill Material 22
6.1.3. Native Material 22
6.1.4 Bedrock 22
6.2 Groundwater: Elevations and Flow Direction 22
6.2.1 Groundwater: Hydraulic Conductivity 22
6.2.2 Groundwater: Horizontal Hydraulic Gradients 23
6.2.3 Groundwater: Vertical Hydraulic Gradients 23
6.3 Soil Texture 23
6.4 Soil: Field Screening 23
6.5 Soil Quality 24
6.5.1 Petroleum Hydrocarbons 24
6.5.2 Volatile Organic Compounds 24
6.5.3 Soil pH 24
6.5.4 Chemical Transformation and Soil Contaminant Source 24
6.5.5 Evidence of Non-Aqueous Phase Liquid 24
6.6 Groundwater Quality 24
6.6.1 Petroleum Hydrocarbons 25
6.6.2 Volatile Organic Compounds 25
6.6.4 Chemical Transformation and Groundwater Contaminant Source 25
6.6.5 Evidence of Non-Aqueous Phase Liquid (NAPL) 25
6.7 Sediment Quality 26
6.8 Quality Assurance and Quality Control Measures 26
6.9 Phase Two Conceptual Site Model 27
7. Conclusions 28

8. General Limitations 29

9 Closure 30

10 References 31

List of Appendices

Figures

Tables

Appendix A – SAAP

Appendix B – Survey Plan

Appendix C – Borehole Logs

Appendix D – Analytical tables

Appendix E – Certificates of Analysis

Appendix F – P2CSM

Appendix G – Non-Potable Groundwater Letter

1. Executive Summary

EXP Services Inc. (EXP) was retained by Waldemar LP., ("Client") to complete a Phase Two Environmental Site Assessment (ESA) of the property with the municipal addresses 418 and 422 Guelph Line, in Burlington, Ontario (hereinafter referred to as the 'Site').

The Site is located on the southwest side of Guelph Line, approximately 35 m southeast of New Street in Burlington, Ontario. The Site is approximately 0.38 hectares (0.94 acres) in size, and is occupied by a one-storey commercial building with a basement and a two-storey residential structure with a basement ("Site buildings"). The Site building at 422 Guelph Line has a footprint of approximately 930 m^2 (10,000 ft^2) and was constructed circa 1958. The basement of this structure covers the entire footprint of the building. The Site building at 418 Guelph Line was reportedly constructed in 1949. At the time of this Phase One ESA, the Site buildings were vacant.

This Phase Two ESA was conducted in accordance with the Phase Two ESA standard defined by Ontario Regulation 153/04, as amended (O.Reg.153/04); and in accordance with generally accepted professional practices. Subject to this standard of care, EXP makes no express or implied warranties regarding its services and no third-party beneficiaries are intended. Limitation of liability, scope of report and third-party reliance are outlined in Section 7 of this report.

The objective of the Phase Two ESA was to assess the areas of potential environmental concern (APECs) identified in the Draft Phase One ESA completed by EXP, dated July 10, 2019.

The APECs identified in the Phase One ESA for each property are provided in the table below.

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)[1]	Location of PCA (on-Site or off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, soil and/or sediment)
APEC 1: Vent pipe for potential former AST	North of the Site building addressed as 418 Guelph Line	PCA#28- Gasoline and Associated Products Storage in Fixed Tanks	On-Site	Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, ethylbenzene and Xylenes (BTEX), and Metals	Soil and Groundwater
APEC 2: Presence of greenhouses on Site	East portion of Site	PCA#40 – Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	On-Site	OC Pesticides	Soil
APEC 3: De-icing salt application to parking areas	On-Site parking areas on northwest portion of the Site	PCA"Other"-De-icing Salt	On-Site	Electrical Conductivity (EC), Sodium Absorption Ratio (SAR)	Soil

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)[1]	Location of PCA (on-Site or off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, soil and/or sediment)
APEC 4: Fill and vent pipes associated with off Site UST at 422 Guelph Line	Northeast portion of the Site at 422 Guelph Line	PCA#28- Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	PHCs, BTEX, and Metals	Soil and Groundwater
APEC 5: Various automotive repair facilities on west adjacent at 2432 New Street	West portion of the Site	PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems	Off-Site	PHCs, and Volatile Organic Compounds (VOCs)	Groundwater
APEC 6A: Former Motorcycle Repair Center north adjacent to Site at 2434 New Street	North portion of the Site	PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems	Off-Site	PHCs, and VOCs	Groundwater
APEC 6B: Fill / vent pipe on building situated on north adjacent property (2434 New Street)	North portion of the Site	PCA#28: Gasoline and Associated Products Storage in Fixed Tanks.	Off-Site	PHCs, BTEX	Groundwater
APEC 7: Dry cleaning facility 25 m east of the Site at 415 Guelph Line	East boundary of the Site	PCA#37 - Operation of Dry Cleaning Equipment (where chemicals are used)	Off-Site	VOCs	Groundwater
APEC 8: Bulk paint storage 25 m east of the Site at 417 Guelph Line	North portion of the Site	PCA#28: Gasoline and Associated Products Storage in Fixed Tanks.	Off-Site	PHCs, BTEX	Groundwater
APEC 9: Automotive Service Station 30 m north of the Site at 433 Guelph Line	Northeast boundary of the Site	PCA#28 – Gasoline and Associated products in fixed tanks.	Off-Site	PHCs, VOCs	Groundwater
APEC 10: Service Centre 60 m north/northwest of Site at 458 Guelph Line with associated USTs	North portion of Site	PCA#28 – Gasoline and Associated products in fixed tanks.	Off-Site	PHCs, BTEX	Groundwater

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)[1]	Location of PCA (on-Site or off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, soil and/or sediment)
APEC 11A: Automotive service centre 75 m north of Site at 3001 New Street (formerly 457 Guelph Line) with associated USTs	North boundary of the Site	PCA#28 – Gasoline and Associated products in fixed tanks	Off-Site	PHCs, BTEX	Groundwater
APEC 11B: Automotive service centre 75 m north of Site at 3001 New Street (formerly 457 Guelph Line) with associated USTs	North boundary of the Site	PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems	Off-Site	PHCs, VOCs	Groundwater
APEC 12: Dry cleaning facility 180 m northwest of the Site at 480 Guelph Line	Northwest boundary of the Site	PCA#37 - Operation of Dry-Cleaning Equipment (where chemicals are used)	Off-Site	VOCs	Groundwater
APEC 13: Commercial printing establishment north adjacent of Site at 2442 New Street	North portion of the Site	PCA Other – Commercial printing establishment	Off-Site	VOCs	Groundwater

VOCs = volatile organic compounds; PHCs = petroleum hydrocarbons; OCs = Organochlorine Pesticides

Based on the findings of the Phase One ESA and conclusions, a Phase Two ESA was recommended to assess the soil and groundwater conditions at the Site.

The scope of the Phase Two ESA was designed to assess soil and/or groundwater quality associated with the identified APECs (1 to 14) and to determine hydraulic conductivity and hydraulic gradients at the Site. The results and findings of the Phase Two ESA conducted at the Site are summarized as follows:

- On June 10 to June 12, 2019, four (4) boreholes (BH201 to BH203, and re-installation of BH102) were advanced by Geo Environmental Drilling to a maximum depth of 12.2 metres below ground surface (m bgs).
- The general stratigraphy at the Site, as observed in the boreholes, consisted of asphalt/ topsoil generally overlying layers of fill followed by sand, overlain by silty clay/ bedrock.
- The monitoring well network advanced as part of this Phase Two ESA consisted of two (2) monitoring wells screened within the bedrock layer, as well as the re-installation of BH102A. Groundwater levels were measured from the previously installed monitoring wells MW1 to MW4 (BIG), MW101 to MW106 (S2S), and the three (3) newly installed monitoring wells (MW102A, MW201 and MW202) on May 17 and June 12, respectively.
- Based on the groundwater contour map delineated for the Site, the shallow groundwater is anticipated to flow in a south/ southeasterly direction. However, EXP notes that the direction of localized groundwater flow may be influenced by disturbed soil (fill), underground utilities and/or underground building structures in the area. As such, the measured groundwater flow direction may not be representative of the regional area.

- The horizontal hydraulic gradient on-Site ranged from 0.005 m/m (between BH105 and BH/MW4) and 0.006 m/m (between BH/MW2 and BH/MW1).
- The vertical hydraulic gradient on-Site ranged between BH104 and MW201 was 0.048 m/m and between BH/MW4 and MW202 was 0.129 m/m.
- Soil samples were submitted for the analysis of petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene and xylenes (BTEX), and volatile organic compounds (VOCs). The following groundwater analytical results indicated that the samples submitted were above the applicable Table 2 SCS:
    - Vinyl Chloride from BH201 – SS6 and duplicate BH201- SS66 was found to be above the applicable MECP (2011) Table 2 SCS.
    - All other parameters, were either non-detected or detected below their applicable MECP (2011) Table 2 SCS.
- Groundwater samples were submitted for the analysis of PHCs, BTEX, and VOCs. The groundwater sampling program included sampling the newly installed monitoring wells (MW201, MW202 and MW102A) and the existing monitoring wells at the Site. The following groundwater analytical results indicated that the samples submitted were above the applicable Table 3 SCS.
    - Chloroform in groundwater samples MW4 (DUP MW44), and MW103;
    - Cis-1,2-Dichloroethylene in groundwater samples BH/MW1, MW3, MW4 (DUP MW44), MW101, MW102, BH104, MW106, and MW102A (DUP MW1022A);
    - Tetrachloroethylene in groundwater samples BH/MW1, BH/MW2, MW3, MW4 (DUP MW44), MW101, MW102, MW103, BH104, BH105, MW106, and MW102A (DUP MW1022A);
    - Trichloroethylene in groundwater samples BH/MW1, BH/MW2, MW3, MW4 (DUP MW44), MW101, MW102, MW103, BH104, BH105, MW106, and MW102A (DUP MW1022A); and
    - Vinyl Chloride in groundwater samples BH/MW1, MW3, MW102, MW102A (DUP MW1022A), and MW201.
- No evidence of free product (i.e. visible film or sheen), was observed during soil sampling, groundwater purging, or groundwater sampling activities. Slight odours were identified while developing and sampling the monitoring wells.

Based on the results of the Phase Two ESA, there are concentrations of EC/SAR in soil and VOCs in soil and groundwater which are above the generic Table 2 SCS. A Risk Assessment is recommended, to develop Site-specific risk-based criteria based on potential exposure pathways of the identified contaminants.

2 Introduction

EXP Services Inc. (EXP) was retained by Waldemar LP., ("Client") to complete a Phase Two Environmental Site Assessment (ESA) of the property with the municipal addresses 418 and 422 Guelph Line, in Burlington, Ontario (hereinafter referred to as the 'Site').

The Site is located on the southwest side of Guelph Line, approximately 35 m southeast of New Street in Burlington, Ontario. The Site is approximately 0.38 hectares (0.94 acres) in size and is occupied by a one-storey commercial building with a basement and a two-storey residential structure with a basement ("Site buildings"). The Site building at 422 Guelph Line has a footprint of approximately 930 m^2 (10,000 ft^2) and was constructed circa 1958. The basement of this structure covers the entire footprint of the building. The Site building at 418 Guelph Line was reportedly constructed in 1949. At the time of this Phase One ESA, the Site buildings were vacant.

This Phase Two ESA was conducted in accordance with the Phase Two ESA standard defined by Ontario Regulation 153/04, as amended (O.Reg.153/04); and in accordance with generally accepted professional practices. Subject to this standard of care, EXP makes no express or implied warranties regarding its services and no third-party beneficiaries are intended. Limitation of liability, scope of report and third-party reliance are outlined in Section 7 of this report.

The objective of the Phase Two ESA was to assess the areas of potential environmental concern (APECs) identified in the Draft Phase One ESA completed by EXP, dated July 10, 2019.

2.1 Site Description

The Site is located on the southwest side of Guelph Line, approximately 35 m southeast of New Street in Burlington, Ontario. The Phase One Study Area consists of properties within a distance of approximately 250 metres from the Site boundaries. The Phase One Study Area is bound by commercial properties to the north, and west, and residential properties to the south and east.

The Phase One Study Area and a Surrounding Land Use Plan are shown on Figure 2.

The Site has an area of approximately 0.38 hectares (0.94 acres). Based on a review of historical aerial photographs, chain of title information, historical maps, and other records, the Site at 418 and 422 Guelph Line were constructed in 1949 and 1958, respectively.

2.2 Legal Description and Property Ownership

The Site is located on the southwest side of Guelph Line, approximately 35 m southeast of New Street in Burlington, Ontario. The Site has an area of approximately 0.38 hectares (0.94 acres). At the time of this Phase One ESA, the Site buildings were vacant.

Details of the Site are as follows:

Municipal Address	418 Guelph Line, Burlington Ontario
Current Land Use	Commercial
Proposed Land Use	Residential
Legal Description	Part Lot 15 Con 4 NEL SDS as in 388093
Property Identification Number (PIN)	07197-0095 (LT)

Approximate Universal Transverse Mercator (UTM) coordinates	NAD83 17T 598498 m E 4799003 m N
Accuracy Estimate of UTM	10-15 m
Measurement Method	Georeferenced aerial photograph
Site Area	0.19 ha (0.48 acres)
Property Owners, Owner Contact and Address	418 Waldemar Inc. 3410 S Service Road Burlington, ON L7N 3T2

Municipal Address	422 Guelph Line, Burlington Ontario
Current Land Use	Commercial
Proposed Land Use	Residential
Legal Description	Part Lot 16 Con 4 NEL SDS as in 442287
Property Identification Number (PIN)	07197-0094 (LT)
Approximate Universal Transverse Mercator (UTM) coordinates	NAD83 17T 598478 m E 4799019 m N
Accuracy Estimate of UTM	10-15 m
Measurement Method	Georeferenced aerial photograph
Site Area	0.19 ha (0.48 acres)
Property Owners, Owner Contact and Address	422 Waldemar Inc. 3410 S Service Road Burlington, ON L7N 3T2

At the time of the Phase One ESA, the Site buildings were vacant. Based on information provided by the client, both properties will be under the same ownership name (422 Waldemar Inc.) for the filing of the RSC.

2.3 Current and Proposed future Uses

At the time of the Phase Two ESA, the property was zoned for commercial land use according to City of Burlington zoning by-law. Reportedly, the Site is intended to be further developed for residential land use.

2.4 Applicable Site Condition Standards

Analytical results obtained for Site soil and groundwater samples were assessed against Site Condition Standards (SCS) as established under subsection 169.4(1) of the Environmental Protection Act, and presented in the document MECP “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”, (“SGWS” Standards), (MECP, 2011a). Tabulated background SCS (Table 1) applicable to environmentally sensitive Sites and effects based generic SCS (Tables 2 to 9) applicable to non-environmentally sensitive Sites are provided in MECP (2011a). The effects based SCS (Tables 2 to 9) are protective of human health and the environment for different groundwater conditions (potable and non-potable),

land use scenarios (residential, parkland, institutional, commercial, industrial, community and agricultural/other), soil texture (coarse or medium/fine) and restoration depth (full or stratified).

Tables 1 to 9 of MECP (2011a) are summarized as follows:

- Table 1 – applicable to sites where background concentrations must be met (full depth), such as sensitive sites where site-specific criteria have not been derived;
- Table 2 – applicable to sites with potable groundwater and full depth restoration;
- Table 3 – applicable to sites with non-potable groundwater and full depth restoration;
- Table 4 – applicable to sites with potable groundwater and stratified restoration;
- Table 5 – applicable to sites with non-potable groundwater and stratified restoration;
- Table 6 – applicable to sites with potable groundwater and shallow soils;
- Table 7 – applicable to sites with non-potable groundwater and shallow soils;
- Table 8 – applicable to sites with potable groundwater and that are within 30 m of a water body; and,
- Table 9 – applicable to sites with non-potable groundwater and that are within 30 m of a water body.

Application of the generic or background SCS to a specific site is based on a consideration of site conditions related to soil pH (i.e. surface and subsurface soil), thickness and extent of overburden material, (i.e. shallow soil conditions), and proximity to an area of environmental sensitivity or of natural significance. For some chemical constituents, consideration is also given to soil textural classification with SCS having been derived for both coarse and medium-fine textured soil conditions.

For assessment purposes, EXP selected the MECP (2011) Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition for Residential/Parkland/Institutional Property Use and coarse textured soil. The selection of this category was based on the following factors:

- The Site has an overburden thickness greater than 2 m.
- The Site is not located within 30 m of a surface water body or an area of natural significance.
- The soil at the Site has a pH value between 5 and 11 for subsurface soils. However, it is noted that the pH value from the soil sample at BH101 (0-0.6 m bgs) is 9.6 which exceeds the 5 to 9 range for surface soil samples. It is understood that additional soil samples will be collected in this area to confirm the pH value at this location as it is deemed to be anomalous. Therefore, the site is not identified as an environmentally sensitive area and the restrictions identified in Section 41 of O. Reg. 153/04 do not apply.
- The property is not located within an area of natural significance; does not include, nor is it adjacent to an area of natural significance, nor is it part of such an area; and, it does not include land that is within 30 m of an area of natural significance, nor is it part of such an area. Based on the review of available resources from the Ministry of Natural Resources and Forestry and MECP, a woodland was observed 115 m east of the Site.
- The Site is serviced by the City of Niagara Falls water distribution system; and, to the best of EXP's knowledge, all properties within 250 m of the Site are serviced by the municipal water supply (i.e. there are no potable water supply wells located within the Phase One Study Area). However, the City of Burlington objected the application for the Non-Potable Ground Water for filing Record of Site Condition for this Site, due to the highly vulnerable aquifer, as identified in the Region's Source Water protection Planning under Clean Water Act, 2006. The letter of Intent is presented in Appendix G.
- The predominant soil type on the Site is considered to be coarse textured (as per the soil description identified in the borehole logs in Appendix C, and the results of the 75 micron sieve result included in Appendix E).

- The Site proposed land use is residential.
- There is no intention to carry out a stratified restoration at the Site.

3 Background Information

3.1 Physical Setting

The following physiographic, geological and soil maps were reviewed on June 8, 2018:

- “Toporama"; Natural Resources Canada. Scale 1:17,500. 2008.
- Quaternary Geology of Ontario - geology_ll.shp [computer file],Ontario: Ontario Geological Survey, 2000.
- Bedrock Geology of Ontario - geology_ll.shp [computer file],Ontario: Ontario Geological Survey, 2000.
- Physiography of Southern Ontario - geology_ll.shp [computer file], Ontario: Ontario Geological Survey, 2007.

Based on the review of the above maps, the following information was obtained:

- The Site is approximately 92 m above sea level.
- The Site and surrounding areas are relatively flat, and gently slope southeast, towards Lake Ontario, which is located approximately 810 m southeast of the Site. Based on a review of the topographic map, the inferred groundwater flow at the Site and surrounding properties is anticipated to flow southeast towards Lake Ontario.
- The Site and surrounding areas were dominated by Glaciolacustrine deposits, consisting primarily of sand and gravel as well as nearshore and beach deposits.
- The bedrock in the general area was part of the Glaciolacustrine deposits, consisting primarily of sand and gravel as well as nearshore and beach deposits.

3.2 Previous Environmental Investigations

The following reports were available for review at the time of this Phase One ESA.

1. A report entitled “Phase I Environmental Site Assessment, 418 & 422 Guelph Line, Burlington, Ontario”, dated February 7th, 2017, was prepared for exp services Inc. (EXP). Pertinent information from the report is as follows:

- Based on the review of historical records, the Site was used for residential and commercial purposed since at least 1958.
- According to the City Directories, the Site building addressed as 418 Guelph Line was occupied by a real estate office from at least 1971 and prior to that it was florist from approximately 1961 to 1971. Historically, the Site was occupied by a bank and a residential building. Greenhouse structures formerly occupied the eastern portion of the Site. The greenhouses were noted to be a source of potential environmental concern.
- The property addressed as 422 Guelph Line, and the Site building addressed as 422 Guelph Line was occupied by a bowling alley since at least 1961.
- A review of a 1971 FIP and City Directories identified the following environmental concerns:
  - The property at 2439 New Street (currently 458 Guelph Line), located 60 m northwest of the Site, was occupied by a gasoline service station with UST(s) from 1961 to 2011. Given the up-gradient location of the property with respect to the inferred groundwater flow direction, the property and UST were considered to be issues of potential environmental concern.
  - The property at 433 Guelph Line, located approximately 30 m northeast, was occupied by a gasoline station with a UST from approximately 1957 to 1967.

  - The property at 2440A New Street (current location of 2432 New Street), located southwest adjacent to the Site, was occupied by an auto repairs facility from approximately 1967 to 2011. Given the close proximity of the property relative to the Site, this property was considered to be an issue of potential environmental concern.
  - The property at 3001 New Street (formerly 457 Guelph Line), located approximately 75 m north of the Site, was formerly occupied by what appears to be an auto service facility and UST. Given the up-gradient location of the property relative to the Site, this property was considered to be an issue of potential environmental concern.
  - The property at 415 Guelph Line, situated approximately 25 m east of the Site, was occupied by City Laundry & Dry Cleaners in 1961;
- TSSA indicated that there was a record of three (3) active underground fuel tanks at 458 Guelph Line, located 60 m northwest of the Site. Based on the proximity and inferred up-gradient location relative to the Site, this property was identified as an issue of potential environmental concern to the Site.
- The review of the ERIS Report identified the following concerns:
  - The property addressed as 458 Guelph Line was occupied by Petro Canada, a service station associated with decommissioned tanks. Suncor Energy Products occupied this property and installed three (3) USTs. Gasoline was identified in a borehole on the property in 2001 and an investigation took place. A tank leak was reported in 1988.
  - The property addressed as 3001 New Street was listed as gasoline service station from 1992 to 1998 (addressed as 457 Guelph Line).
- An AST used for furnace oil was observed on the Site addressed as 418 Guelph Line in a structure adjoined to the garage. According to the Site representative, furnace oil was formerly used to heat the residence.
- A furnace oil UST was noted to exist beneath the steps north adjacent to the Site building addressed as 422 Guelph Line. Fill and vent pipes to the UST were observed in the northeast portion of the basement. Mapping resources indicated the UST appeared to be situated off-Site.
- At the time of the Site visit, Petro Canada was situated on the property addressed as 458 Guelph Line situated approximately 60 m northwest of the Site and up-gradient with respect to the anticipated groundwater flow direction.

Based on a review of the above reports, the following PCAs as defined in Table 2 Schedule D of O.Reg 153/04 were identified for the Site:

- The former presence of greenhouses on the Site addressed as 418 Guelph Line is associated with PCA#40 – Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications.
- The Site was noted to have an abandoned AST formerly used to for heating oil at 418 Guelph Line. This is associated with PCA#28 – Gasoline and Associated products in fixed tanks.
- A UST was noted to exist northeast adjacent to the Site building addressed as 422 Guelph Line and fill and vent pipes were observed in the basement. This is associated with PCA#28 – Gasoline and Associated products in fixed tanks.
- The property at 433 Guelph Line was occupied by a gasoline station with a UST and associated with PCA#28- Gasoline and Associated Products Storage in Fixed Tanks.
- The property at 2440A (currently 2432 New Street) was occupied by an auto repair facility and associated with PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems.
- The property at 3001 New Street (formerly 457 Guelph Line) was occupied by an auto service facility with PCA#28- Gasoline and Associated Products Storage in Fixed Tanks and PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems.

- The property at 415 Guelph Line was occupied by City Laundry & Dry Cleaners and associated with PCA#37 - Operation of Dry-Cleaning Equipment (where chemicals are used).
- The property at 433 Guelph Line was occupied by a gasoline service operation and associated with PCA#28 – Gasoline and Associated products in fixed tanks.
- The property at 458 Guelph Line (formerly 2439 New Street) was occupied by Kirby BP Service Station, Petro Canada, and Suncore Energy Products and TSSA had records of three (3) active USTs. Gasoline was noted to have leaked from a UST and was identified in a borehole. At the time of the 2017 Site visit, this property remained occupied by Petro Canada. This property is associated with PCA#28 – Gasoline and Associated products in fixed tanks.

The need for a Phase Two ESA on the Site was identified in the Draft Phase One ESA conducted for the Site by EXP, dated July 10, 2019. Based on the findings of the Phase One ESA, including a review of previously completed reports, numerous Potentially Contaminating Activities (PCAs) were identified within the Phase One ESA Study Area (Figure 2). Fourteen (14) corresponding Areas of Potential Environmental Concern (APECs) were identified.

Based on the findings of the Phase One ESA and conclusions, a Phase Two ESA was recommended to assess the soil and groundwater conditions at the Site.

4 Scope of Investigation

4.1 Overview of Site Investigation

The objective of the Phase Two ESA was to assess the APECs identified in EXP's (2019) Phase One ESA to obtain soil and groundwater data to further characterize the Site to support the filing of a RSC on the MECP's Environmental Brownfield Site Registry.

4.1.1 Scope of Work

The scope of work for the Phase Two ESA was as follows:

- Request local utility locating companies (e.g. cable, telephone, gas, hydro, water, sewer and storm water) to mark any underground utilities present at the Site;
- Retain a private utility locating company to mark any underground utilities present in the vicinity of the proposed borehole locations and to clear the individual borehole locations;
- Oversee a licensed drilling company to advance a total of four (4) boreholes across the Site;
- Install two (2) vertical delineation monitoring wells for vertical delineation purposes (BH/MW201 and BH/MW 202);
- Decommission BH102 and reinstall to 6 m bgs (as per comments provided by the MECP);
- One (1) shallow borehole in the vicinity of the AST (BH203);
- Collect representative soil samples from the boreholes for laboratory analysis of PHCs, VOCs, Metals, pH, and/or 75-micron sieve;
- Develop the three (3) newly installed groundwater monitoring wells, and ten (10) previously installed wells by BIG and S2S in 2017;
- Collect groundwater samples from the newly installed and existing monitoring wells for laboratory analysis of PHCs, VOCs, and/or Metals;
- Complete an elevation survey of all newly installed monitoring wells to determine the groundwater flow direction in the groundwater unit(s) identified beneath the Site; and,
- Analyze the data and prepare a report of the findings, in accordance with O.Reg.153/04.

4.2 Media Investigated

The Phase Two ESA included the investigation of the Site soil and/or groundwater. As there were no surface water bodies on the Site, sediment sampling was not required.

4.3 Phase One Conceptual Site Model

The Phase One Conceptual Site Model (CSM) is incorporated into the Phase Two CSM, presented in Appendix F.

4.4 Deviations from Sampling and Analysis Plan

The field investigative and sampling program was carried out following the requirements of the Site Sampling and Analysis Plan (SAAP) presented in Appendix A. No significant deviations from the SAAP were reported, that could affect the sampling and data quality objectives for the Site.

4.5 Impediments

The Site was accessible at the time of the investigation, and no physical impediments were encountered during the field investigation

5. Investigation Method

5.1 General

The Site investigative activities consisted of the following:

- Borehole drilling to facilitate the collection of soil samples for geologic characterization and/or chemical analysis; and,
- Monitoring well installation for hydrogeologic characterization and the collection of groundwater samples for chemical analysis.

Boreholes were advanced in the topsoil and overburden soils by a licensed drilling company under the full-time supervision of EXP staff. The drilling equipment used to advance the boreholes is described below. No petroleum-based greases or solvents were used during drilling activities.

Monitoring wells were installed in the boreholes by a MECP licensed well contractor in accordance with Ontario Regulation 903/90, as amended (O.Reg. 903) using manufactured well components (i.e. riser pipes and screens) and materials (i.e. sand pack and grout) from documented sources.

The approximate locations of the boreholes and monitoring wells are shown on Figure 2.

5.2 Underground Utilities

Prior to the commencement of drilling activities, the locations of underground utilities including but not limited to cable, telephone, natural gas, electrical lines, water, sewer and storm water conduits were marked out by public locating companies. In addition, a private utility locating service (Bulls-Eye) was retained to clear individual borehole locations.

5.3 Borehole Drilling

The fieldwork for the soil investigative portion of the Phase Two ESA was carried out between June 10 and 12, 2019. The boreholes were advanced under the full-time supervision of EXP staff.

Four (4) boreholes (BH201 to BH203, and re-installation of BH102) were advanced by Geo Environmental Drilling to a maximum depth of 12.2 metres below ground surface (m bgs). The boreholes were advanced using a Truck-Mounted CME 75-3 and a Bosh Electric equipped with hallow stem augers. A summary of the boreholes advanced is provided in Table 2.

EXP continuously monitored the drilling activities to record the physical characteristics of the soil, depth of soil sample collection and total depth of boreholes. Field observations are summarized on the borehole logs provided in Appendix C. Representative soil samples were recovered from the boreholes continuously using split-spoon samplers or acetate liners.

All soil cuttings were stored in drums on the Site.

5.4 Soil: Sampling

The soil sampling conducted during the completion of this Phase Two ESA was undertaken in accordance with the SAAP presented in Appendix A, to ensure that soil quality in the APECs identified in the Phase One ESA was characterized in accordance with O.Reg.153/04.

Soil samples for geologic characterization and chemical analysis were collected on a discrete basis in the overburden materials using 5 cm diameter, 60 cm long, split spoons or acetate liners advanced into the subsurface using a track-mounted direct push drill rig or a Bosh Electric. The soil cores were extruded from the samplers upon retrieval by drilling personnel. Geologic details of the recovered cores were logged by EXP field staff and samples were collected from selected cores for chemical analysis. Field observations are summarized on the borehole logs prepared from the field logs and provided in Appendix C.

Measures were taken in the field and during transport to preserve sample integrity prior to chemical analysis. Recommended volumes of soil samples selected for chemical analysis were collected from the recovered cores into pre-cleaned, laboratory-supplied glass sample jars/vials identified for the specified analytical test group. Samples intended for PHC fractions F1 and VOCs were collected using a laboratory-supplied soil core sampler, placed into the vials containing methanol for preservation purposes and sealed using Teflon lined lids.

Soil samples selected for laboratory analysis were placed in clean coolers containing ice prior to and during transportation to the subcontract laboratory, Maxxam Analytics Inc. (Maxxam) of Mississauga, Ontario. The samples were transported/submitted within the acceptable holding time to Maxxam following Chain of Custody protocols for chemical analysis.

Decontamination and other protocols were followed during sample collection and handling to minimize the potential for sample cross-contamination. New disposable nitrile gloves were used for the handling and sampling of each retrieved soil core. The sampling equipment (i.e. split spoons) was decontaminated between borehole locations by the drilling contractor using a potable water/phosphate-free detergent solution followed by rinses with potable water and de-ionized water. Wash and rinse waters were collected in sealed, labeled containers. Drill cuttings were placed in labeled, sealed drums upon completion of sampling.

Soil samples submitted for specific chemical analysis were selected on the basis of visual inspection of the recovered cores, TOV readings, sample location and/or depth interval. The rationale for soil sample submission is presented in Table 3.

Soil samples were also collected and submitted for grain size analysis.

Appropriate quality assurance/quality control (QA/QC) samples were collected during soil sampling, including field duplicate samples, as presented in Section 5.14 and Table 3.

5.5 Soil: Field Screening Measurements

Where required for the characterization of volatile parameters, a portion of each soil core was placed in a sealed plastic bag and allowed to reach ambient temperature prior to field screening, using an RKI Eagle II (RKI) device equipped with a Photoionization Detection (PID) instrument, calibrated with isobutylene and hexane gases. The measurements were made by inserting the instrument's probe into the plastic bag while manipulating the sample to ensure volatilization of the soil gases. These readings provide a real-time indication of the relative concentration of combustible vapours encountered in the subsurface during drilling and are used to aid in the assessment of the vertical and horizontal extent of volatile parameter contamination and the selection of soil samples for analysis.

The field screening measurements, in parts per million (ppm) isobutylene and hexane equivalents, are presented on the borehole logs in Appendix C. It should be noted that field measurements are for screening purposes only and the presence/absence of contamination is determined by laboratory analysis.

Each sample was additionally examined for visual, textural and olfactory classification at the time of sampling.

5.6 Groundwater: Monitoring Well Installation

Three (3) of the four (4) boreholes advanced at the Site were instrumented with monitoring wells. The monitoring wells were installed in general accordance with the Ontario Water Resources Act - R.R.O. 1990, Regulation 903 - amended to O. Reg. 128/03, and were installed by licensed well contractors (Geo Environmental Drilling).

The monitoring wells consisted of a 3 m or 1.5 m length, 51 mm diameter number 10 slot size (0.25 mm) PVC well screen and Schedule 40 PVC riser pipe. All pipe connections were factory machined threaded flush couplings. The annular space around the wells was backfilled with silica sand to an average height of 0.3 m above the top of the screen. A bentonite seal was added

from the top of the sand pack to approximately 0.3 m below ground surface. The monitoring wells were completed with a flush-mount well casing. A summary of the monitoring well installation details is provided in Table 4.

EXP continuously monitored the well installation activities. Well installation details are summarized in Table 4 and on the borehole logs provided in Appendix C.

When the monitoring wells are no longer required, they must be decommissioned in accordance with the procedure outlined in the Ontario Water Resources Act - R.R.O. 1990, Regulation 903 - amended to O. Reg. 128/03.

Measures taken to minimize the potential for cross contamination or the introduction of contaminants during well construction included:

- The use of well pipe components (e.g. riser pipe and well screens) with factory machined threaded flush coupling joints;
- Construction of wells without the use of glues or adhesives;
- Removing the protective plastic wraps from well components at borehole insertion to prevent contact with the ground and other surfaces; and,
- Cleaning of augers between sampling locations.

5.7 Groundwater: Monitoring Well Development

Following the installation of monitoring wells, the newly installed monitoring wells, and ten (10) of the existing monitoring wells were developed, on June 12 and May 17, 2019, respectively, to remove fine sediment particles from the sand pack and enhance hydraulic communication with the surrounding formation waters. The new monitoring wells were developed using dedicated low-density polyethylene (LDPE) tubing, equipped with an inertial foot-valve to disturb the water column and recover groundwater containing dislodged sediment particles. The wells were developed until approximately 3 to 5 well volumes of water were removed and/or until purged dry.

5.8 Groundwater: Purging and Field Measurements of Water Quality Parameters

At least 24 hours following the monitoring well development activities, the depth to groundwater at each monitoring well was measured utilizing an electronic water level meter obtained from Spectra Scientific Inc. (Spectra) of Mississauga, ON. The water level measurements were recorded on log sheets or in a bound field book. The water level meter was decontaminated between monitoring well locations.

Prior to collecting groundwater samples, field measurements of water quality parameters were recorded from the thirteen (13) monitoring wells utilizing low-flow purging and sampling methodologies. Groundwater was purged from each location using a peristaltic pump and dedicated LDPE tubing. Field measurements of dissolved oxygen concentration, electrical conductivity, oxidation-reduction potential, pH, temperature, turbidity and water levels were recorded at three (3) minute intervals during the purging activities using a pre-calibrated multi probe water quality meter, a turbidity meter and a water level meter. Groundwater was considered to be chemically stable when the pH measurements of three (3) successive readings agreed to within ± 1 pH units, the specific conductance within ± 10%, and the temperature within ± 10%. The multi-meter electrodes were calibrated prior to receipt of the meter by the supplier using in-house reference standards.

All development and purged water was collected and stored on Site in labeled, sealed containers, until properly managed or disposed off-Site.

Equipment used during groundwater monitoring were thoroughly cleaned and decontaminated between wells. Well purging details were recorded on log sheets or in a bound field book.

5.9 Groundwater: Sampling

The groundwater sampling conducted during the completion of this Phase Two ESA was undertaken in accordance with the SAAP presented in Appendix A, to ensure that the APECs identified in the Phase One ESA were properly characterized, in accordance with O.Reg.153/04.

Upon completion of purging activities, groundwater samples were collected from monitoring wells. Recommended groundwater sample volumes were collected into pre-cleaned laboratory-supplied vials or bottles provided with analytical test group specific preservatives, as required. The samples were placed in an insulated cooler pre-chilled with ice immediately upon collection. Samples for VOCs and/or PHC F1 analysis were collected in triplicate vials prepared with concentrated sodium bisulphate as a preservative. Each VOC/PHC vial was inverted and inspected for gas bubbles prior to being placed in the cooler to ensure that no head-space was present in the samples. Samples for Inductively Coupled Plasma Mass Spectrometry (ICPMS) metals were collected using disposable 0.45 micron field filters, supplied by Spectra, or laboratory filtered.

All groundwater samples were placed in clean coolers containing ice prior to and during transportation to the subcontract laboratory, Maxxam. The samples were transported/submitted following appropriate holding time requirements following Chain of Custody protocols for chemical analysis.

Decontamination and other protocols were followed during sample collection and handling to minimize the potential for sample cross-contamination. New disposable nitrile gloves were used at each monitoring well location.

Groundwater samples submitted for specific chemical analysis were selected on the basis of sample location and/or depth interval. The rationale for groundwater sample submission is presented in Table 5.

Appropriate QA/QC samples were collected during groundwater sampling, including field duplicate samples and trip blanks, where required, as presented in Table 5.

5.10 Sediment Sampling

As no water body was present at the Site, sediment sampling was not part of the Phase Two ESA.

5.11 Analytical Testing

The contractual laboratory selected to perform the chemical analyses was Maxxam Analytics Inc., of Mississauga, ON. Maxxam is an accredited laboratory under the Standards Council of Canada/Canadian Association of Environmental Analytical Laboratories (Accredited Laboratory No. 97 and No. A3200, respectively) in accordance with ISO/IEC 17025:2005 – “General Requirements for the Competence of Testing and Calibration Laboratories”.

5.12 Residue Management Procedures

The residue materials produced during the borehole drilling, soil sampling programs and monitoring well sampling programs comprised of soil cuttings from drilling activities, decontamination fluids from equipment cleaning, and waters from well development and purging. All soil cuttings were stored in drums on the north central portion of the Site until the material was properly disposed of at an off-Site MECP licensed landfill facility. All development and purged water was collected and stored on-Site in labeled, sealed containers, until disposed of off-Site at a MECP licensed landfill facility.

5.13 Elevation Survey

An elevation survey was conducted during the Phase Two ESA investigative activities, with the purpose of obtaining relative vertical control of the monitoring well locations. The top of pipe and ground surface elevations of each monitoring well were surveyed relative to an arbitrary benchmark. The temporary benchmark was the survey marker observed on the central east boundary of the Site.

5.14 Quality Assurance and Quality Control Measures

Quality Control/Quality Assurance measures, as set out in the Sampling and Analysis Plan, were implemented during sample collection, storage and transport to provide accurate data representative of conditions in the surficial fill and upper overburden soils and the water table aquifer. The QA/QC measures included decontamination procedures to minimize the potential for sample cross contamination, the execution of standard operating procedures to collect representative and unbiased samples, the collection of quality control samples to evaluate sample precision and accuracy, and the implementation of measures to preserve sample integrity.

Decontamination protocols were followed during sample collection and handling to minimize the potential for cross-contamination. During the collection of soil samples, split-spoon and duel tube samplers were scraped and decontaminated between sampling intervals by washing with a potable water/phosphate-free detergent solution followed by a rinse with potable water. New disposable nitrile gloves were used for the handling and collection of samples from each soil core and for sample collection from each borehole.

Soil samples selected for chemical analyses were collected from the retrieved soil cores and placed directly into pre-cleaned, laboratory-supplied glass jars or vials. Sample volumes were consistent with analytical test group requirements as specified by the receiving laboratory.

Groundwater samples were collected into pre-clean laboratory-supplied vials or bottles provided with analytical test group specific preservatives, as required. Recommended analytical test group specific sample volumes were collected as specified by the contractual laboratory. Sample vials for analysis of PHC F1 (BTEX) and VOCs were inspected for the presence of gas bubbles and the presence of head space, where volatiles may partition into.

Measures were followed to preserve sample integrity between collection and receipt by the contractual laboratory. All samples, both soil and groundwater, immediately upon collection were placed in insulated coolers pre-chilled with ice for storage and transport to the contractual laboratory. Samples were received by the contractual laboratory within specific analytical test group holding time requirements.

Documentation procedures were followed to confirm sample identification and tracked sample movement. Each sample was assigned a unique identification ID number, which was recorded along with the date, time of sampling and requested analyses on labels affixed to the sampling containers, and in a bound field notebook. Chain of Custody protocols were followed to track sample handling and movement until receipt by the contractual laboratory. Field QA/QC samples were collected during the soil and groundwater sampling. Duplicate samples were collected to evaluate sampling precision to evaluate the potential for sample cross-contamination during handling and transport.

Two (2) duplicate soil samples, BH201-SS66 and BH223-SS1, were collected from BH201-SS6 and BH203-SS1 respectively and submitted for analysis of VOCs and PHCs with BTEX, for QA/QC purposes. Two (2) duplicate groundwater samples (BH/MW22 and BH1044) were collected from monitoring wells BH/MW2and BH104, respectively and submitted for analysis of PHCs and BTEX parameters for QA/QC purposes. Three (3) duplicates groundwater samples (BH/MW22, BH44, and BH/MW1022A) were collected from monitoring wells BH/MW2, MW4 and BH/MW102A, respectively, and submitted for analysis of VOC parameters for QA/QC purposes. In addition, two (2) trip blank samples were analyzed for VOCs

6. Review and Evaluation

6.1 Geology

The soil investigation conducted at the Site for the environmental assessment consisted of the advancement of four (4) boreholes into the topsoil material and the underlying native materials to a maximum depth of 12.2 m bgs. The borehole logs describing geologic details of the soil cores recovered during the Site drilling activities are presented in Appendix C. Boundaries of soil indicated on the log sheets are intended to reflect transition zones for the purpose of environmental assessment and should not be interpreted as exact planes of geological change.

The general stratigraphy at the Site, as observed in the boreholes, consisted of asphalt/ topsoil generally overlying layers of fill followed by sand, overlain by silty clay/ bedrock. A brief description of the soil stratigraphy at the Site, in order of depth, is summarized in the following sections. Refer to borehole logs provided in Appendix C for details of soil stratigraphy. The interpreted Site geology is also shown on the enclosed cross sections (Figures 21 and 22).

6.1.1 Surface Material

Topsoil with thickness of approximately 100 mm and asphalt of approximately 50 - 100 mm was encountered at the surface of all boreholes.

6.1.2. Fill Material

Fill material was encountered below the asphalt/ topsoil in majority of the boreholes extending to depths between 0.05 m bgs and 2.13 m bgs. The fill comprised generally of sand, with trace silt and gravel.

6.1.3. Native Material

Fine sand, and silty clay material was encountered below the fill material and extended to depths of approximately 5.95 m bgs.

6.1.4 Bedrock

Bedrock was encountered at BH201and BH202 to the maximum investigated depth of 12.2 m.

6.2 Groundwater: Elevations and Flow Direction

The monitoring well network advanced as part of this Phase Two ESA consisted of three (3) monitoring wells. Ten (10) existing monitoring wells (MW1 to MW4 installed by BIG, and BH101 to BH106, installed by S2S) were screened between 1.5 and 10.7 m bgs and three (3) newly installed monitoring wells (MW201, MW202 and MW102A) were screened between 2.74 and 12.2 m bgs, within the sand layer (MW102S), and the bedrock (MW201 and MW202). Groundwater levels were measured between May 21 and June 20, 2019. The groundwater levels and corresponding elevations are summarized in Table 6, and presented in the borehole logs provided in Appendix C.

Based on the groundwater contour map delineated for the Site, the shallow groundwater is anticipated to flow in an east/southeasterly direction. A groundwater contour map is presented in Figure 6. However, EXP notes that the direction of localized groundwater flow may be influenced by disturbed soil (fill), underground utilities and/or underground building structures in the area. As such, the measured groundwater flow direction may not be representative of the regional area.

6.2.1 Groundwater: Hydraulic Conductivity

Based on the soil types and textual values provided in the textbook called Groundwater by Alan R. Freeze and John A. Cherry, the value is approximately 1 x 10-6 m/s.

6.2.2 Groundwater: Horizontal Hydraulic Gradients

The horizontal hydraulic gradient, between each monitoring well pair, is calculated using the following equation:

$$i = \Delta h/\Delta s$$

Where,

i = horizontal hydraulic gradient;

Δh (m) = groundwater elevation difference; and,

Δs (m) = separation distance.

The horizontal hydraulic gradient on-Site ranged from 0.005 m/m (between BH105 and BH/MW4) and 0.006 m/m (between BH/MW2 and BH/MW1) as shown in Table 7.

6.2.3 Groundwater: Vertical Hydraulic Gradients

The horizontal hydraulic gradient, between each monitoring well pair, is calculated using the following equation:

$$iv = (h2-h1)/(z2-z1)$$

Where,

i = vertical hydraulic gradient;

z (m) = bottom of well elevation minus 50; and,

h (m) = difference between the groundwater elevation bottom of well elevation plus z.

The vertical hydraulic gradient on-Site ranged between BH104 and MW201 was 0.048 m/m and between BH/MW4 and MW202 was 0.129 m/m as shown in Table 8.

6.3 Soil Texture

Based on the 75 micron sieve of representative soil, the soil texture at the Site was determined to be coarse textured soils (refer to the 75 micron sieve analysis in the Certificates of Analysis - Appendix E)

6.4 Soil: Field Screening

TOV readings from each sample interval were measured for soil sample selected for BTEX/PHC and VOC analysis from all advanced boreholes. Vapour concentrations readings collected during subsurface drilling were measured using the RKI Eagle 2 in ppm calibrated with isobutylene and hexane or equivalent. The vapour readings, in ppm, are provided on the borehole logs in Appendix C.

Soil samples submitted for chemical analysis were selected on the basis of visual inspection of the recovered cores, TOV readings, sample location and/or depth interval. Both hexane and isobutylene readings indicate that there are insignificant volatile particles in the soil vapours.

6.5 Soil Quality

In accordance with the scope of work, chemical analyses were performed on selected soil samples recovered from the boreholes. The selection of representative "worst case" soil samples was based on field screening, visual and/or olfactory evidence of impacts, and the presence of potential water bearing zones. Copies of the laboratory Certificates of Analysis for the analyzed soil samples are provided in Appendix E. A summary of the analytical results for the soil samples, including the locations and depths of each sample, a comparison of concentrations against applicable SCS, and the identification of the potential contaminants of concern, are provided in Appendix D.

6.5.1 Petroleum Hydrocarbons

One (1) soil sample, including one (1) QA/QC field duplicate (BH223-SS1) were analyzed for PHCs including BTEX. The results of the analysis together with the applicable Table 2 SCS are presented in Table D-1 in Appendix D.

As shown in Table D-1, PHCs were not detected above the laboratory RDLs. The laboratory RDLs were below the Table 2 SCS.

6.5.2 Volatile Organic Compounds

One (1) soil sample, including one (1) QA/QC field duplicate (BH201-SS66) were analyzed for VOCs. The results of the analysis together with the applicable Table 2 SCS are presented in Table D-2 in Appendix D.

The following compounds were detected in exceedances of the MECP (2011) Table 2 SCS.

- Vinyl Chloride in soil sample BH201 – SS6 and duplicate BH201- SS66.

As shown in Table D-2, the remaining VOCs were not detected above the laboratory RDLs. The laboratory RDLs were below the Table 2 SCS.

6.5.3 Soil pH

The Table 2 SCS criteria are applicable if soil pH is in the range of 5 to 9 for surface soil (less than 1.5 m below soil surface) and 5 to 11 for subsurface soil (greater than 1.5 m below soil surface). It is noted that the pH value from the soil sample at BH101 (0-0.6 m bgs) is 9.6 which exceeds the 5 to 9 range for surface soil samples. Additional soil samples will be collected in this area to confirm the pH value at this location as it is deemed to be anomalous. The remaining pH values from previous analytical results (S2S) were within the acceptable range to use the Table 2 SCS.

Refer to Table D-5 for a summary of the soil samples analyzed for pH.

6.5.4 Chemical Transformation and Soil Contaminant Source

No chemical constituents were detected in the soil samples. It is anticipated that the soil exceedances are associated with the APECs identified off-Site (former dry cleaner).

6.5.5 Evidence of Non-Aqueous Phase Liquid

Inspection of the soil cores retrieved from the boreholes did not indicate the presence of non-aqueous phase liquid (NAPL), staining, or sheen at the time of the Phase Two ESA.

6.6 Groundwater Quality

In accordance with the scope of work, chemical analyses were performed on groundwater samples recovered from the monitoring wells. The selection of groundwater samples was based on location and/or screen depth. Copies of the laboratory Certificates of Analysis for the analyzed groundwater samples are provided in Appendix E. A summary of the analytical results

for the groundwater samples, including the locations of each sample, well screen interval depth, a comparison of parameter concentrations against applicable SCS, and the identification of the PCOCs, are provided in Appendix D.

6.6.1 Petroleum Hydrocarbons

Based on the findings in the 2017 Phase II ESAs by BIG and S2S, PHC parameters in groundwater samples MW1 and MW2 were above the Table 2 SCS. EXP resampled the wells in 2019 to confirm the concentration of PHCs from MW1 and MW2. Based on the analytical results from two rounds of groundwater sampling from the existing wells MW1 and MW2 the concentration of PHCs is below the Table 2 SCS.

Seven (7) groundwater samples including two (2) QA/QC field duplicates (BH/MW22 and BH1044) were analyzed for PHCs including BTEX. The results of the analysis together with the applicable Table 2 SCS are presented in Table D-7 in Appendix D.

As shown in Table D-7, PHCs including BTEX were detected below the laboratory RDLs in the analyzed samples. The laboratory RDLs were below the Table 2 SCS.

It is noted that the historic PHCs exceedance in groundwater at MW1 and MW2 may be a result of sediment in the samples during the groundwater sampling procedures or incomplete well development. As such, additional well purging was conducted prior to groundwater sampling. In addition, these wells were sampled utilizing low flow sampling procedures to reduce the potential for sediment interference. A review of the 2019 analytical results indicated that the concentrations of PHCs in the groundwater samples from MW1 and MW2 are below laboratory detection limits in this Phase Two ESA, and the laboratory detection limits are below Table 2 SCS. As such, the PHCs analytical results of groundwater samples from MW1 and MW2 in 2017 Phase II ESA have been superseded.

6.6.2 Volatile Organic Compounds

Eighteen (18) groundwater samples, including two (2) QA/QC field duplicates and two (2) trip blank samples were analyzed for VOCs. The results of the analysis together with the applicable Table 2 SCS are presented in Table D-8 in Appendix D.

The following compounds were detected in exceedances of the MECP (2011) Table 2 SCS.

- Chloroform in groundwater samples MW4 (DUP MW44), and MW103;
- Cis-1,2-Dichloroethylene in groundwater samples BH/MW1, MW3, MW4 (DUP MW44), MW101, MW102, BH104, MW106, and MW102A (DUP MW1022A);
- Tetrachloroethylene in groundwater samples BH/MW1, BH/MW2, MW3, MW4 (DUP MW44), MW101, MW102, MW103, BH104, BH105, MW106, and MW102A (DUP MW1022A);
- Trichloroethylene in groundwater samples BH/MW1, BH/MW2, MW3, MW4 (DUP MW44), MW101, MW102, MW103, BH104, BH105, MW106, and MW102A (DUP MW1022A); and
- Vinyl Chloride in groundwater samples BH/MW1, MW3, MW102, MW102A (DUP MW1022A), and MW201.

As shown in Table D-8, the remaining VOCs were either not detected or detected below the applicable Table 2 SCS. The laboratory RDLs were below the Table 2 SCS.

6.6.4 Chemical Transformation and Groundwater Contaminant Source

The groundwater impacts noted consist of chlorinated solvents and sodium/ chloride based on previous environmental investigation and the current Phase Two ESA. The chlorinated solvents are likely associated with an off-site source (former dry cleaner) and the sodium/chloride is likely associated with the use of salt for de-icing purposes on asphalt paved surfaces.

6.6.5 Evidence of Non-Aqueous Phase Liquid (NAPL)

Inspection of the purged groundwater retrieved from the monitoring wells did not indicate the presence of NAPL, staining, or sheen. Slight odours were identified while developing and sampling the monitoring wells.

6.7 Sediment Quality

As no surface water body was located on-Site, the Phase Two ESA did not include sediment sampling.

6.8 Quality Assurance and Quality Control Measures

Quality assurance and quality control measures were taken during the field activities to meet the objectives of the sampling and quality assurance plan to collect unbiased and representative samples to characterize existing conditions in the overburden and bedrock materials, and water table units at the Site.

Review of field activity documentation indicated that recommended sample volumes were collected from soil and groundwater for each analytical test group into appropriate containers and preserved with proper chemical reagents in accordance with the protocols set out in the "Protocol for Analytical Methods used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" (MECP, 2004). Samples were preserved at the required temperatures in pre-chilled insulated coolers and met applicable holding time requirements, when relinquished to the receiving laboratory.

Field QA/QC samples were collected during soil and groundwater sampling. A total of two (2) soil and four (4) groundwater duplicate samples were collected to evaluate sampling precision. Two (2) trip blank samples were analyzed for VOCs. Refer to Tables D-1, D-2, D-7 and D-8 for a summary of the QA/QC samples collected and submitted for chemical analysis

The field duplicate sample results were quantitatively evaluated by calculating the relative percent difference (RPD). Assessment of the duplicate soil and groundwater sample showed that the results generally met analytical test group specific acceptance criteria. The overall assessment indicates that the soil and groundwater samples were collected with an acceptable level of precision, and the data is acceptable quality for meeting the objectives of the Phase Two ESA.

The contractual laboratory selected to perform the chemical analyses was Maxxam Analytics Inc., of Mississauga, ON. Maxxam is an accredited laboratory under the Standards Council of Canada/Canadian Association of Laboratory Accreditation (Accredited Laboratory No. 97 and No. A3200, respectively) in accordance with ISO/IEC 17025:2005 – "General Requirements for the Competence of Testing and Calibration Laboratories". Certificates of Analysis were received from Maxxam reporting the results of all the chemical analyses performed on the submitted soil and groundwater samples. Copies of the Certificates of Analysis are provided in Appendix E. Review of the Certificates of Analysis, prepared by Maxxam, indicates that they were in compliance with the requirements set out under subsection 47(3) of O. Reg. 153/04.

The analytical program conducted by Maxxam included analytical test group specific QA/QC measures to evaluate the accuracy and precision of the analytical results and the efficiency of analyte recovery during solute extraction procedures. The laboratory QA/QC program consisted of the preparation and analysis of laboratory duplicate samples to assess precision and sample homogeneity, method blanks to assess analytical bias, spiked blanks and QC standards to evaluate analyte recovery, matrix spikes to evaluate matrix interferences and surrogate compound recoveries (VOCs only) to evaluate extraction efficiency. The laboratory QA/QC results are presented in the Quality Assurance Report provided in the Certificate of Analysis prepared by Maxxam. The QA/QC results are reported as percent recoveries for matrix spikes, spike blanks and QC standards, relative percent difference for laboratory duplicates and analyte concentrations for method blanks. The QA/QC results were assessed against test group control limits in the case of spiked blanks, matrix spikes and surrogate recoveries and alert criteria in the case of method blanks and laboratory duplicates. Review of the laboratory QA/QC results reported by Maxxam indicated that they were within acceptable control limits or below applicable alert criteria for the sampled media and analytical test groups. Based on the assessment of the QA/QC, the analytical results reported are of acceptable quality and data qualifications are not required.

6.9 Phase Two Conceptual Site Model

This section presents a Phase Two Conceptual Site Model (CSM) providing a narrative, graphical and tabulated description integrating information related to the Site geologic and hydrogeologic conditions, areas of potential environmental concern/potential contaminating activities, the presence and distribution of potential contaminants of concern, contaminant fate and transport, and potential exposure pathways. The Phase Two CSM was completed in accordance with O. Reg.153/04 as defined by the MECP and is presented in Appendix F

7. Conclusions

The results and findings of the Phase Two ESA conducted at the Site are summarized as follows:

- On June 10, to June 12, 2019, four (4) boreholes (BH201 to BH203, and re-installation of BH102) were advanced by Geo Environmental Drilling to a maximum depth of 12.2 metres below ground surface (m bgs).
- The general stratigraphy at the Site, as observed in the boreholes, consisted of asphalt/ topsoil generally overlying layers of fill followed by sand, overlain by silty clay/ bedrock.
- The monitoring well network advanced as part of this Phase Two ESA consisted of two (2) monitoring wells screened within the bedrock layer, as well as the re-installation of BH102A. Groundwater levels were measured from the previously installed monitoring wells MW1 to MW4 (BIG), MW101 to MW106 (S2S), and the three (3) newly installed monitoring wells (MW102A, MW201 and MW202) on May 17 and June 12, respectively.
- Based on the groundwater contour map delineated for the Site, the shallow groundwater is anticipated to flow in a south/ southeasterly direction. However, EXP notes that the direction of localized groundwater flow may be influenced by disturbed soil (fill), underground utilities and/or underground building structures in the area. As such, the measured groundwater flow direction may not be representative of the regional area.
- The horizontal hydraulic gradient on-Site ranged from 0.005 m/m (BetweenBH105 and BH/MW4) and 0.006 m/m (between BH/MW2 and BH/MW1).
- The vertical hydraulic gradient on-Site ranged between BH104 and MW201 was 0.048 m/m and between BH/MW4 and MW202 was 0.129 m/m.
- Soil samples were submitted for the analysis of petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene and xylenes (BTEX), and volatile organic compounds (VOCs).
    - Vinyl Chloride in soil sample BH201 – SS6 and duplicate BH201- SS66 was found to be above the applicable MECP (2011) Table 2 SCS.
    - All other parameters, were either non-detected or detected below their applicable MECP (2011) Table 2 SCS.
- Groundwater samples were submitted for the analysis of PHCs, BTEX, and VOCs. The groundwater sampling program included sampling the newly installed monitoring wells (MW201, MW202 and MW102A) and the existing monitoring wells at the Site. The following groundwater analytical results indicated that the samples submitted were above the applicable Table 3 SCS.
    - Chloroform in groundwater samples MW4 (DUP MW44), and MW103;
    - Cis-1,2-Dichloroethylene in groundwater samples BH/MW1, MW3, MW4 (DUP MW44), MW101, MW102, BH104, MW106, and MW102A (DUP MW1022A);
    - Tetrachloroethylene in groundwater samples BH/MW1, BH/MW2, MW3, MW4 (DUP MW44), MW101, MW102, MW103, BH104, BH105, MW106, and MW102A (DUP MW1022A);
    - Trichloroethylene in groundwater samples BH/MW1, BH/MW2, MW3, MW4 (DUP MW44), MW101, MW102, MW103, BH104, BH105, MW106, and MW102A (DUP MW1022A); and
    - Vinyl Chloride in groundwater samples BH/MW1, MW3, MW102, MW102A (DUP MW1022A), and MW201.
- No evidence of free product (i.e. visible film or sheen), was observed during soil sampling, groundwater purging, or groundwater sampling activities. Slight odours were identified while developing and sampling the monitoring wells.

Based on the results of the Phase Two ESA, there are concentrations of EC/SAR in soil and VOCs in soil and groundwater which are above the generic Table 2 SCS. A Risk Assessment is recommended, to develop Site-specific risk-based criteria based on potential exposure pathways of the identified contaminants.

8. General Limitations

The information presented in this report is based on a limited investigation designed to provide information to support an assessment of the current environmental conditions within the subject property. The conclusions and recommendations presented in this report reflect Site conditions existing at the time of the investigation.

More specific information with respect to the conditions between samples, or the lateral and vertical extent of materials may become apparent during excavation operations. The interpretation of the borehole information must, therefore, be validated during any such excavation operations. Consequently, during the future development of the property, conditions not observed during this investigation may become apparent. Should this occur, EXP Services Inc. should be contacted to assess the situation, and the need for additional testing and reporting. EXP has qualified personnel to provide assistance in regards to any future geotechnical and environmental issues related to this property.

The environmental investigation was carried out to address the intent of applicable provincial Regulations, Guidelines, Policies, Standards, Protocols and Objectives administered by the Ministry of the Environment and Climate Change. It should also be noted that current environmental Regulations, Guidelines, Policies, Standards, Protocols and Objectives are subject to change, and such changes, when put into effect, could alter the conclusions and recommendations noted throughout this report. Achieving the study objectives stated in this report has required us to arrive at conclusions based upon the best information presently known to us. No investigative method can completely eliminate the possibility of obtaining partially imprecise or incomplete information; it can only reduce the possibility to an acceptable level. Professional judgment was exercised in gathering and analyzing information obtained and in the formulation of the conclusions. Like all professional persons rendering advice, we do not act as absolute insurers of the conclusions we reach, but we commit ourselves to care and competence in reaching those conclusions.

Our undertaking at EXP, therefore, is to perform our work within limits prescribed by our clients, with the usual thoroughness and competence of the engineering profession. It is intended that the outcome of this investigation assist in reducing the client's risk associated with environmental impairment. Our work should not be considered 'risk mitigation'. No other warranty or representation, either expressed or implied, is included or intended in this report.

This report was prepared for the exclusive use of 418 Waldemar Inc. and 422 Waldemar Inc. may not be reproduced in whole or in part, without the prior written consent of EXP, or used or relied upon in whole or in part by other parties for any purposes whatsoever. Any use which a third party makes of this report, or any part thereof, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. EXP Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

9 Closure

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

Yours truly,

EXP Services Inc.



Patricia McMullan, B.Eng, EIT
Environmental Scientist
Environmental Services



Stephanie Hsia, B.Sc
Team Lead - Hamilton
Environmental Services



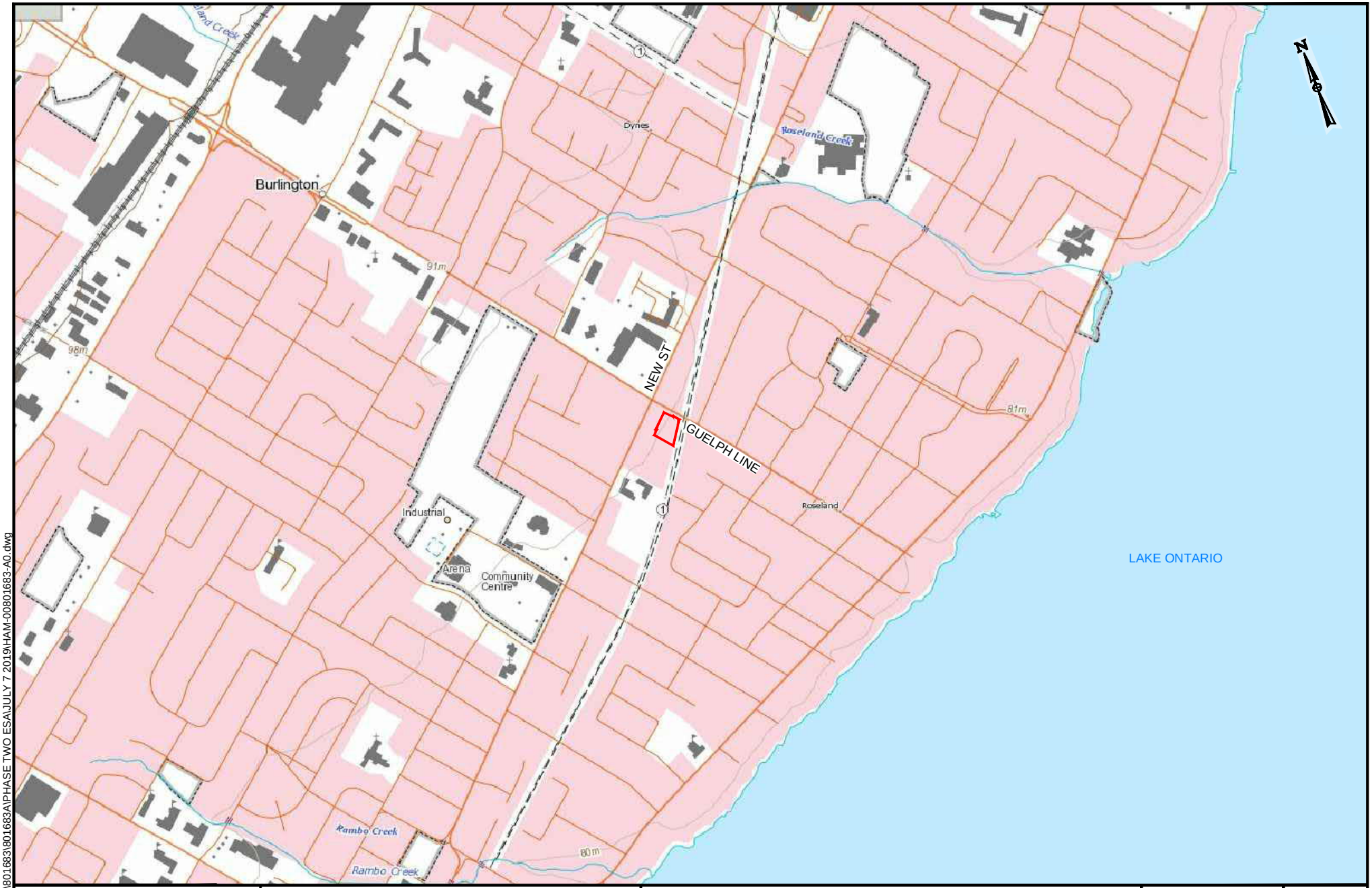
Samuel Lee, P.Geo.
Senior Project Manager
Environmental Services

10 References

This study was conducted in general accordance with the applicable Regulations, Guidelines, Policies, Standards, Protocols and Objectives administered by the Ministry of the Environment. Specific reference is made to the following:

- Canadian Standards Association [CSA] (2000) Z769-00, Phase II Environmental Site Assessment. Canadian Standards Association, March 2000.
- Environmental Protection Act, R.S.O. 1990, Chapter E.19, as amended, September 2004.
- Ministry of the Environment [MECP] (1996) Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario. Ontario Ministry of the Environment, December 1996.
- MECP (2011a) Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Ontario Ministry of the Environment, March 2004, amended as of July 1, 2011.
- MECP (2011) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Ontario Ministry of the Environment, April 15, 20101.
- Occupational Health and Safety Act - Ministry of Labour (MOL).
- Ontario Regulation 153/04, made under the Environmental Protection Act, May 2004, amended.
- Ontario Water Resources Act – R.R.O. 1990, Regulation 903, amended.
- Ontario Geological Survey (2010a) Physiography of Southern Ontario (Scale 1:22,000).
- Topographic Map available at the Natural Resources Canada (NRC) website http://atlas.nrcan.gc.ca/site/english/maps/topo/map
- Ontario Geological Survey (2010b) Surficial geology of Southern Ontario (Scale 1:22,000).
- Ontario Geological Survey (2011) Bedrock geology of Ontario (Scale 1:22,000).

Figures



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada

www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

APPROXIMATE SITE BOUNDARY

SCALE

150 0 150 300 450 600 750m

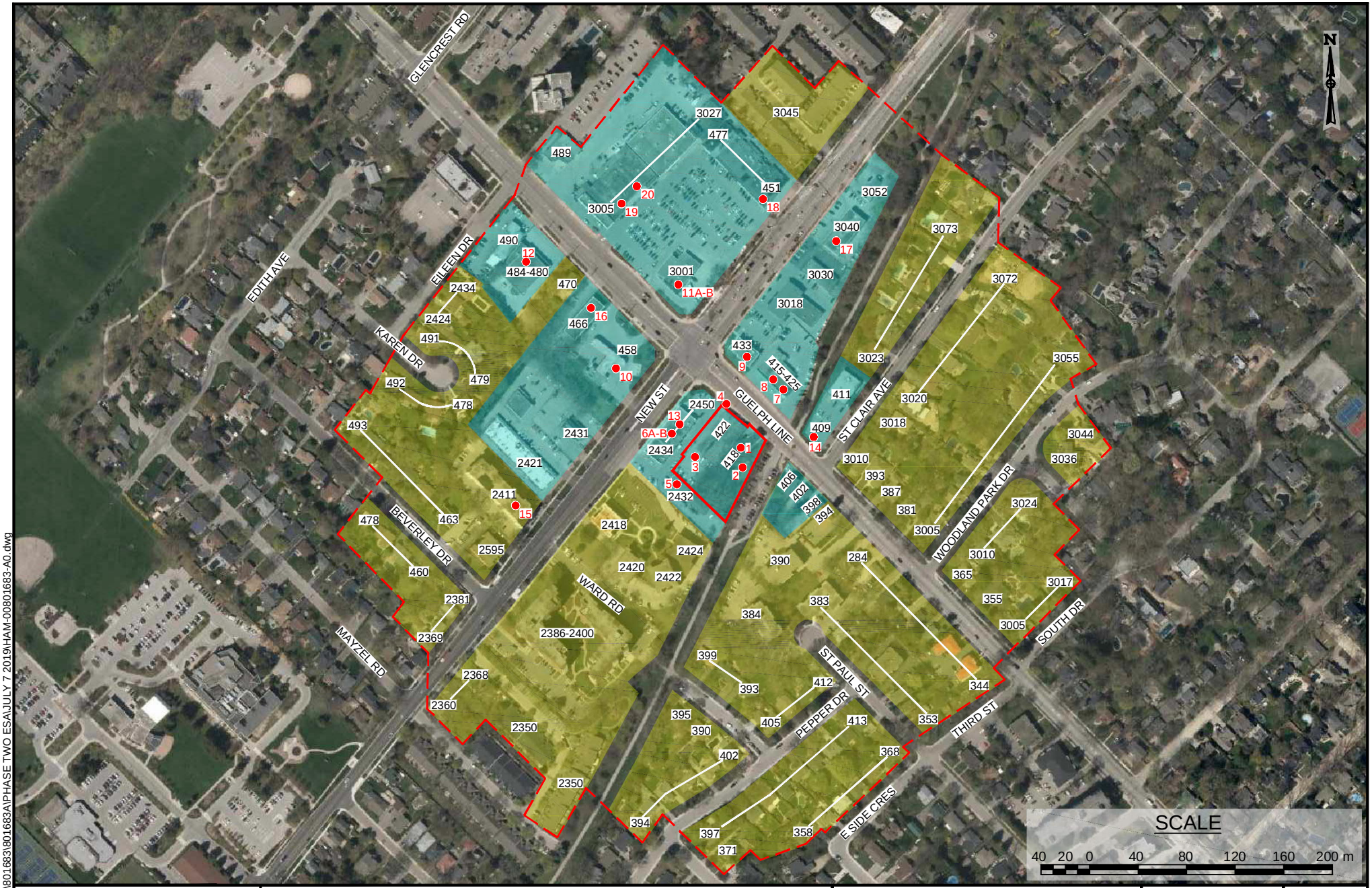
TITLE AND LOCATION:

SITE LOCATION PLAN

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	1

X:\DRAWINGS\80100\80160\80168\80168\3\80168\3A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- PHASE I STUDY AREA
- 1 PCA IDENTIFIER
- RESIDENTIAL
- COMMERCIAL

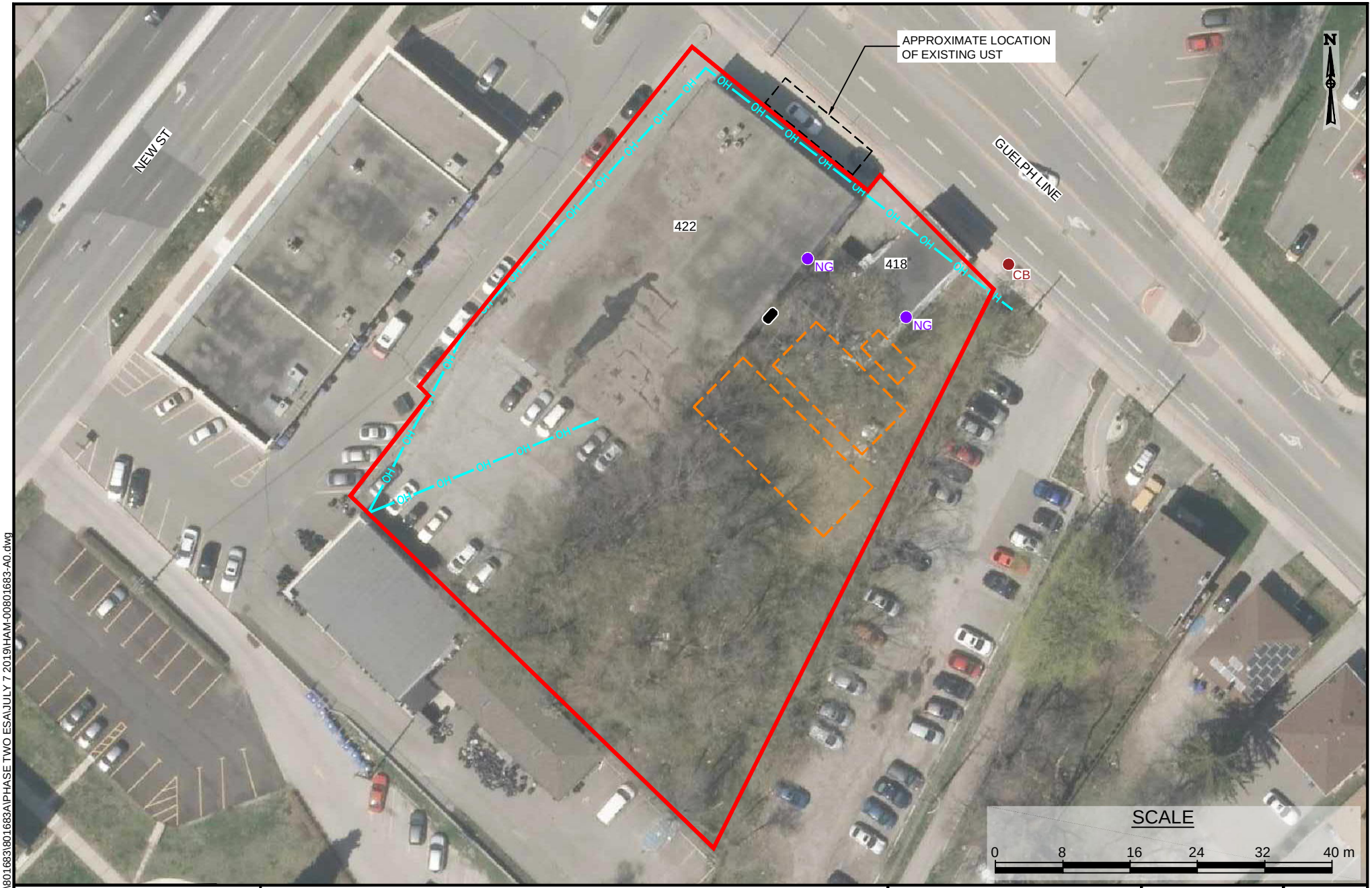
TITLE AND LOCATION:

SURROUNDING LAND USE PLAN, PHASE I STUDY AREA AND PCAs

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	2

X:\DRAWINGS\80100018016001801683\801683\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- OH — OVERHEAD LINES
- CB — CATCH BASIN
- NG — NATURAL GAS HOOK-UP
- APPROXIMATE FORMER LOCATION OF GREEN HOUSE
- AST

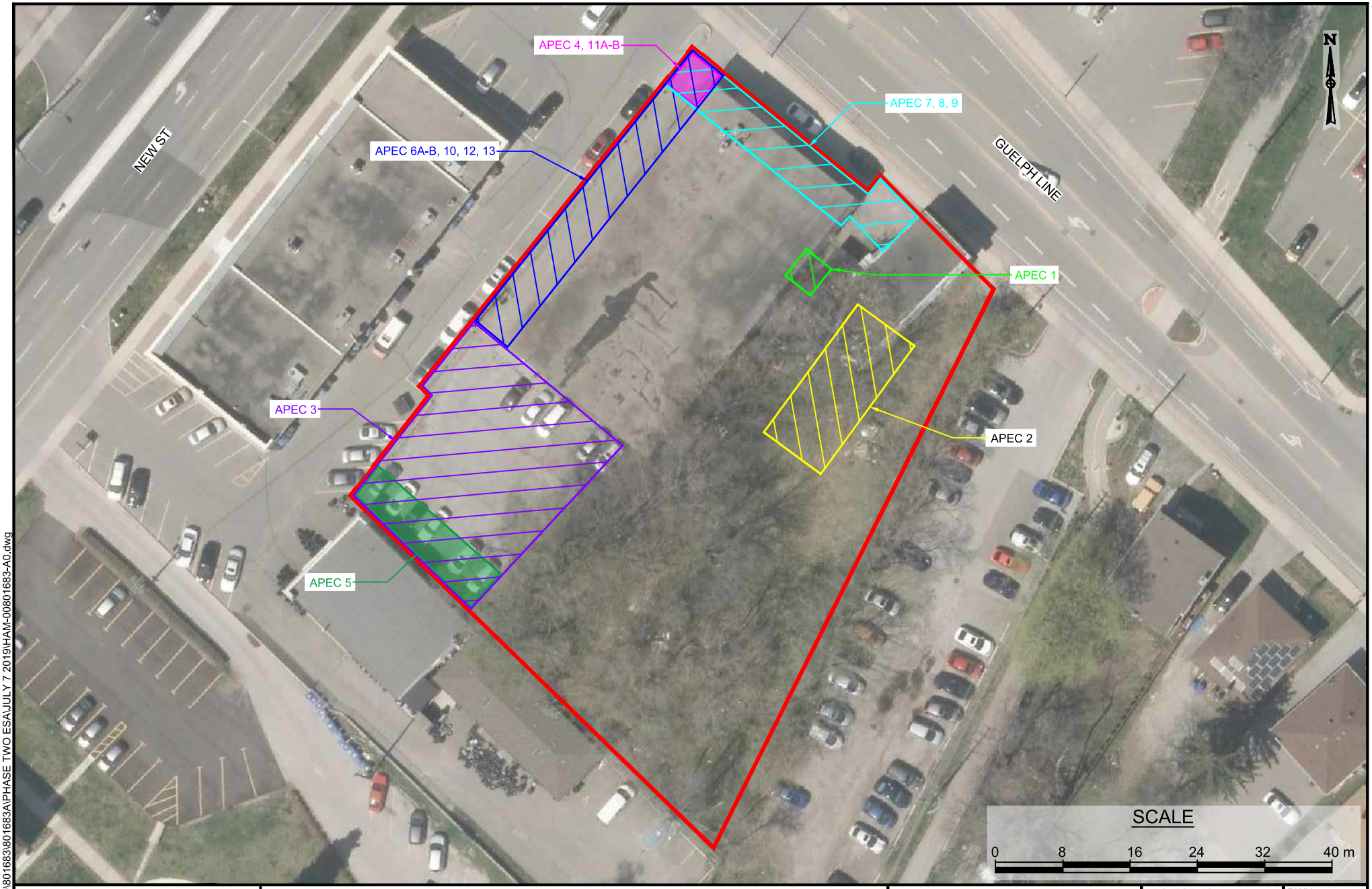
TITLE AND LOCATION:

SITE PLAN AND UTILITIES

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	3

X:\DRAWINGS\80100\001600\80168301683\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



X:\DRAWINGS\801000\801600\801683\801683A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

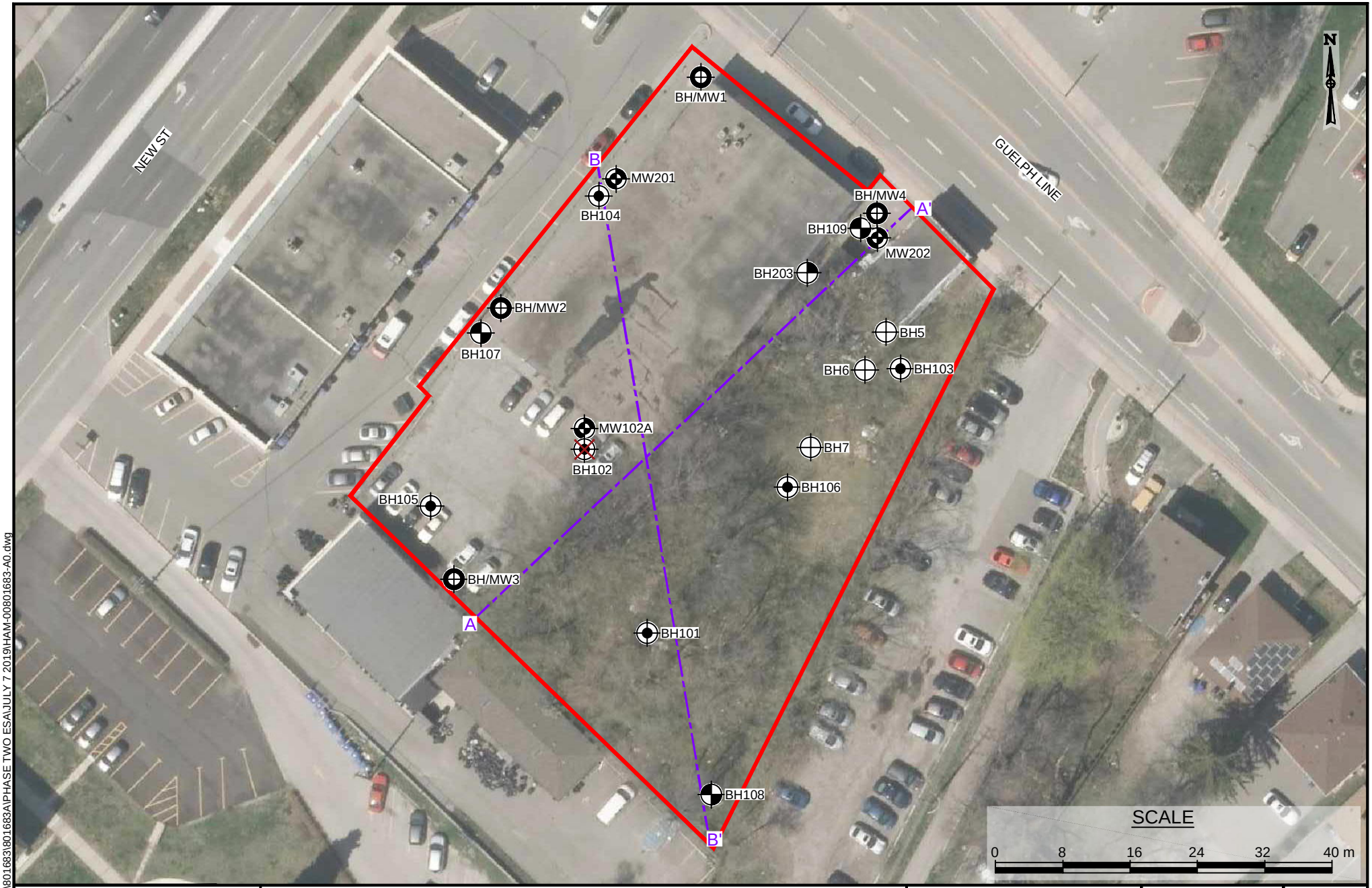
APPROXIMATE SITE BOUNDARY

TITLE AND LOCATION:

SITE PLAN AND APECs

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	4



X:\DRAWINGS\80100\01600\80160083\801683\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

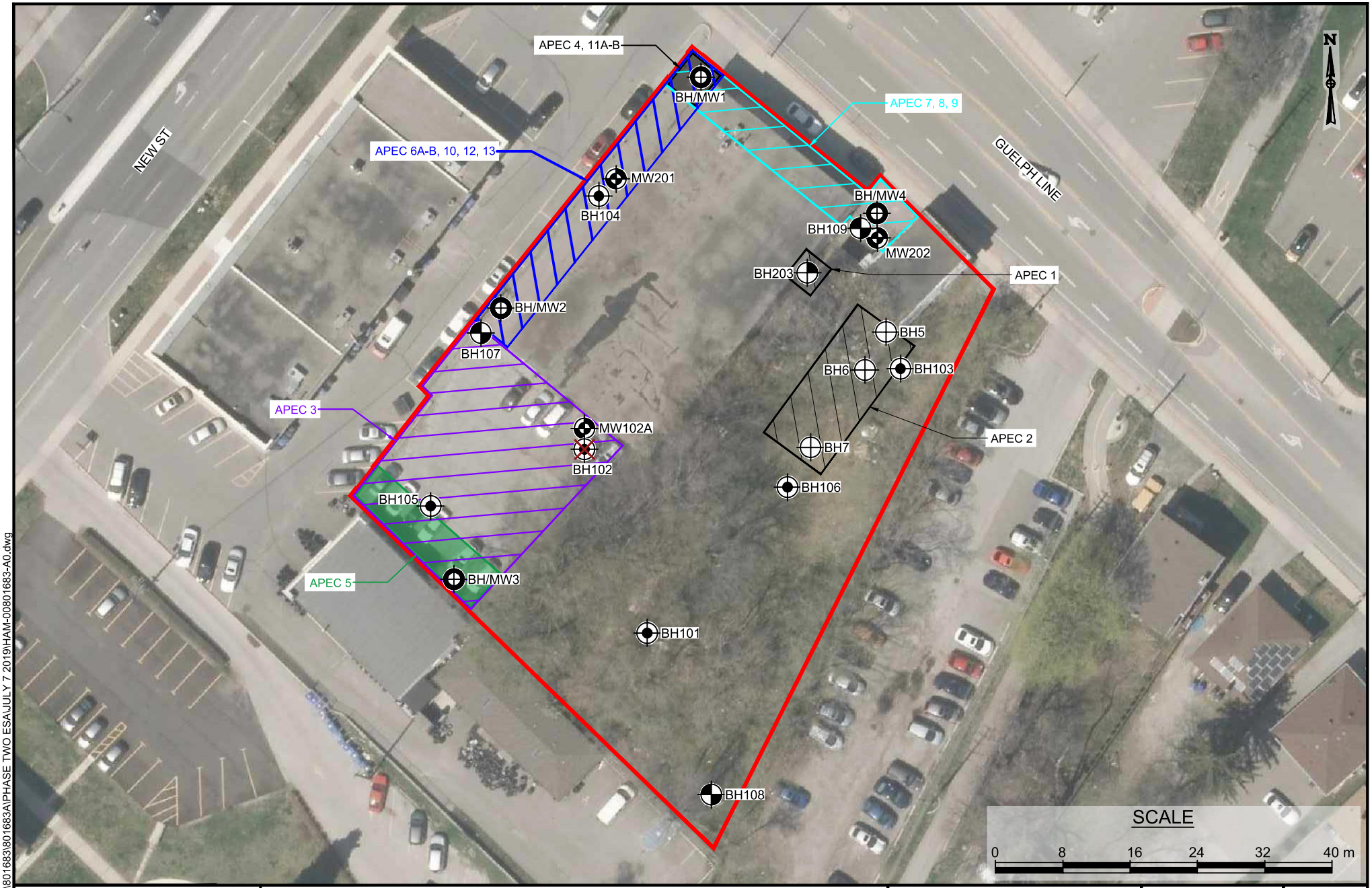
- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- DECOMMISSIONED (JUNE 2019)
- A-A' CROSS SECTION A-A' (SEE FIGURE 21)
- B-B' CROSS SECTION B-B' (SEE FIGURE 22)

TITLE AND LOCATION:

BOREHOLE / MONITORING WELL LOCATION PLAN

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE: AS NOTED	CK: SH
DATE: JULY 2019	FIG. NO.: 5A



X:\DRAWINGS\801000\801600\801683\801683A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

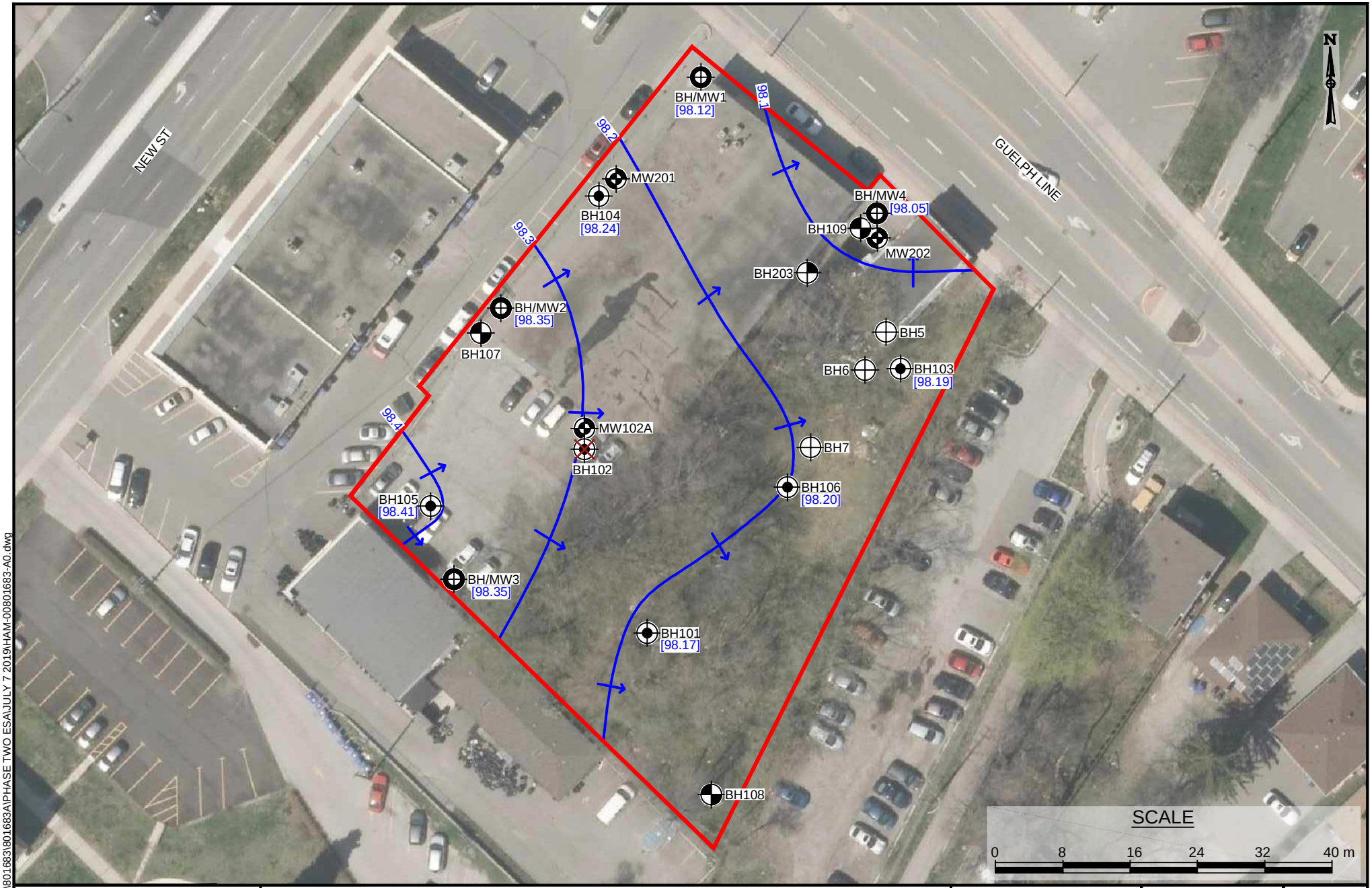
- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- DECOMMISSIONED (JUNE 2019)

TITLE AND LOCATION:

BOREHOLE / MONITORING WELL LOCATION PLAN WITH APECs

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	5B



X:\DRAWINGS\80100\80160\80168\80168301683\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

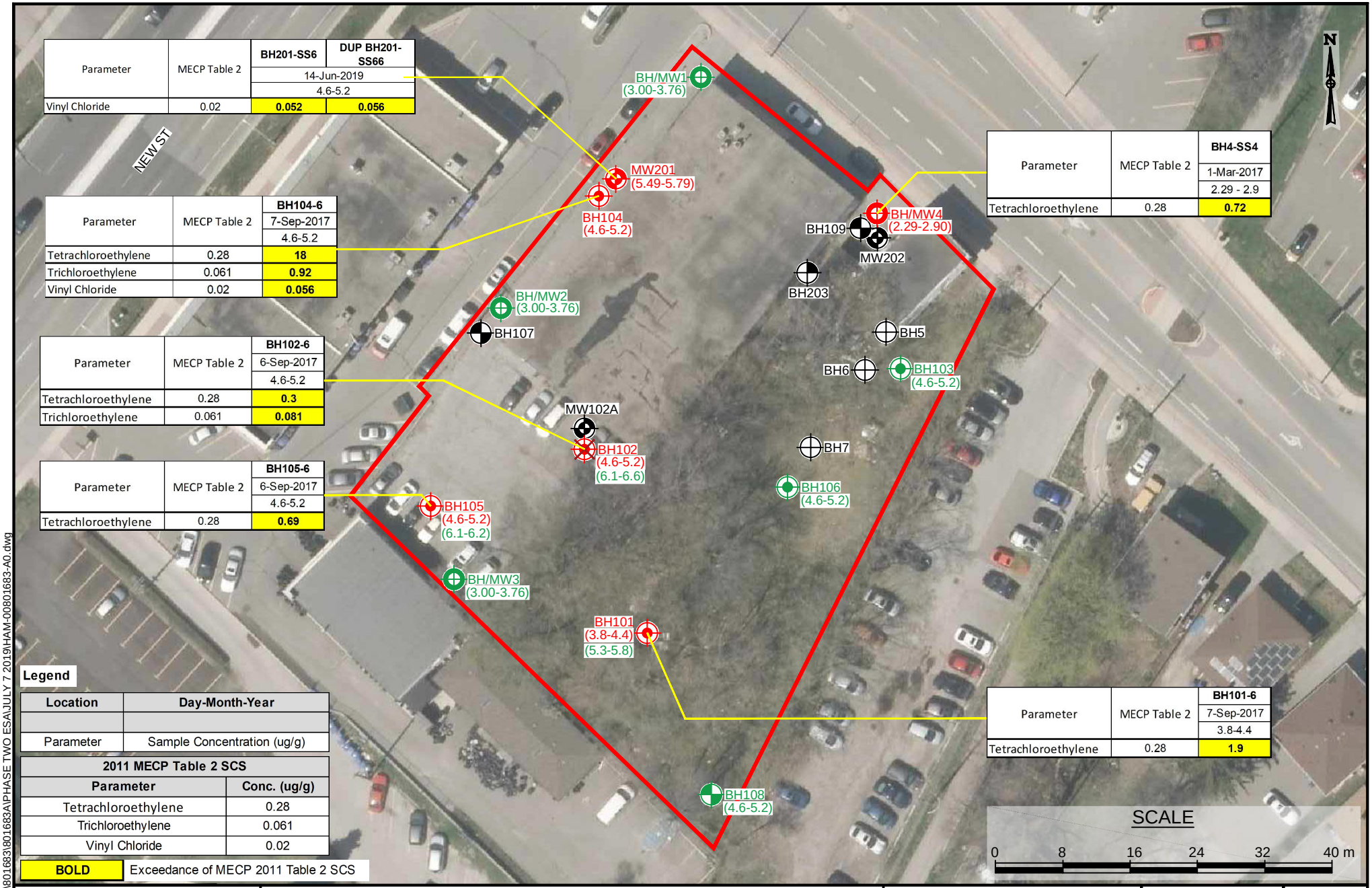
- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- GROUNDWATER CONTOURS
- [XX.XX] GROUNDWATER ELEVATION (MAY 21 2019)
- GROUNDWATER FLOW DIRECTION
- DECOMMISSIONED (JUNE 2019)

TITLE AND LOCATION:

GROUNDWATER CONTOURS

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	6



Parameter	MECP Table 2	BH201-SS6	DUP BH201-SS66
		14-Jun-2019	
		4.6-5.2	
Vinyl Chloride	0.02	**0.052**	**0.056**

Parameter	MECP Table 2	BH104-6
		7-Sep-2017
		4.6-5.2
Tetrachloroethylene	0.28	**18**
Trichloroethylene	0.061	**0.92**
Vinyl Chloride	0.02	**0.056**

Parameter	MECP Table 2	BH102-6
		6-Sep-2017
		4.6-5.2
Tetrachloroethylene	0.28	**0.3**
Trichloroethylene	0.061	**0.081**

Parameter	MECP Table 2	BH105-6
		6-Sep-2017
		4.6-5.2
Tetrachloroethylene	0.28	**0.69**

Parameter	MECP Table 2	BH4-SS4
		1-Mar-2017
		2.29 - 2.9
Tetrachloroethylene	0.28	**0.72**

Parameter	MECP Table 2	BH101-6
		7-Sep-2017
		3.8-4.4
Tetrachloroethylene	0.28	**1.9**

Legend

Location	Day-Month-Year
Parameter	Sample Concentration (ug/g)

2011 MECP Table 2 SCS	
Parameter	**Conc. (ug/g)**
Tetrachloroethylene	0.28
Trichloroethylene	0.061
Vinyl Chloride	0.02

BOLD Exceedance of MECP 2011 Table 2 SCS

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- SAMPLE EXCEEDS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

TITLE AND LOCATION:

SOIL SAMPLING LOCATIONS VOCs

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	7

X:\DRAWINGS\80100\80160\80168\80168\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



X:\DRAWINGS\80100018016001801683\801683A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

TITLE AND LOCATION:

SOIL SAMPLING LOCATIONS PHCs

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	8



X:\DRAWINGS\80100\80160\80168\80168301683\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

TITLE AND LOCATION:

SOIL SAMPLING LOCATIONS BTEX

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE: AS NOTED	CK: SH
DATE: JULY 2019	FIG. NO.: 9



X:\DRAWINGS\80100018016001801683\801683\APHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

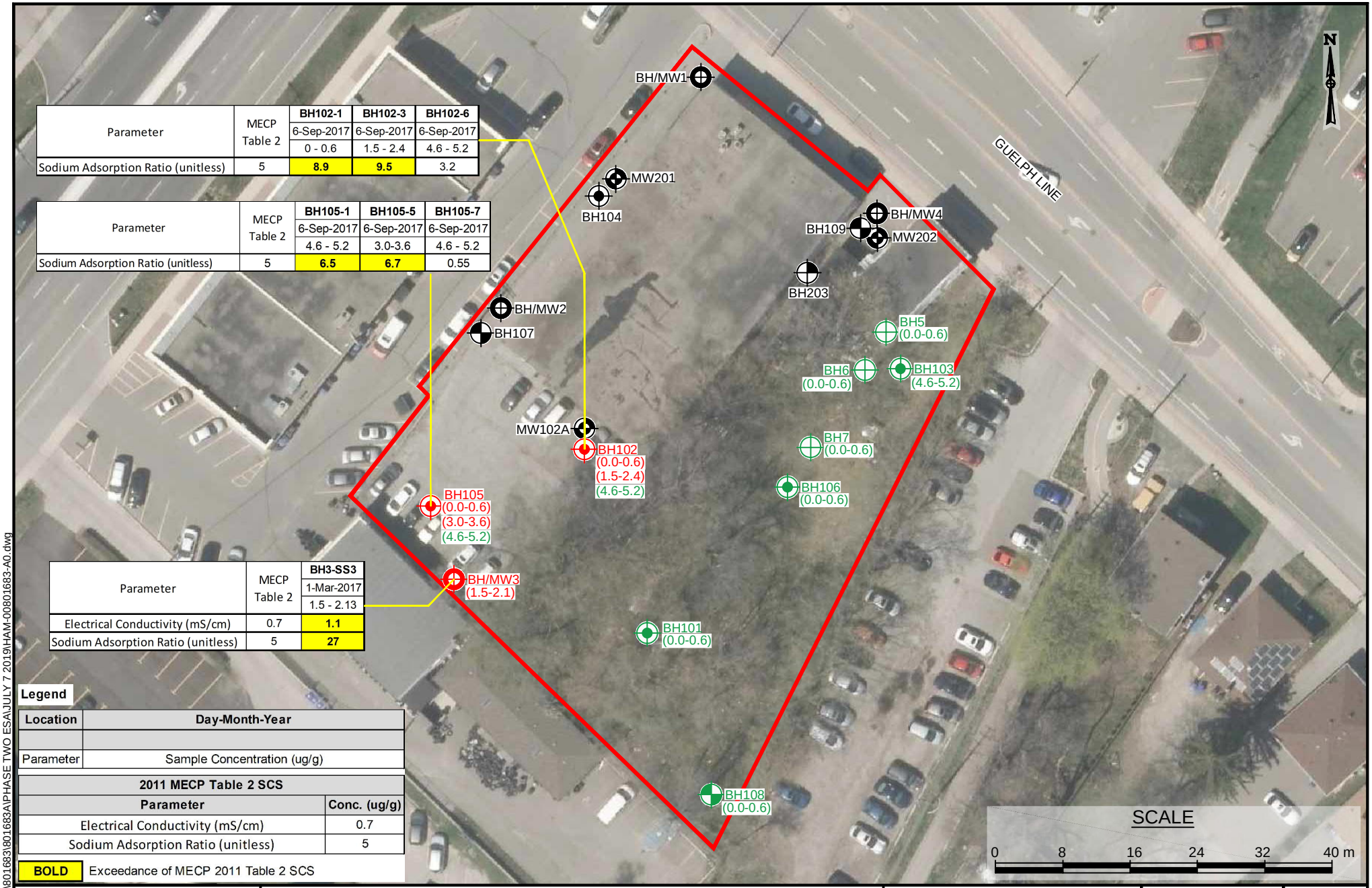
- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

TITLE AND LOCATION:

SOIL SAMPLING LOCATIONS METALS

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.: HAM-00801683-A0	DWN.: LE
SCALE: AS NOTED	CK: SH
DATE: JULY 2019	FIG. NO.: 10



Parameter	MECP Table 2	BH102-1	BH102-3	BH102-6
		6-Sep-2017	6-Sep-2017	6-Sep-2017
		0 - 0.6	1.5 - 2.4	4.6 - 5.2
Sodium Adsorption Ratio (unitless)	5	**8.9**	**9.5**	3.2

Parameter	MECP Table 2	BH105-1	BH105-5	BH105-7
		6-Sep-2017	6-Sep-2017	6-Sep-2017
		4.6 - 5.2	3.0-3.6	4.6 - 5.2
Sodium Adsorption Ratio (unitless)	5	**6.5**	**6.7**	0.55

Parameter	MECP Table 2	BH3-SS3
		1-Mar-2017
		1.5 - 2.13
Electrical Conductivity (mS/cm)	0.7	**1.1**
Sodium Adsorption Ratio (unitless)	5	**27**

Legend

Location	Day-Month-Year
Parameter	Sample Concentration (ug/g)

2011 MECP Table 2 SCS	
Parameter	**Conc. (ug/g)**
Electrical Conductivity (mS/cm)	0.7
Sodium Adsorption Ratio (unitless)	5

BOLD Exceedance of MECP 2011 Table 2 SCS

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- SAMPLE EXCEEDS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

TITLE AND LOCATION:

SOIL SAMPLING LOCATIONS EC/SAR

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	11

X:\DRAWINGS\80100\80160\80168\80168\APHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

TITLE AND LOCATION:

SOIL SAMPLING LOCATIONS PCBs

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	12

X:\DRAWINGS\80100\80160\80168\801683\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

TITLE AND LOCATION:

SOIL SAMPLING LOCATIONS PAHs

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	13

X:\DRAWINGS\80100\80160\80168\801683\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

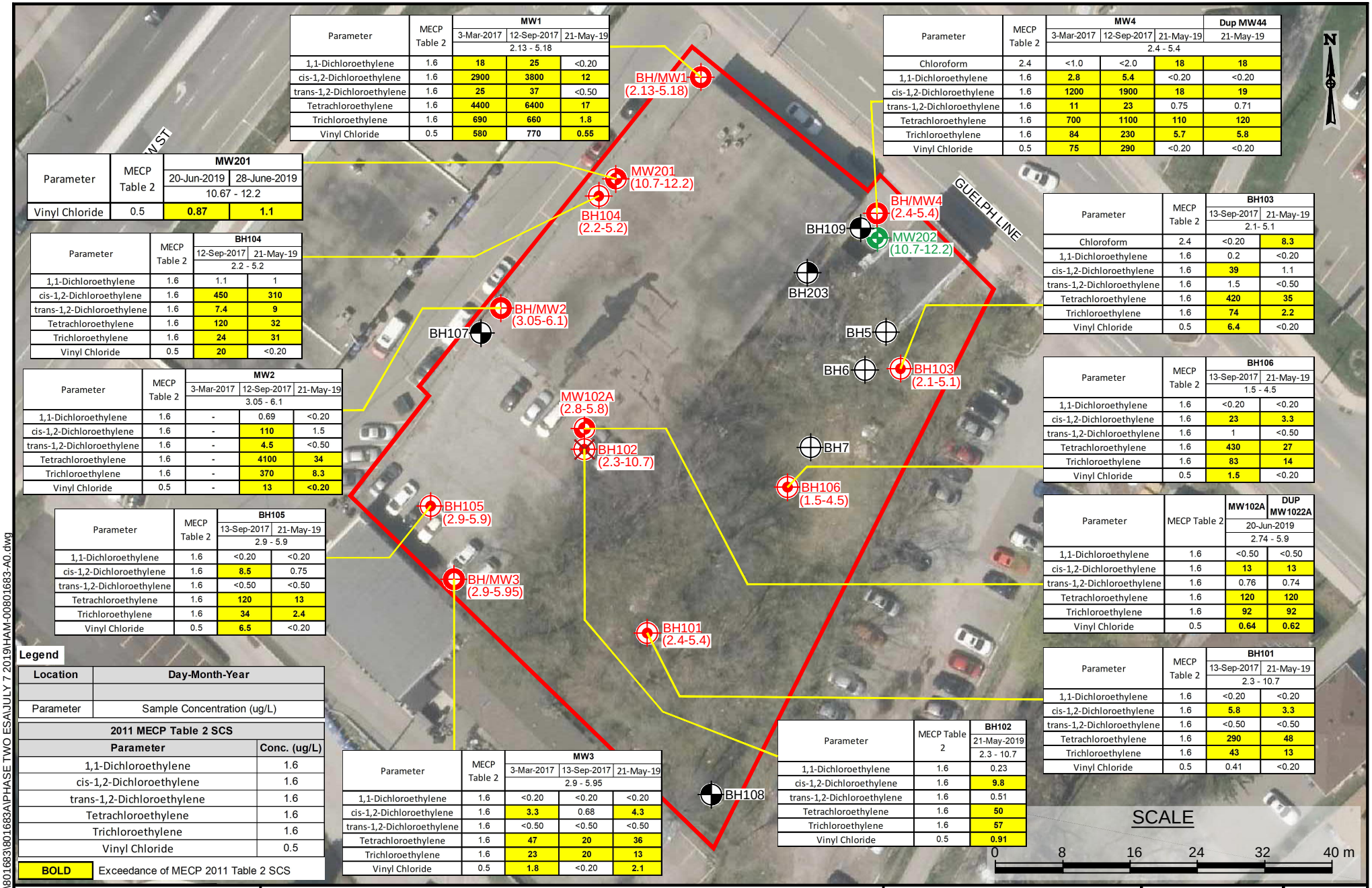
TITLE AND LOCATION:

SOIL SAMPLING LOCATIONS OC PESTICIDES

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	14

X:\DRAWINGS\80100\80160\80168\801683\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



Parameter	MECP Table 2	MW1		
		3-Mar-2017	12-Sep-2017	21-May-19
		2.13 - 5.18		
1,1-Dichloroethylene	1.6	18	25	<0.20
cis-1,2-Dichloroethylene	1.6	2900	3800	12
trans-1,2-Dichloroethylene	1.6	25	37	<0.50
Tetrachloroethylene	1.6	4400	6400	17
Trichloroethylene	1.6	690	660	1.8
Vinyl Chloride	0.5	580	770	0.55

Parameter	MECP Table 2	MW4			Dup MW44
		3-Mar-2017	12-Sep-2017	21-May-19	21-May-19
		2.4 - 5.4			
Chloroform	2.4	<1.0	<2.0	18	18
1,1-Dichloroethylene	1.6	2.8	5.4	<0.20	<0.20
cis-1,2-Dichloroethylene	1.6	1200	1900	18	19
trans-1,2-Dichloroethylene	1.6	11	23	0.75	0.71
Tetrachloroethylene	1.6	700	1100	110	120
Trichloroethylene	1.6	84	230	5.7	5.8
Vinyl Chloride	0.5	75	290	<0.20	<0.20

Parameter	MECP Table 2	MW201	
		20-Jun-2019	28-June-2019
		10.67 - 12.2	
Vinyl Chloride	0.5	0.87	1.1

Parameter	MECP Table 2	BH104	
		12-Sep-2017	21-May-19
		2.2 - 5.2	
1,1-Dichloroethylene	1.6	1.1	1
cis-1,2-Dichloroethylene	1.6	450	310
trans-1,2-Dichloroethylene	1.6	7.4	9
Tetrachloroethylene	1.6	120	32
Trichloroethylene	1.6	24	31
Vinyl Chloride	0.5	20	<0.20

Parameter	MECP Table 2	BH103	
		13-Sep-2017	21-May-19
		2.1- 5.1	
Chloroform	2.4	<0.20	8.3
1,1-Dichloroethylene	1.6	0.2	<0.20
cis-1,2-Dichloroethylene	1.6	39	1.1
trans-1,2-Dichloroethylene	1.6	1.5	<0.50
Tetrachloroethylene	1.6	420	35
Trichloroethylene	1.6	74	2.2
Vinyl Chloride	0.5	6.4	<0.20

Parameter	MECP Table 2	MW2		
		3-Mar-2017	12-Sep-2017	21-May-19
		3.05 - 6.1		
1,1-Dichloroethylene	1.6	-	0.69	<0.20
cis-1,2-Dichloroethylene	1.6	-	110	1.5
trans-1,2-Dichloroethylene	1.6	-	4.5	<0.50
Tetrachloroethylene	1.6	-	4100	34
Trichloroethylene	1.6	-	370	8.3
Vinyl Chloride	0.5	-	13	<0.20

Parameter	MECP Table 2	BH106	
		13-Sep-2017	21-May-19
		1.5 - 4.5	
1,1-Dichloroethylene	1.6	<0.20	<0.20
cis-1,2-Dichloroethylene	1.6	23	3.3
trans-1,2-Dichloroethylene	1.6	1	<0.50
Tetrachloroethylene	1.6	430	27
Trichloroethylene	1.6	83	14
Vinyl Chloride	0.5	1.5	<0.20

Parameter	MECP Table 2	BH105	
		13-Sep-2017	21-May-19
		2.9 - 5.9	
1,1-Dichloroethylene	1.6	<0.20	<0.20
cis-1,2-Dichloroethylene	1.6	8.5	0.75
trans-1,2-Dichloroethylene	1.6	<0.50	<0.50
Tetrachloroethylene	1.6	120	13
Trichloroethylene	1.6	34	2.4
Vinyl Chloride	0.5	6.5	<0.20

Parameter	MECP Table 2	MW102A	DUP MW1022A
		20-Jun-2019	
		2.74 - 5.9	
1,1-Dichloroethylene	1.6	<0.50	<0.50
cis-1,2-Dichloroethylene	1.6	13	13
trans-1,2-Dichloroethylene	1.6	0.76	0.74
Tetrachloroethylene	1.6	120	120
Trichloroethylene	1.6	92	92
Vinyl Chloride	0.5	0.64	0.62

Legend

Location	Day-Month-Year
Parameter	Sample Concentration (ug/L)

2011 MECP Table 2 SCS	
Parameter	Conc. (ug/L)
1,1-Dichloroethylene	1.6
cis-1,2-Dichloroethylene	1.6
trans-1,2-Dichloroethylene	1.6
Tetrachloroethylene	1.6
Trichloroethylene	1.6
Vinyl Chloride	0.5

BOLD Exceedance of MECP 2011 Table 2 SCS

Parameter	MECP Table 2	MW3		
		3-Mar-2017	13-Sep-2017	21-May-19
		2.9 - 5.95		
1,1-Dichloroethylene	1.6	<0.20	<0.20	<0.20
cis-1,2-Dichloroethylene	1.6	3.3	0.68	4.3
trans-1,2-Dichloroethylene	1.6	<0.50	<0.50	<0.50
Tetrachloroethylene	1.6	47	20	36
Trichloroethylene	1.6	23	20	13
Vinyl Chloride	0.5	1.8	<0.20	2.1

Parameter	MECP Table 2	BH102
		21-May-2019
		2.3 - 10.7
1,1-Dichloroethylene	1.6	0.23
cis-1,2-Dichloroethylene	1.6	9.8
trans-1,2-Dichloroethylene	1.6	0.51
Tetrachloroethylene	1.6	50
Trichloroethylene	1.6	57
Vinyl Chloride	0.5	0.91

Parameter	MECP Table 2	BH101	
		13-Sep-2017	21-May-19
		2.3 - 10.7	
1,1-Dichloroethylene	1.6	<0.20	<0.20
cis-1,2-Dichloroethylene	1.6	5.8	3.3
trans-1,2-Dichloroethylene	1.6	<0.50	<0.50
Tetrachloroethylene	1.6	290	48
Trichloroethylene	1.6	43	13
Vinyl Chloride	0.5	0.41	<0.20

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- SAMPLE EXCEEDS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

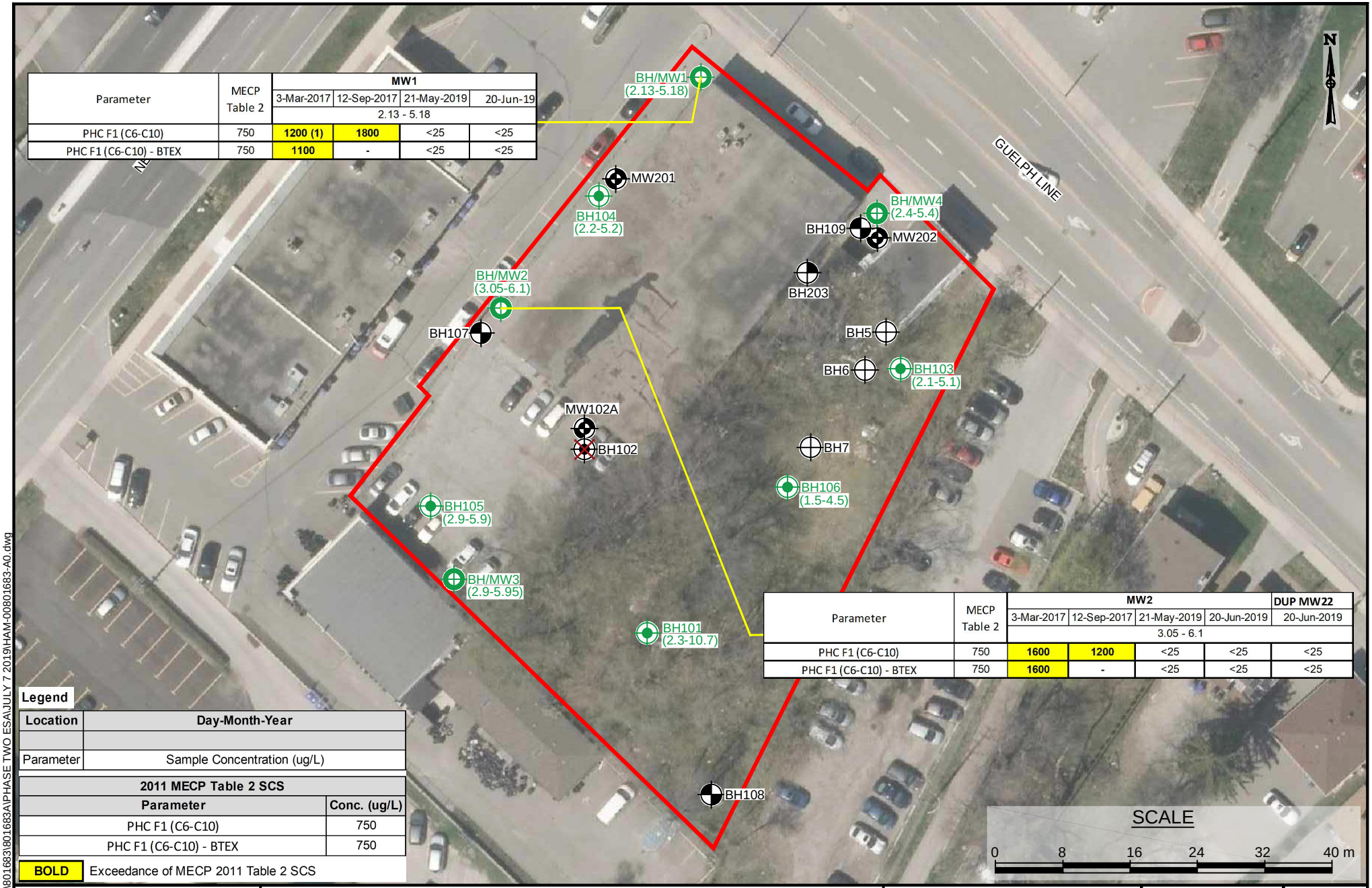
TITLE AND LOCATION:

GROUNDWATER SAMPLING LOCATIONS VOCs

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	15

X:\DRAWINGS\80100\80160\80168\80168\APHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



Parameter	MECP Table 2	MW1			
		3-Mar-2017	12-Sep-2017	21-May-2019	20-Jun-19
		2.13 - 5.18			
PHC F1 (C6-C10)	750	**1200 (1)**	**1800**	<25	<25
PHC F1 (C6-C10) - BTEX	750	**1100**	-	<25	<25

Parameter	MECP Table 2	MW2				DUP MW22
		3-Mar-2017	12-Sep-2017	21-May-2019	20-Jun-2019	20-Jun-2019
		3.05 - 6.1				
PHC F1 (C6-C10)	750	**1600**	**1200**	<25	<25	<25
PHC F1 (C6-C10) - BTEX	750	**1600**	-	<25	<25	<25

Legend

Location	Day-Month-Year
Parameter	Sample Concentration (ug/L)

2011 MECP Table 2 SCS	
Parameter	**Conc. (ug/L)**
PHC F1 (C6-C10)	750
PHC F1 (C6-C10) - BTEX	750

BOLD Exceedance of MECP 2011 Table 2 SCS

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- SAMPLE EXCEEDS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

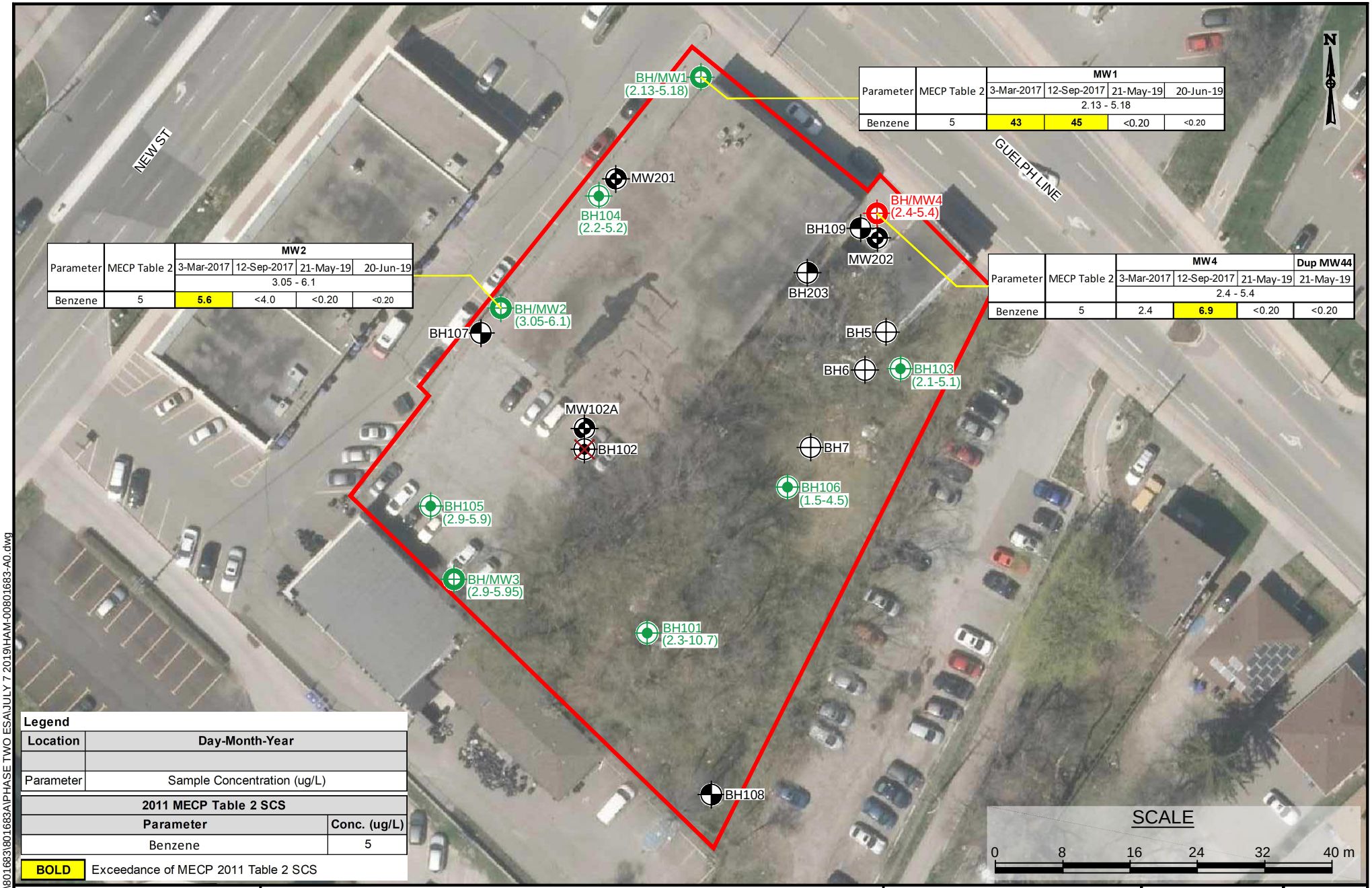
TITLE AND LOCATION:

GROUNDWATER SAMPLING LOCATIONS PHCs

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	16

X:\DRAWINGS\80100\80160\80168\80168\3\80168\3A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



Parameter	MECP Table 2	MW1			
		3-Mar-2017	12-Sep-2017	21-May-19	20-Jun-19
		2.13 - 5.18			
Benzene	5	**43**	**45**	<0.20	<0.20

Parameter	MECP Table 2	MW2			
		3-Mar-2017	12-Sep-2017	21-May-19	20-Jun-19
		3.05 - 6.1			
Benzene	5	**5.6**	<4.0	<0.20	<0.20

Parameter	MECP Table 2	MW4			Dup MW44
		3-Mar-2017	12-Sep-2017	21-May-19	21-May-19
		2.4 - 5.4			
Benzene	5	2.4	**6.9**	<0.20	<0.20

Legend

Location	Day-Month-Year
Parameter	Sample Concentration (ug/L)

2011 MECP Table 2 SCS	
Parameter	**Conc. (ug/L)**
Benzene	5

BOLD Exceedance of MECP 2011 Table 2 SCS

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- SAMPLE EXCEEDS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

TITLE AND LOCATION:

GROUNDWATER SAMPLING LOCATIONS BTEX

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	17

X:\DRAWINGS\80100\80160\80168\801683\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

TITLE AND LOCATION:

GROUNDWATER SAMPLING LOCATIONS METALS

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.: HAM-00801683-A0	DWN.: LE
SCALE: AS NOTED	CK: SH
DATE: JULY 2019	FIG. NO.: 18

X:\DRAWINGS\80100\80160\80168\80168\3\80168\3A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



Parameter	MECP Table 2	MW3
		13-Sep-2017
		2.9 - 5.9
Sodium	490000	**1200000**
Chloride	790000	**2000000**

Legend

Location	Day-Month-Year
Parameter	Sample Concentration (ug/L)

2011 MECP Table 2 SCS	
Parameter	**Conc. (ug/L)**
Sodium	490000
Chloride	790000

BOLD Exceedance of MECP 2011 Table 2 SCS

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY • INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- SAMPLE EXCEEDS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

TITLE AND LOCATION:

GROUNDWATER SAMPLING LOCATIONS SODIUM AND CHLORIDE

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	19

X:\DRAWINGS\80100\80160\80168\801683\801683A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- APPROXIMATE SITE BOUNDARY
- BOREHOLE LOCATION (S2S, 2017)
- BOREHOLE / MONITORING WELL LOCATION (S2S, 2017)
- BOREHOLE LOCATION (BIG, 2017)
- BOREHOLE / MONITORING WELL LOCATION (BIG, 2017)
- BOREHOLE LOCATION (EXP, 2019)
- BOREHOLE / MONITORING WELL LOCATION (EXP, 2019)
- SAMPLE MEETS TABLE 2 SCS
- DECOMMISSIONED (JUNE 2019)

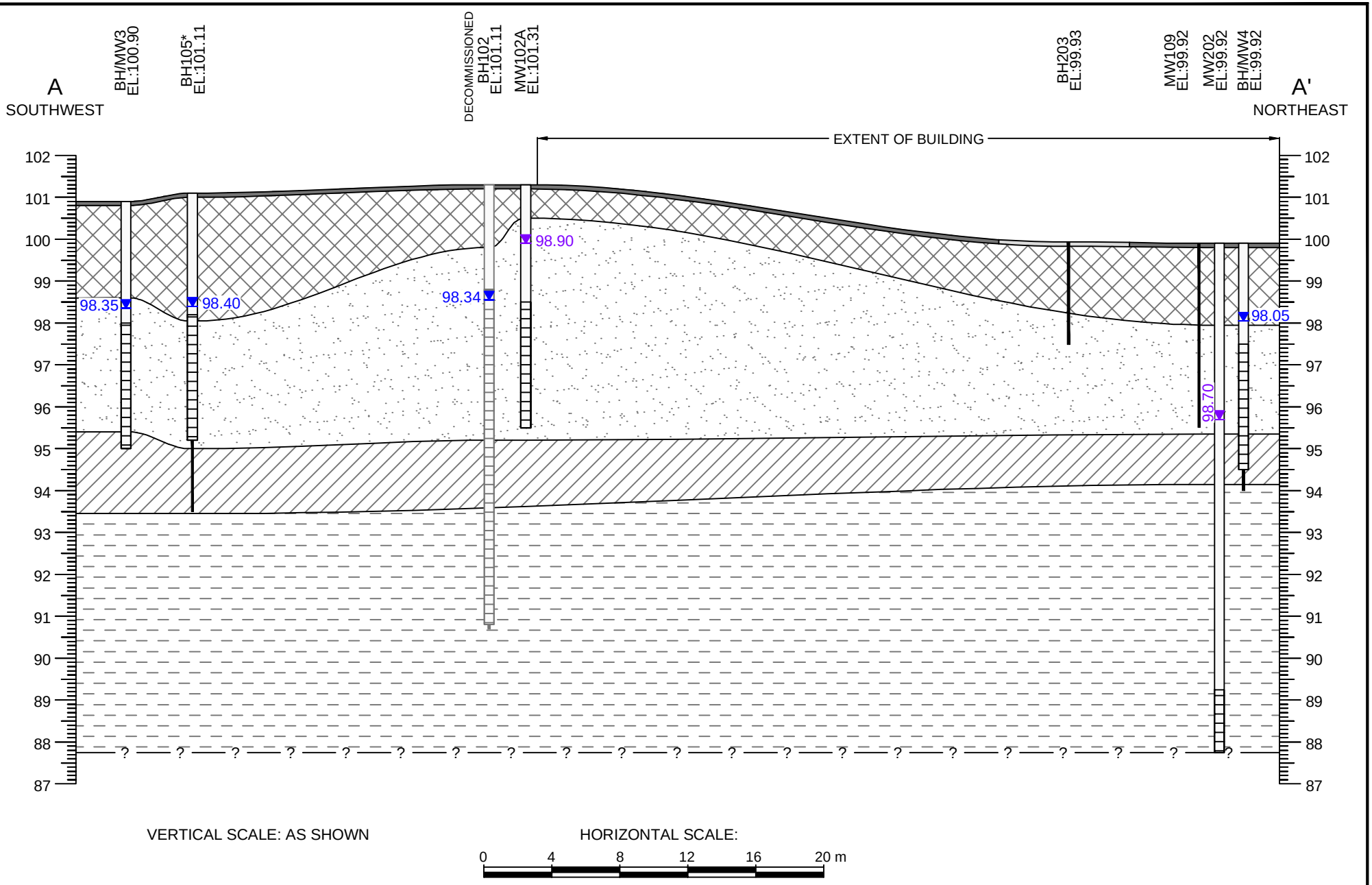
TITLE AND LOCATION:

GROUNDWATER SAMPLING LOCATIONS PAHs

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.: HAM-00801683-A0	DWN.: LE
SCALE: AS NOTED	CK: SH
DATE: JULY 2019	FIG. NO.: 20

X:\DRAWINGS\80100\01600\80168301683\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- ASPHALT
- TOPSOIL
- FILL
- SAND
- SILTY SILT TILL
- BEDROCK
- GROUNDWATER ELEVATION AS MEASURED ON MAY 21, 2019
- GROUNDWATER ELEVATION AS MEASURED ON JUNE 20, 2019
- * FOR CHEMICAL CHARACTERIZATION ONLY

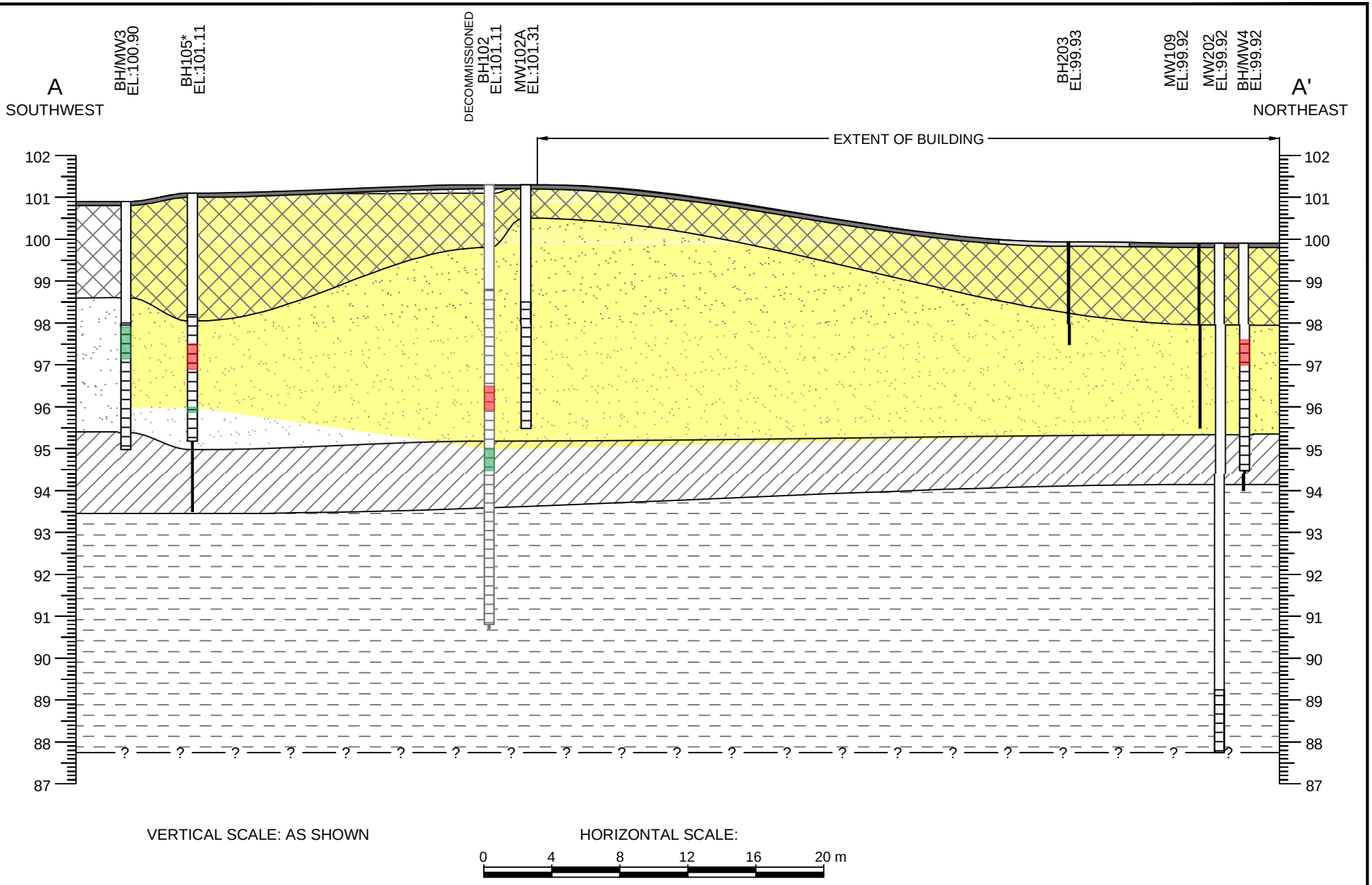
TITLE AND LOCATION:

CROSS SECTION A-A'

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.: HAM-00801683-A0	DWN.: LE
SCALE: AS NOTED	CK: SH
DATE: JULY 2019	FIG. NO.: 21

X:\DRAWINGS\80100\80160\80168\80168\APHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- ASPHALT
- TOPSOIL
- FILL
- SAND
- SILTY SILT TILL
- BEDROCK
- SAMPLE MEETS TABLE 2 SCS
- SAMPLE EXCEEDS TABLE 2 SCS
- EXTENT OF IMPACT
- * FOR CHEMICAL CHARACTERIZATION ONLY

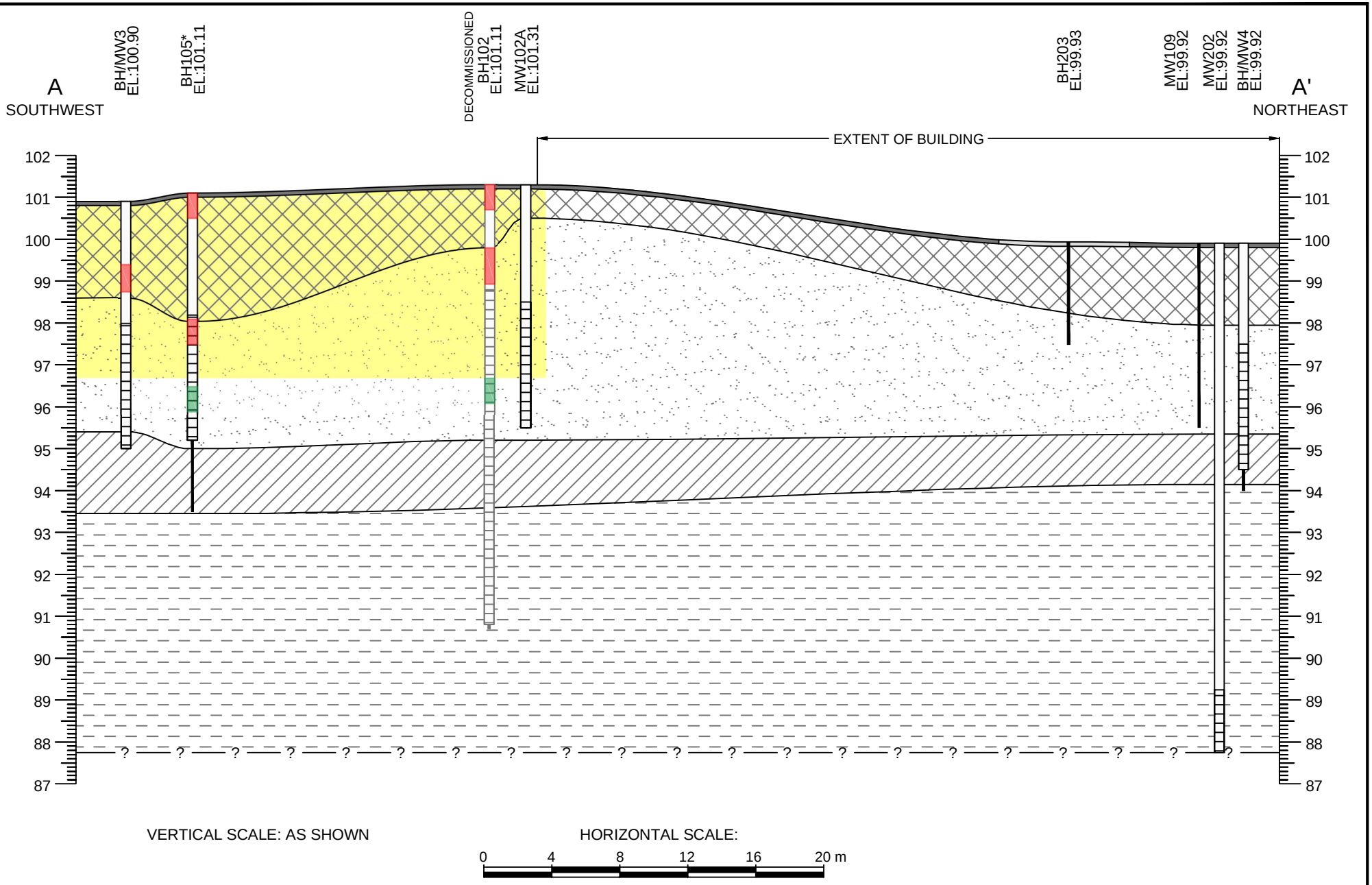
TITLE AND LOCATION:

SOIL ANALYTICAL RESULTS VOCs

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	21A

X:\DRAWINGS\80100\80160\80168\80168\APHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- ASPHALT
- TOPSOIL
- FILL
- SAND
- SILTY SILT TILL
- BEDROCK
- SAMPLE MEETS TABLE 2 SCS
- SAMPLE EXCEEDS TABLE 2 SCS
- EXTENT OF IMPACT
- * FOR CHEMICAL CHARACTERIZATION ONLY

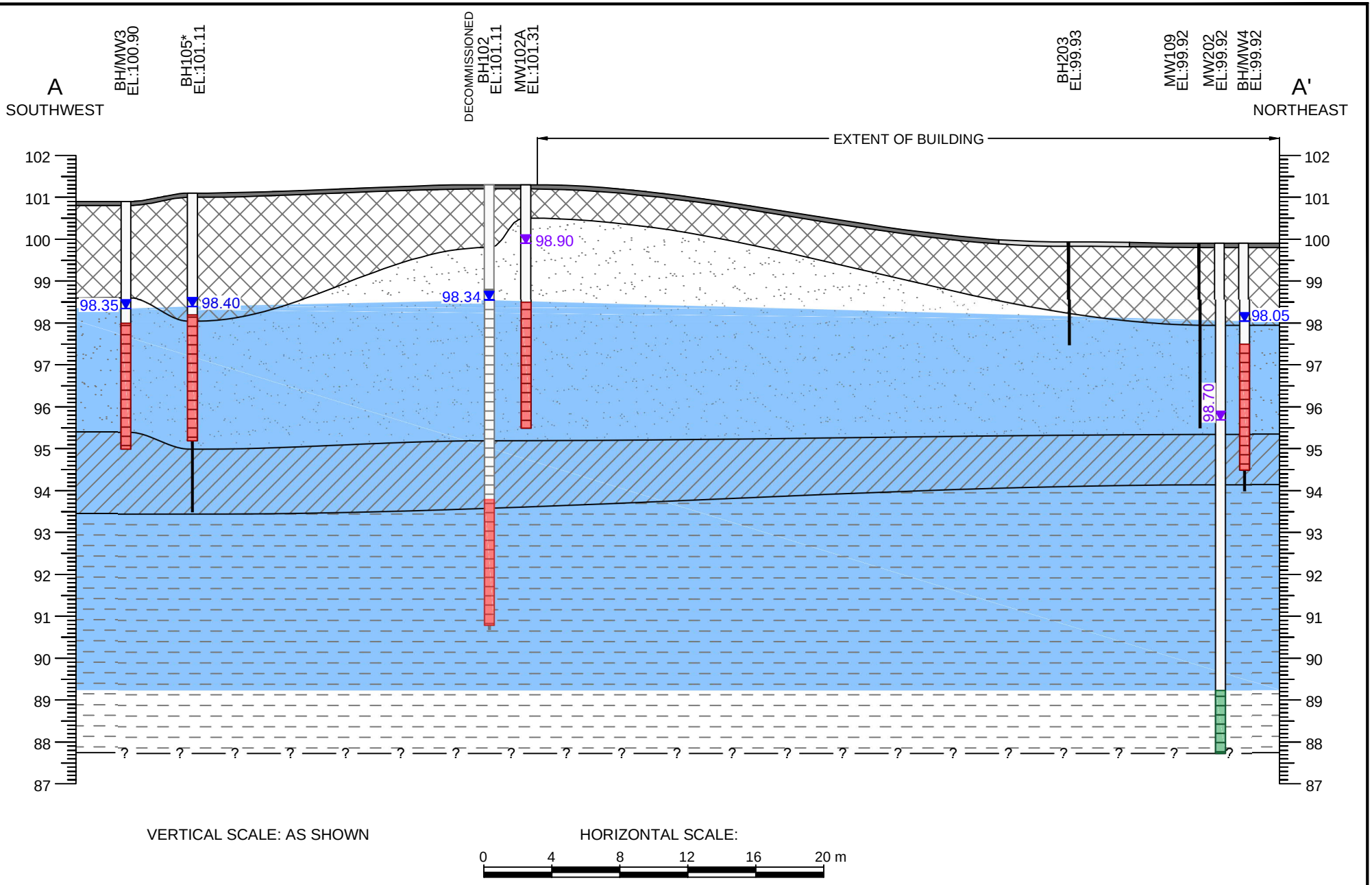
TITLE AND LOCATION:

SOIL ANALYTICAL RESULTS EC/SAR

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.: HAM-00801683-A0	DWN.: LE
SCALE: AS NOTED	CK: SH
DATE: JULY 2019	FIG. NO.: 21B

X:\DRAWINGS\80100\80160\80168\80168\APHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- ASPHALT
- TOPSOIL
- FILL
- SAND
- SILTY SILT TILL
- BEDROCK
- SAMPLE MEETS TABLE 2 SCS
- SAMPLE EXCEEDS TABLE 2 SCS
- EXTENT OF IMPACT
- * FOR CHEMICAL CHARACTERIZATION ONLY
- GROUNDWATER ELEVATION (MAY 21, 2019)
- GROUNDWATER ELEVATION (JUNE 20, 2019)

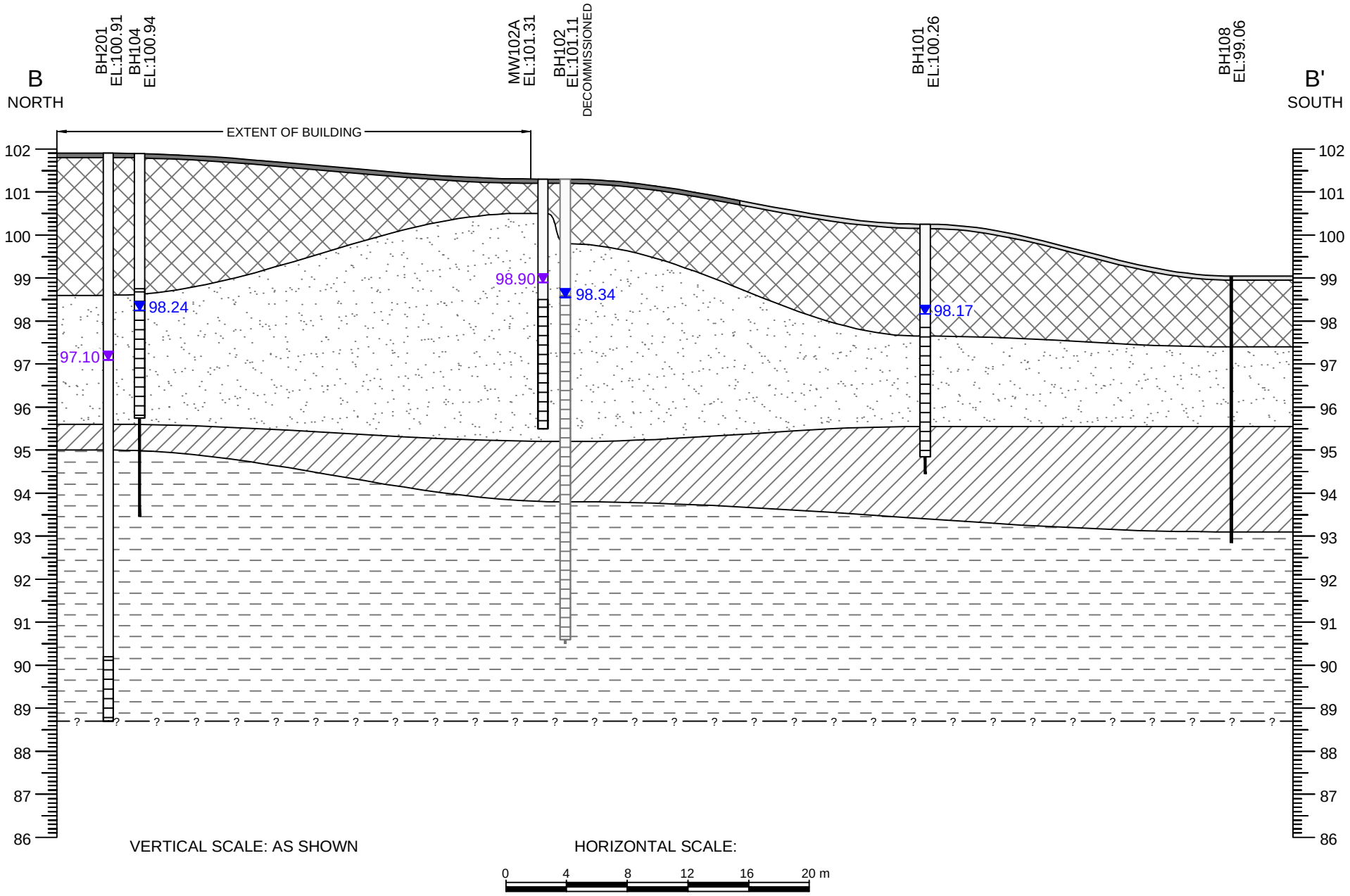
TITLE AND LOCATION:

GROUNDWATER ANALYTICAL RESULTS VOCs

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.: HAM-00801683-A0	DWN.: LE
SCALE: AS NOTED	CK: SH
DATE: JULY 2019	FIG. NO.: 21C

X:\DRAWINGS\80100\01600\80168319\01683\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- ASPHALT
- TOPSOIL
- FILL
- SAND
- SILTY SILT TILL
- BEDROCK
- GROUNDWATER ELEVATION AS MEASURED ON MAY 21, 2019
- GROUNDWATER ELEVATION AS MEASURED ON JUNE 20, 2019
- * FOR CHEMICAL CHARACTERIZATION ONLY

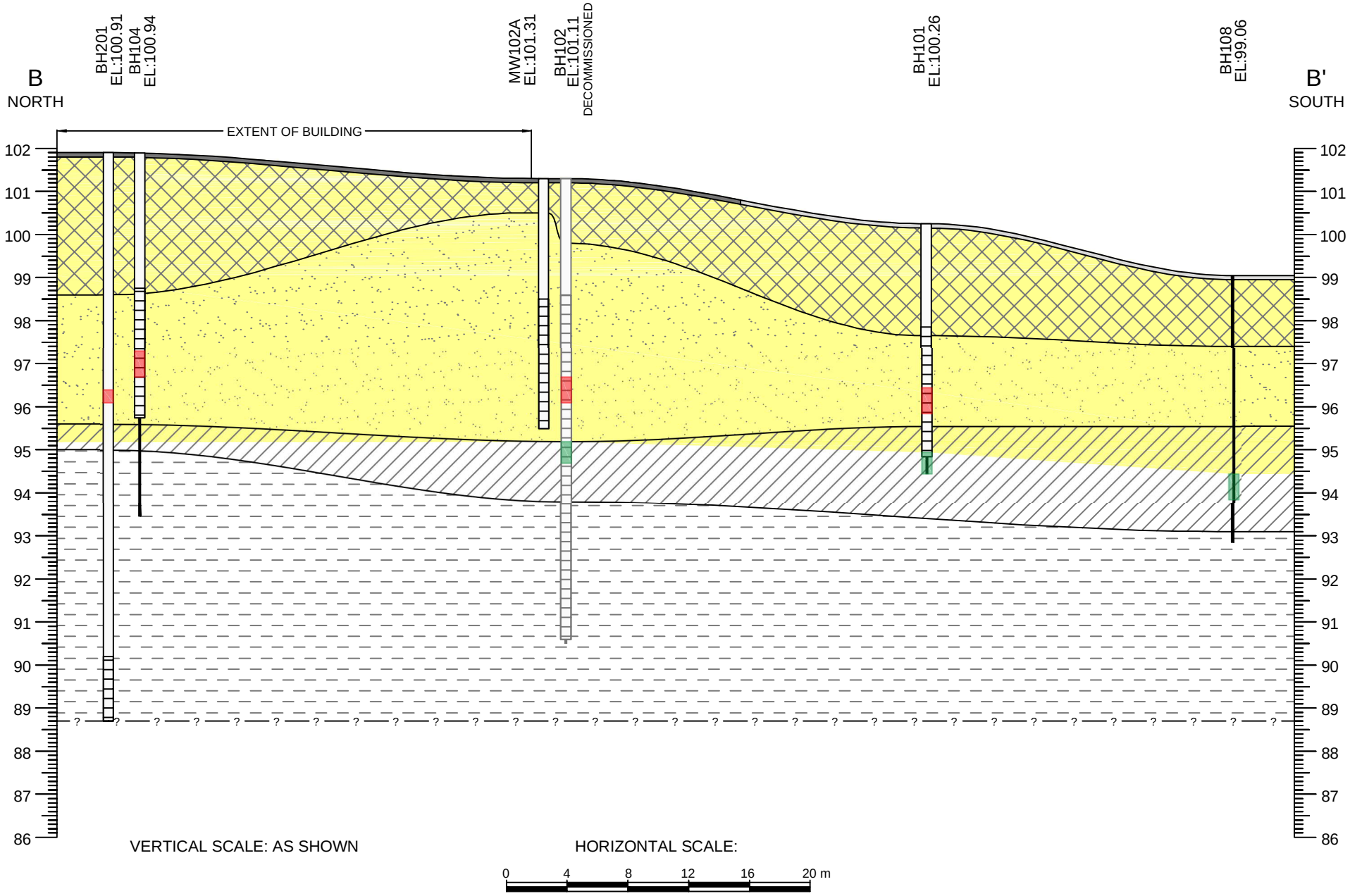
TITLE AND LOCATION:

CROSS SECTION B-B'

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE: AS NOTED	CK: SH
DATE: JULY 2019	FIG. NO.: 22

X:\DRAWINGS\80100\80160\80168\80168\APHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



X:\DRAWINGS\80100\80160\80168\80168\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

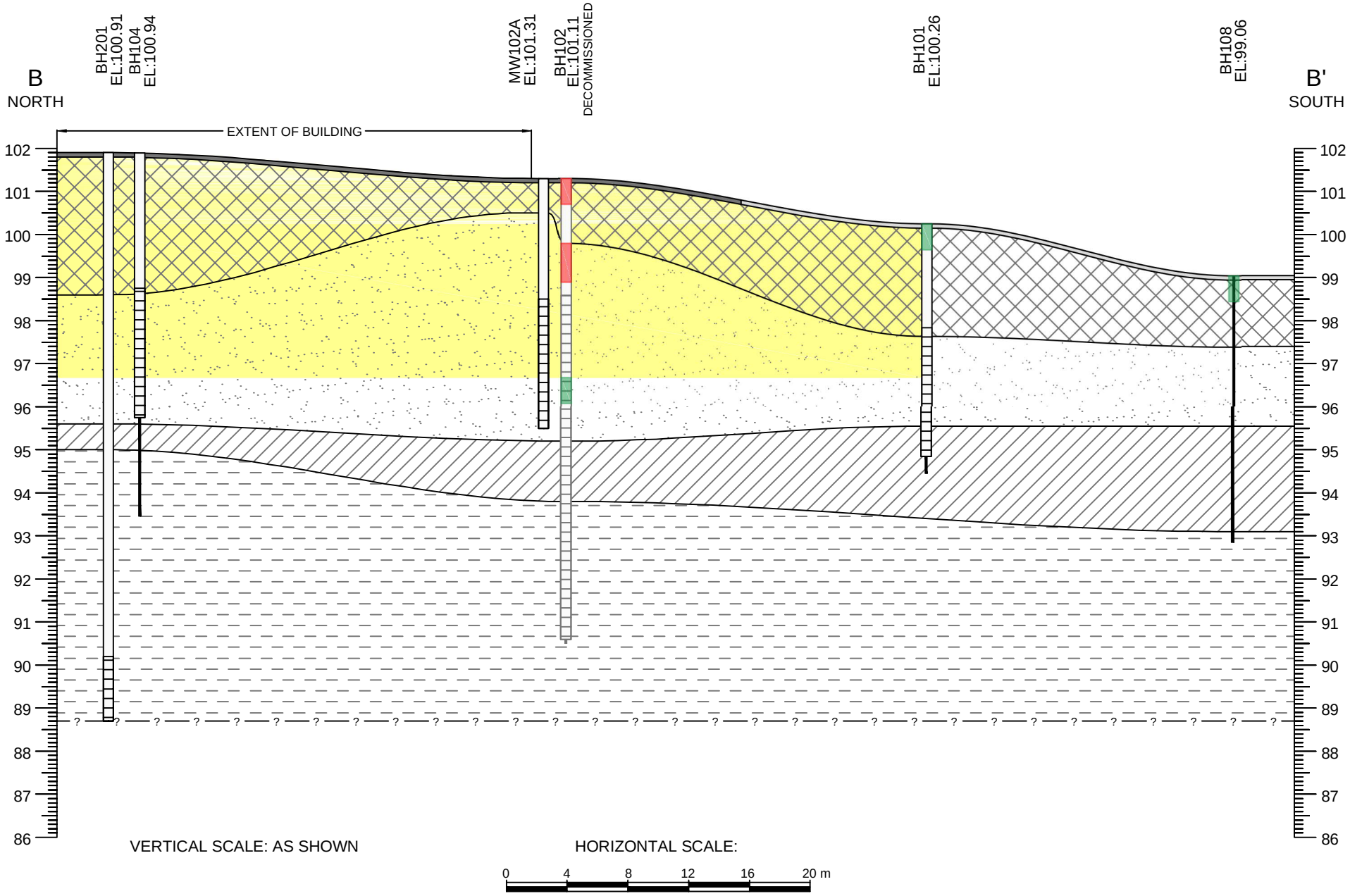
LEGEND:

- ASPHALT
- TOPSOIL
- FILL
- SAND
- SILTY SILT TILL
- BEDROCK
- SAMPLE MEETS TABLE 2 SCS
- SAMPLE EXCEEDS TABLE 2 SCS
- EXTENT OF IMPACT
- * FOR CHEMICAL CHARACTERIZATION ONLY

TITLE AND LOCATION:

SOIL ANALYTICAL RESULTS
VOCs
PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.: HAM-00801683-A0	DWN.: LE
SCALE: AS NOTED	CK: SH
DATE: JULY 2019	FIG. NO.: 22A



EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- ASPHALT
- TOPSOIL
- FILL
- SAND
- SILTY SILT TILL
- BEDROCK
- SAMPLE MEETS TABLE 2 SCS
- SAMPLE EXCEEDS TABLE 2 SCS
- EXTENT OF IMPACT
- * FOR CHEMICAL CHARACTERIZATION ONLY

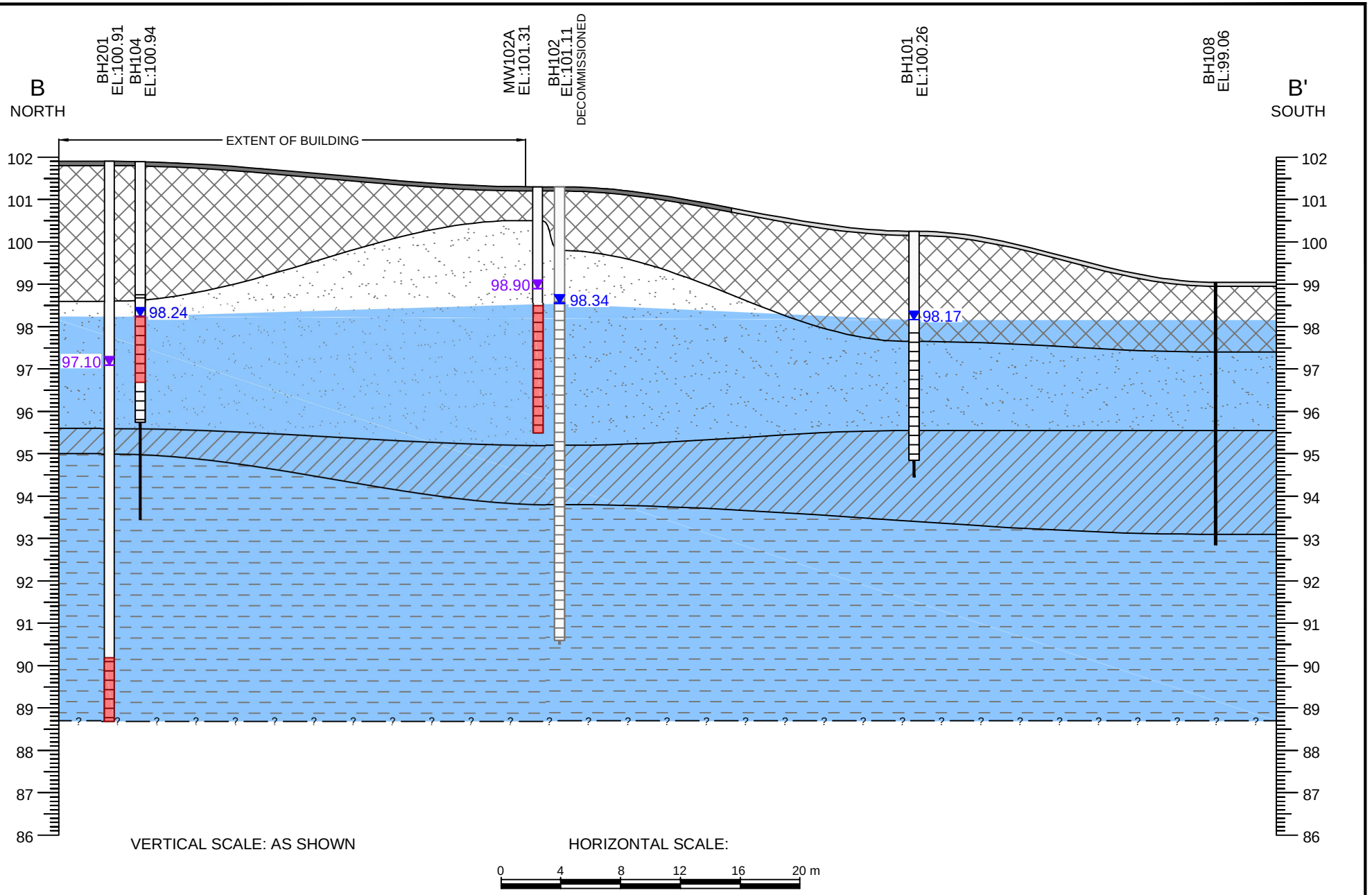
TITLE AND LOCATION:

SOIL ANALYTICAL RESULTS EC/SAR

PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.:	DWN.:
HAM-00801683-A0	LE
SCALE:	CK:
AS NOTED	SH
DATE:	FIG. NO.:
JULY 2019	22B

X:\DRAWINGS\80100\80160\80168\80168\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg



X:\DRAWINGS\80100\80160\80168\80168301683\A\PHASE TWO ESA\JULY 7 2019\HAM-00801683-A0.dwg

EXP Services Inc.
t: +1.905.793.9800 | f: +1.905.793.0641
1595 Clark Boulevard
Brampton, ON L6T 4V1
Canada
www.exp.com

• BUILDINGS • EARTH & ENVIRONMENT • ENERGY •
• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

LEGEND:

- ASPHALT
- TOPSOIL
- FILL
- SAND
- SILTY SILT TILL
- BEDROCK
- SAMPLE MEETS TABLE 2 SCS
- SAMPLE EXCEEDS TABLE 2 SCS
- EXTENT OF IMPACT
- * FOR CHEMICAL CHARACTERIZATION ONLY
- GROUNDWATER ELEVATION (MAY 21, 2019)
- GROUNDWATER ELEVATION (JUNE 20, 2019)

TITLE AND LOCATION:

GROUNDWATER ANALYTICAL RESULTS
VOCs
PHASE TWO ESA
418 AND 422 GUELPH LINE,
BURLINGTON, ONTARIO

PROJECT NO.: HAM-00801683-A0	DWN.: LE
SCALE: AS NOTED	CK: SH
DATE: JULY 2019	FIG. NO.: 22C

Tables

TABLE 1
AREAS OF POTENTIAL ENVIRONMENTAL CONCERN (APECs)
(Refer to clause 16(2)(a), Schedule D, O.Reg. 153/04)
418 & 422 Guelph Line, Burlington, Ontario
(On-Site and within 250 m)

Area of Potential Environmental Concern (APEC)[1]	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)[2]	Location of PCA (on-Site or off-Site)	Contaminants of Potential Concern[3]	Media Potentially Impacted (Groundwater, soil and/or sediment)
APEC 1: Vent pipe for potential former AST	North of the Site building addressed as 418 Guelph Line	PCA#28- Gasoline and Associated Products Storage in Fixed Tanks	On-Site	Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, ethylbenzene and Xylenes (BTEX), and Metals	Soil and Groundwater
APEC 2: Presence of greenhouses on Site	East portion of Site	PCA#40 – Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	On-Site	OCs	Soil
APEC 3: De-icing salt application to parking areas	On-Site parking areas on northwest portion of the Site	PCA "Other" – Use of salt for de-icing purposes (asphalt paved areas).	On-Site	Electrical Conductivity (EC), Sodium Absorption Ratio (SAR)	Soil
APEC 4: Fill and vent pipes associated with off Site UST at 422 Guelph Line	Northeast portion of the Site at 422 Guelph Line	PCA#28- Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	PHCs, BTEX, and Metals	Soil and Groundwater
APEC 5: Various automotive repair facilities on southwest adjacent property addressed as 2432 New Street	Southwest boundary of the Site	PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems	Off-Site	PHCs, and Volatile Organic Compounds (VOCs)	Groundwater
APEC 6A: Motorcycle Repair Center north adjacent to Site at 2434 New Street	North portion of the Site	PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems	Off-Site	PHCs, and VOCs	Groundwater
APEC 6B: Fill / vent pipe on building situated on north adjacent property (2434 New Street)	North portion of the Site	PCA#28: Gasoline and Associated Products Storage in Fixed Tanks.	Off-Site	PHCs, BTEX	Groundwater
APEC 7: Dry cleaning facility 25 m east of the Site at 415 Guelph Line	East boundary of the Site	PCA#37 - Operation of Dry-Cleaning Equipment (where chemicals are used)	Off-Site	Volatile Organic Compounds (VOCs)	Groundwater
APEC 8: Bulk paint storage 25 m east of the Site at 417 Guelph Line	East boundary of the Site	PCA#39 - Paints Manufacturing, Processing and Bulk Storage	Off-Site	Volatile Organic Compounds (VOCs)	Groundwater
APEC 9: Automotive Service Station 30 m north of the Site at 433 Guelph Line	Northeast boundary of the Site	PCA#28 – Gasoline and Associated products in fixed tanks.	Off-Site	PHCs, and Volatile Organic Compounds (VOCs)	Groundwater
APEC 10: Automotive service centre 60 m northwest of Site at 458 Guelph Line with associated USTs	Northwest boundary of the Site	PCA#28 – Gasoline and Associated products in fixed tanks.	Off-Site	PHCs, and Volatile Organic Compounds (VOCs)	Groundwater

TABLE 1
AREAS OF POTENTIAL ENVIRONMENTAL CONCERN (APECs)
(Refer to clause 16(2)(a), Schedule D, O.Reg. 153/04)
418 & 422 Guelph Line, Burlington, Ontario
(On-Site and within 250 m)

Area of Potential Environmental Concern (APEC)[1]	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)[2]	Location of PCA (on-Site or off-Site)	Contaminants of Potential Concern[3]	Media Potentially Impacted (Groundwater, soil and/or sediment)
APEC 11A: Automotive service centre 75 m north / northeast of Site at 3001 New Street (formerly 457 Guelph Line) with associated USTs	North boundary of the Site	PCA#28 – Gasoline and Associated products in fixed tanks	Off-Site	PHCs, and Volatile Organic Compounds (VOCs)	Groundwater
APEC 11B: Automotive service centre 75 m north / northeast of Site at 3001 New Street (formerly 457 Guelph Line) with associated USTs	North boundary of the Site	PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems	Off-Site	PHCs, and Volatile Organic Compounds (VOCs)	Groundwater
APEC 12: Dry cleaning facility 180 m northwest of the Site at 480 Guelph Line	Northwest boundary of the Site	PCA#37 - Operation of Dry-Cleaning Equipment (where chemicals are used)	Off-Site	Volatile Organic Compounds (VOCs)	Groundwater
APEC 13: Commercial printing establishment north adjacent of Site at 2442 New Street	North portion of the Site	PCA Other – Commercial printing establishment	Off-Site	VOCs	Groundwater

1. Area of Potential Environmental Concern means the area on, in or under a phase one study area where one or more contaminants are potentially present, as determined through the PI ESA, including through,
(a) identification of post or present uses on, in or under the phase one property, and
(b) identification of potentially contaminating activities.

2. Potentially contaminating activity means a use or activity set out in Column A of Table 2 of Schedule D that is occurring or has occurred in a phase one study area

3. When completing this column, identify all contaminants of potential concern using the Method Groups as identified in the "Protocol for in the Assessment of Properties under Part XV.1 of the Environmental Protection Act, March 9, 2004, amended as of July 1, 2011, as specified below:

ABNs	PCBs	Metals	EC	SAR
CPs	PAHs	As, Sb, Se	Cr (VI)	
1,4- Dioxane	THMs	Na	Hg	
Dioxins/Furans, PCDDs/PCDFs	VOCs	B-HWS	Methyl Mercury	
Ocs	BTEX	Cl-	high pH	
PHCs	Ca, Mg	CN-	low pH	

4. When submitting a record of site condition for filing, a copy of this table must be attached
***Cette publication hautement spécialisée n'est disponible qu'en anglais en vertu du règlement 671/92, qui en**

TABLE 2 - Borehole Log Information

HAM-00801683-A0 - Phase Two Environmental Site Assessment

418 & 422 Guelph Line, Burlington, Ontario

Location ID	Ground Elevation	Depth of BH	Bottom Elevation	Date Drilled	Drilling Contractor
BH102A	101.31	5.79	96.20	12-Jun-19	Geo Environmental Drilling
BH201	100.94	12.20	88.74	June 10 & 11, 2019	Geo Environmental Drilling
BH202	99.92	12.20	87.72	June 10 & 11, 2019	Geo Environmental Drilling
BH203	99.93	2.44	97.49	12-Jun-19	Geo Environmental Drilling

TABLE 3 - Summary of Soil Samples Submitted for Chemical Analysis

HAM-00801683-A0 - Phase Two Environmental Site Assessment

418 & 422 Guelph Line, Burlington, Ontario

Soil Sample ID	Sample Depth Interval (m)	Rationale	Analysis
BH201 - SS6	5.49 - 5.79	To vertically delineate VOC impacts	VOCs
BH203 - SS1	0 - 0.61	To address APEC 1: Potential presence of AST at 418 Guelph Line	PHCs +BTEX
QA/QC Samples:			
BH201- SS66 (Duplicate of BH201-SS6)	5.49 - 5.79	QA/QC purposes	VOCs
BH223 - SS1 (Duplicate of BH203-SS1)	0 - 0.61	QA/QC purposes	PHCs +BTEX

TABLE 4 - Monitoring Well Installation Details

HAM-00801683-A0 - Phase Two Environmental Site Assessment

418 & 422 Guelph Line, Burlington, Ontario

Location ID	Ground Elevation (m)	Stickdown/ Stickup (m)	Top of Pipe Elevation (m)	Measured Depth of Top of Screen (m bgs)	Measured Depth of MW (m bgs)	Screen Length (m)	Elevation of Top of Screen (Measured)	Elevation of Bottom of Screen (Measured)	Geologic Units Intercepted by Well Screen	Well Condition
MW102A	101.31	-0.10	101.21	2.71	5.76	3.05	98.60	95.55	Sand	Intact
MW201	100.94	-0.14	100.80	10.63	12.13	1.50	90.31	88.81	Bedrock	Intact
MW202	99.92	-0.15	99.77	10.61	12.11	1.50	89.32	87.82	Bedrock	Intact

TABLE 5 - Summary of Groundwater Samples Submitted for Chemical Analysis

HAM-00801683-A0 - Phase Two Environmental Site Assessment

418 & 422 Guelph Line, Burlington, Ontario

GW Sample ID	Sampling Date	Rationale	Analysis
BH/MW1	May 21, 2019 & June 20, 2019	To address APEC 4, 6A-B, 7, 8, 9, 10, 11A-B, 12 and 13, Confirmatory gw sample to confirm concentrations	PHCs and VOCs
BH/MW2	May 21, 2019 & June 20, 2019	To address APEC 6A-B, 7, 8, 9, 10, 12 and 13, Confirmatory gw sample to confirm concentrations	PHCs and VOCs
MW3	21-May-19	To address APEC 3 & 5, Confirmatory gw sample to confirm concentrations	VOCs
MW4	21-May-19	Confirmatory gw sample to confirm concentrations & to address APEC 7, 8, and 9	VOCs
MW101	21-May-19	Confirmatory gw sample to confirm concentrations	VOCs
MW102	21-May-19	Confirmatory gw sample to confirm concentrations & to address APEC 3	VOCs
MW103	21-May-19	Confirmatory gw sample to confirm concentrations, horizontal delineation of VOC impacts in GW	VOCs
BH104	21-May-19	Confirmatory gw sample to confirm concentrations & to address APEC 6 A-B, 10, 12, 13	PHCs, VOCs
BH105	21-May-19	Confirmatory gw sample to confirm concentrations and to address APEC 3 and 5	VOCs
MW106	21-May-19	Confirmatory gw sample to confirm concentrations	VOCs
MW102A	20-Jun-19	Horizontal delineation of VOC impacts	VOCs
MW201	20-Jun-19	Vertical delineation VOC impacts	VOCs
MW202	20-Jun-19	Vertical delineation VOC impacts	VOCs
QA/QC Samples:			
TRIP BLANK		QA/QC Purposes	VOCs
BH/MW22 (Duplicate of BH/MW2)	20-Jun-19	QA/QC Purposes	PHCs
BH1044 (Duplicate of BH104)	21-May-19	QA/QC Purposes	PHCs
MW44 (Duplicate of MW4)	21-May-19	QA/QC Purposes	VOCs
MW1022A (Duplicate of MW102A)	21-May-19	QA/QC Purposes	VOCs

TABLE 6 - Water Level Depths and Elevations

HAM-00801683-A0 - Phase Two Environmental Site Assessment

418 & 422 Guelph Line, Burlington, Ontario

Location ID	Ground Elevation (m relative)	Stickdown/ Stickup (m)	Top of Pipe Elevation (m relative)	Water Level Depth (TOP)	Water Level Depth (m bgs)	Water Level Depth (m relative)	Date
BH/MW1	100.73	-0.09	100.64	2.52	2.61	98.12	21-May-19
BH/MW2	101.38	-0.13	101.25	2.89	3.02	98.36	21-May-19
BH/MW3	100.9	-0.07	100.83	2.47	2.54	98.36	21-May-19
BH/MW4	99.92	-0.17	99.75	1.70	1.87	98.05	21-May-19
BH101	100.26	-0.07	100.19	2.02	2.09	98.17	21-May-19
BH102	101.31	-0.15	101.16	2.82	2.97	98.34	21-May-19
MW102A	101.31	-0.10	101.21	2.95	3.05	98.26	20-Jun-19
BH103	99.77	-0.16	99.61	1.42	1.58	98.19	21-May-19
BH104	100.94	-0.12	100.82	2.57	2.69	98.25	21-May-19
BH105	101.11	-0.16	100.95	2.54	2.70	98.41	21-May-19
BH106	99.76	-0.13	99.63	1.43	1.56	98.20	21-May-19
MW201	100.94	-0.14	100.80	3.62	3.76	97.18	20-Jun-19
MW202	99.92	-0.15	99.77	2.89	3.04	96.88	20-Jun-19

TABLE 7 - Summary of Horizontal Hydraulic Gradients (Overburden)

HAM-00801683-A0 - Phase Two Environmental Site Assessment

418 & 422 Guelph Line, Burlington, Ontario

Well Pair	Separation Distance (m)	Groundwater Elevations (m)	Elevation Difference (m)	Hydraulic Gradient* (m/m)
BH105 BH/MW4	67.2	97.04 96.68	0.36	0.005
BH/MW2 BH/MW1	36.9	98.35 98.12	0.23	0.006

*The horizontal hydraulic gradient between monitoring well pair is calculated from i = Δh/Δs, where I is the horizontal hydraulic gradient, Δh (m) is the groundwater elevation difference and Δs (m) is the distance apart.

TABLE 8- Vertical Hydraulic Gradient

HAM-00801683-A0 - Phase Two Environmental Site Assessment

418 & 422 Guelph Line, Burlington, Ontario

Well Pair	Groundwater Elevation (m ASL)	Bottom of Well Elevation (m ASL)	hp	z	h	Gradient* (m/m)
BH104	96.87	94.37	2.50	44.37	46.87	-0.049
MW201	97.14	88.81	8.33	38.81	47.14	
BH/MW4	96.68	94.05	2.63	44.05	46.68	0.153
MW202	95.73	87.82	7.91	37.82	45.73	

*The vertical hydraulic gradient between monitoring well pair is calculated from iv = (h2-h1)/(z2-z1)

Appendix A – SAAP

Phase Two Environmental Site Assessment

1. Introduction

This Appendix presents the Sampling and Analysis Plan (SAAP) that was developed in support of the Phase Two Environmental Assessment Work (ESA) for the property located at, 418 & 422 Guelph line, in Burlington, Ontario (hereinafter referred to as the 'Site'). The Phase Two ESA will be conducted to provide further characterization of the Site subsurface conditions and address the Areas of Potential Environmental Concerns (APECs) outlined in EXP March 2019 Phase One ESA to the subsequent filing of a Record of Site Condition (RSC) on the Ontario Ministry of the Environment (MOE) Brownfields Environmental Site Registry, which might be required. The SAAP presents the procedures and measures that will be undertaken during field investigative activities to characterize the Site conditions and meet the data quality objectives of the Phase Two ESA.

The SAAP presents the sampling program proposed for the Site, the recommended procedures and protocols for sampling and related field activities, the data quality objectives, and the quality assurance/ quality control measures that will be undertaken to provide for the collection of accurate, reproducible and representative data.

2. Field Sampling Program

The field sampling program was developed to provide for the collection of samples of the surficial and subsurface soil materials for chemical analysis of petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene and xylenes (collectively known as 'BTEX'), and volatile organic compounds (VOCs) in soil and for the analysis of PHCs, BTEX, and VOCs in groundwater. The soil sampling media is to consist of the surface soils and upper overburden materials (depths up to 12.2 m below grade). The soil sampling will be location-specific to assess for the potential presence of PHCs, BTEX, and VOCs, based on the identification of areas of potential environmental concern (APECs). Vapour readings will also be collected in the field to determine samples to be submitted for BTEX and PHC F1-F2 analysis. The soil sample intervals will extend from the surface up to a maximum depth of approximately 12.2 meters (m) below grade surface (bgs).

The groundwater sampling will be location-specific to assess for the potential presence of PHCs, BTEX, and VOCs, based on the identification of APECs. The monitoring well network will comprise of three (3) newly installed wells along with additional locations previously installed by BIG and S2S in 2017.

Vertical control of the boreholes and monitoring wells will be obtained through the completion of an elevation survey with reference to a local structure with a known geodetic elevation. Groundwater flow and direction in the water table aquifer will also be determined through groundwater level measurements and the elevations established from the Site elevation survey.

3. Field Methods

To meet the requirements of the field sampling program, the following field investigative methods will be undertaken:

- Borehole Drilling;
- Soil Sampling;

- Monitoring Well Installation;
- Monitoring Well Development;
- Groundwater Level Measurements;
- Elevation Survey; and,
- Groundwater Sampling.

The field investigative methods will be performed following the procedures and protocols set out in EXP's standard operating procedures and are outlined below:

3.1 Borehole Drilling

Boreholes will be advanced at the Site to facilitate the collection of soil samples for chemical analysis and geologic characterization; and, for the installation of groundwater monitoring wells. A total of four (4) boreholes are proposed to be advanced at the Site for the environmental investigation, up to a maximum depth of approximately 12.2 m below grade, to provide for the collection of samples of the surficial and overburden materials beneath the Site. The borehole locations will be selected to determine the presence or absence of impacts in the soils and the upper overburden groundwater and to address the APECs outlined in EXP July 2019 Phase One ESA Report.

Prior to borehole drilling, utility clearances will be obtained from public and private locators, as required. If any uncertainty regarding the location of a buried utility at a borehole location is encountered, hand augering or digging will be performed beforehand to confirm the location of the utility.

Where there is overlying asphalt or concrete, the overlying material will be mechanically cored to provide access to the underlying soil materials. The borehole drilling program will be conducted by a licensed driller under the oversight of EXP field staff. Auger flights will be cleaned prior to the commencement of drilling at each borehole location.

3.2 Soil Sampling

Soil samples will be collected for chemical analysis and geologic property characterization. The soil samples will be collected using 5 cm diameter, 61 cm long, split spoons and hollow stem augers or a 5 cm diameter, 1.5 m long, duel tube sampling system with interior dedicated vinyl sampling tubes. Upon retrieval from the boreholes, the split spoons or vinyl sampling tubes will be placed on a flat surface and disassembled by drilling personnel to provide access of the recovered cores. Geologic and sampling details of the recovered cores will be logged and the samples will be assessed for the potential presence of non-aqueous phase liquids. Soil stratigraphy encountered in the boreholes will be texturally, visually and olfactory classified in the field and in the laboratory. Soil samples will be logged for colour, grain size, moisture content, density, structures, texture, staining, and field vapour readings. A Photo-ionization Detector (PID) or GastechtorTM will be utilized to screen the soil samples for Total Organic Vapour (TOV). Representative worst-case soil samples from each borehole will be collected and submitted to a certified laboratory for analysis based on TOV readings, sample depth, visual and/or olfactory field observations.

Recommended volumes of soil samples selected for chemical analysis will be collected into pre-cleaned laboratory-supplied glass sample jars/vials identified for the specified analytical test group. Samples intended for PHC/BTEX and VOCs will be collected using a laboratory-supplied soil core sampler, placed into the vials containing methanol for preservation purposes and sealed using Teflon lined septa lids. The samples will be placed into clean insulated coolers chilled with ice for storage and transport. The samples will be assigned unique identification numbers, and the date, time, location, and requested analyses for each sample will be documented in a bound field note book. The samples will be submitted to the contractual laboratory within analytical test group holding times under Chain of Custody protocols. New disposable chemical resistant gloves will be used for each soil core to prevent sample cross-contamination.

3.3 Monitoring Well Installation

A proposed total of three (3) boreholes will be instrumented as groundwater monitoring wells installed with 1.5 to 3 m long screens intercepting the native overburden material, where the shallow water table aquifer is expected, extending to depths of approximately 12.2 m below grade. The monitoring wells will be constructed using 51 mm diameter, Schedule 40, PVC riser pipe and number 10 slot size (0.25 mm) well screens. The base of the well screen will be sealed with threaded flush PVC end caps. All well pipe connections will be factory machined threaded flush couplings. The annular space around the well screen will be backfilled with silica sand, to an average height of 0.6 m above the top of the screen. Granular bentonite will be placed in the borehole annulus from the top of the sand pack to approximately 0.3 m below grade. The monitoring well will be completed with flush-mounted protective steel casings cemented into place.

3.4 Monitoring Well Development

The newly installed and previous (BIG and S2S, 2017) monitoring wells, will be developed to remove fine sediment particles potentially lodged in the sand pack and well screen to enhance hydraulic communication with the surrounding formation waters. The monitoring wells will be developed using a dedicated low-density polyethylene (LDPE) tubing, equipped with an inertial foot valve to disturb the water column. The wells will be developed until approximately 3 to 5 well volumes of water will be removed and/or until purged dry. Well development details will be documented on a well development log sheet or in a bound hard cover notebook. All development waters will be collected and stored in labeled, sealed containers.

3.5 Groundwater Level Measurements

Groundwater level measurement will be recorded for the newly installed monitoring well to determine the depth of the water table aquifer beneath the Site. The water level will be measured with respect to the top of the PVC riser pipe by means of an electronic water level meter. The water levels will be recorded on water level log sheets or in a bound field notebook. The water level meter probe will be decontaminated between monitoring well locations.

3.6 Elevation Survey

An elevation survey will be conducted to obtain vertical control of the newly installed monitoring well location and boreholes. The top of the PVC riser pipe of the monitoring well and ground surface elevation of the monitoring well and borehole locations will be surveyed against an geodetic benchmark, or if unavailable, against a suitable arbitrary benchmark. Elevations measured against a geodetic/arbitrary benchmark will be recorded as meters above mean sea level (m AMSL). The elevation survey will be accurate to within ± 0.3 cm.

3.7 Field Measurements of Water Quality Parameters

Prior to collecting the groundwater sample, field measurements of water quality parameters will be recorded from the monitoring wells utilizing low-flow purging and sampling methodologies. Groundwater will be purged from the monitoring wells using a peristaltic pump and dedicated LDPE tubing. Field measurements of dissolved oxygen concentration, electrical conductivity, oxidation-reduction potential, pH, temperature, turbidity and water levels will be recorded in three (3) minute intervals during the purging activities using a pre-calibrated multi probe water quality meter, a turbidity meter and a water level meter. Generally well purging will continued until the purged water has chemically stabilized as indicated by field parameter measurements and the well head drawdown is maintained within 10 cm for 3 consecutive readings. In the event that the parameters do not stabilize or the well head drawdown is too significant, the groundwater is to recover to approximately 75% of static levels before sampling.

The multi-meter electrodes will be calibrated prior to receipt of the meter by the supplier using in-house pH and conductivity reference standards. All collected purged water will be stored on-Site in labeled, sealed containers. Equipment used during groundwater monitoring will be thoroughly cleaned and decontaminated between wells.

3.8 Groundwater Sampling

Upon completion the field measurements of water quality parameters, groundwater samples will be collected for chemical analysis using the peristaltic pump and dedicated LDPE tubing. Recommended groundwater sample volumes will be collected into pre-clean laboratory-supplied vials or bottles provided with analytical test group specific preservatives, as required. The samples will be placed in an insulated cooler chilled with ice for storage and transport. Samples for BTEX and VOC analysis will be collected in triplicate vials prepared with concentrated hydrochloric acid or an acceptable substitute as a preservative. Each vial will be inverted and inspected for gas bubbles prior to being placed in the cooler to ensure that no head-space is present.

The groundwater sample will be assigned a unique identification number, and the date, time, project number, company name, location and requested analyses will be documented in a bound hard cover notebook. The sample will be submitted to the contractual laboratory within analytical test group holding times under chain of custody protocols. New disposable chemical resistant gloves will be used for each sampling location to prevent sample cross-contamination.

4. Field Quality Assurance/Quality Control Program

The objective of the field quality assurance/quality control (QA/QC) program is to obtain soil and groundwater samples and other field measurements that provide data of acceptable quality that meets the objectives of the Phase Two ESA. The objectives of the QA/QC program will be achieved through the implementation of procedures for the collection of unbiased (i.e. non-contaminated) samples, sample documentation and the collection of appropriate QC samples to provide a measure of sample reproducibility and accuracy. The field QA/QC measures will comprise:

- Decontamination Protocols;
- Equipment Calibration;
- Sample Preservation;
- Sample Documentation; and,
- Field Quality Control Samples.

Details on the field QA/QC measures are provided below.

4.1 Decontamination Protocols

Decontamination protocols will be followed during field sampling where non-dedicated sampling equipment is used to prevent sample cross contamination. For the borehole drilling and soil sampling, soil sampling devices will be cleaned/decontaminated between sampling intervals and auger flights between borehole locations in according with SOP requirements. For the monitoring well installation, well components are not to come into contact with the ground surface prior to insertion into boreholes. Electronic water level meters will be decontaminated between monitoring well locations during well development, and purging activities. For hydraulic conductivity tests, the electronic water level meters will be decontaminated between sampling locations. All decontamination fluids will be collected and stored in sealed, labeled containers.

4.2 Equipment Calibration

All equipment requiring calibration will be calibrated in the field according to manufacturer's requirements using analytical grade reagents, or by the supplier prior to conducting field activities, and subsequently checked in the field. The calibration of all pre-calibrated instruments will be checked in the field using analytical grade reagents and re-calibrated as required. For multiple day sampling events, equipment calibration will be checked prior to the beginning of sampling activities. All calibration data will be documented in a bound hard cover notebook.

4.3 Sample Preservation

All samples will be preserved using appropriate analytical test group specific reagents, as required, and upon collection placed in pre-chilled insulated coolers packed with ice for storage and transport.

4.4 Sample Documentation

All samples will be assigned a unique identification number, which is to be recorded along with the date, time, project number, company name, location and requested analysis in a bound field notebook. All samples will be handled and transported following COC protocols.

4.5 Field Quality Control

Field quality control samples will be collected to evaluate the accuracy and reproducibility of the field sampling procedures. For groundwater sampling, one (1) field duplicate is to be collected for every ten (10) samples submitted for chemical analysis. For multiple day sampling events, at least one (1) field duplicate soil and groundwater sample will be submitted for chemical analysis. The field duplicate samples will be assessed by calculating the relative percent difference and comparing to the analytical test group specific acceptance criteria.

Appendix B – Survey Plan

KNOWN AS
NEW STREET
(ROAD ALLOWANCE BETWEEN CONCESSION 3 & 4 S.D.S.)

PART 28 | PART 29 | PART 31 | PART 32 | PART 33 PLAN 20R-7332 | PART 34

PART 4 PLAN 20R-19098 | PART 2 PLAN 20R-19098 | PART 1 PLAN 20R-19098

PART 1 20R-11547

PLAN 20R-1934

NORTH CORNER LOT 16, CONCESSION 4 SDS

2440
1 STOREY
BRICK AND BLOCK
BUILDING
DSILL
90.79

PART 1
PART 2

PIN 07197-0093

422
BRICK AND BLOCK
BUILDING
DSILL
90.71

PIN 07197-0094

422
BRICK AND BLOCK
BUILDING
DSILL
90.10

PIN 07197-0095

PIN 07197-0096

418
2 STOREY STUCCO
BUILDING
DSILL
89.41

406
2-STOREY
BRICK BUILDING

PART 3 PLAN 221 MISC.

PART 1 PLAN 20R-944
PART 36 PLAN 20R-732

CONCESSION 4 S.D.S.

GUELPH LINE
(ROAD ALLOWANCE BETWEEN LOTS 15 & 16 S.D.S.)
KNOWN AS
PIN 07046-0022

GUARD RAIL | ANCHOR | POST & CABLE FENCE | TREE LINE 7m ± WIDE | GATE | 'P' SIGN | STEPS | CONC. PAD | GARFLR | EDGE OF ROAD | BOC | CB | CC | CP | LS | RS | WV | HYDRO | HYPW | WHYY | OHW | GAS MAIN | WATER MAIN | SAN MH | ST MH | WVCH | ASPHALT DRIVE WAY | PORCH | BLOCKED | S. ROAD

SUBSURFACE UTILITY & TOPOGRAPHIC MAPPING

GEOGRAPHIC LOCATION NOTE

PART OF LOT 16
CONCESSION 4 S.D.S.

(GEOGRAPHIC TOWNSHIP OF NELSON)

NOW IN THE

CITY OF BURLINGTON

REGIONAL MUNICIPALITY OF HALTON

SCALE 1 : 200

0 5 10 20 metres

MacKAY, MacKAY & PETERS LIMITED – ONTARIO LAND SURVEYORS
© 2019

ADDRESS: 422 & 418 GUELPH LINE	CLIENT: PRO FUNDS MORTGAGES

Legend :

PIN DENOTES PROPERTY IDENTIFICATION NUMBER
℄ DENOTES CENTRE LINE
℗ DENOTES ROUND
SDS DENOTES SOUTH OF DUNDAS STREET
BF DENOTES BOARD FENCE
OHW DENOTES OVERHEAD WIRE
HYPW DENOTES HYDRO POLE (WOOD)
WV DENOTES WATER VALVE
GV DENOTES GAS VALVE
GM DENOTES GAS METER
CB DENOTES CATCH BASIN
ST MH DENOTES STORM MANHOLE
SAN MH DENOTES SANITARY MANHOLE
RS DENOTES ROAD SIGN
LS DENOTES UTILITY LIGHT STANDARD
DSILL DENOTES DOOR SILL ELEVATION
GARFLR DENOTES GARAGE FLOOR ELEVATION
BOC DENOTES BACK OF CURB
UHH DENOTES UTILITY HANDY HOLE
WFHY DENOTES WATER FIRE HYDRANT
WHYV DENOTES WATER HIGHWAY VALVE
WVCH DENOTES WATER VALVE CHAMBER
WVB DENOTES WATER VALVE BOX
NTS DENOTES NOT TO SCALE
GAS DENOTES GAS MAIN
GAS SERVICE DENOTES GAS SERVICE
H DENOTES HYDRO
WM DENOTES WATER MAIN
WS DENOTES WATER SERVICE
SAN SEWER DENOTES SANITARY SEWER
STM DENOTES STORM SEWER

Benchmark Note:

CITY OF BURLINGTON BENCHMARK No. 273 ELEVATION = 80.809 METRES (CGVD 1928 : 1978 ADJUSTMENT)

BRASS CAP IN TOP OF CURB AT THE NORTHERLY END OF THE RAMP LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF LAKESHORE ROAD AND GUELPH LINE. THE MONUMENT IS LOCATED 5.5 METRES FROM THE END OF THE CURB RETURN ON THE SOUTHEAST CORNER OF THE INTERSECTION, 2.68 METRES FROM A NAIL IN THE FACE OF A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHEAST CORNER, AND 19.2 METRES FROM A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHWEST CORNER OF THE INTERSECTION.

DISCLAIMER:

LOCATE VALID FOR THIRTY DAYS POST COMPLETION DATE. EXCAVATORS ARE EXPECTED TO FOLLOW CANADIAN COMMON GROUND ALLIANCE "UNDERGROUND INFRASTRUCTURE DAMAGE PREVENTION" BEST PRACTICES VERSION 2 SECTION 4 – EXCAVATION BEST PRACTICES. DETAILED INFORMATION CAN BE FOUND AT HTTP://ORCGA.COM/WP-CONTENT/UPLOADS/2016/12/1-CGGA-BEST-PRACTICES-VOLUME-2.01. LOCATE NOT VALID IF FIELD MARKINGS BECOME UNCLEAR OR WORK AREA HAS BEEN CHANGED. FIELD MARKINGS ARE ESTIMATES ONLY, THE EXACT LOCATION OF UNDERGROUND UTILITIES MUST BE DETERMINED BE HAND DIGGING (HYDRO-VAC AND AIR-VAC) PRIOR TO EXCAVATION WITH MECHANICAL EQUIPMENT. CONTRACTOR/APPLICANT MUST HAND DIG (HYDRO-VAC AND AIR-VAC) WITHIN ONE METRE OF MARKINGS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR/APPLICANT TO OBTAIN FULL PUBLIC LOCATES IN ORDER FOR THE PRIVATE LOCATE TO BE VALID. PRIVATE LOCATES ARE RELIANT UPON THE AVAILABILITY AND ACQUISITION OF COMPLETE RECORDS, TOGETHER WITH THE CONDUCTIVITY OF FACILITIES BEING LOCATED. IF CONTACT IS MADE OR EVEN SUSPECTED WITH ANY UNDERGROUND FACILITY "STOP WORK IMMEDIATELY", SHUT DOWN ALL POWERED EQUIPMENT, FOLLOW HEALTH AND SAFETY PROTOCOL AND NOTIFY THE FACILITY OWNER.

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

DISCLAIMER

UTILITY LOCATES ARE FOR DESIGN PURPOSES ONLY.
VALID PUBLIC AND PRIVATE LOCATES MUST BE OBTAINED BEFORE GROUND DISTURBANCE.

BOUNDARY DATA SHOWN HEREON WAS COMPILED FROM SURVEY RECORDS & REGISTRY OFFICE INFORMATION.

DRAFTING COMPLETED	MAY 8, 2019	COPYRIGHT © 2019
FIELD WORK COMPLETED	APRIL 24, 2019	

CAD FILE: E:\LOCATES\(20) HALTON\19-1021-UL\19-1021-UL.DWG

MMP LAND SURVEYORS & MAPPERS
MMP Utility Locates
a division of
MacKay, MacKay & Peters Limited

3380 South Service Road
Unit 101
Burlington, ON
L7N 3J5
(905) 639-1375
halton@mmplimited.com
mmpsurveyors.ca
mmplocators.ca

PARTY CHIEF:	A.B.
LOCATOR:	C.P.
DRAWN BY:	M.S.
CHECKED BY:	K.J.D.
PROJECT NO.:	19-1021-UL

Appendix C – Borehole Logs

Log of Borehole BH/MW102A

Project No. HAM-00801683-A0 | Drawing No. 1

Project: Phase Two ESA | Sheet No. 1 of 1

Location: 418 & 422 Guelph Line, Burlington, ON

Refer to borehole location plan

Date Drilled: June 12, 2019

Drill Type: CME 75-3

Datum: Relative

Chemical Analysis

BTEX	Benzene, Toluene, Ethylbenzene and Xylenes	*	Duplicate Sample
ING	Metals and Inorganics	PCB	Polychlorinated Biphenyls
MET	Metals	PHC	Petroleum Hydrocarbons (F1-F4)
PAH	Polycyclic Aromatic Hydrocarbons	VOC	Volatile Organic Compounds
PEST	Organochlorine Pesticides		

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
			101.31	0
		Asphalt	~101.3	
		Sand Fill		
		SAND Brown, trace silt, moist	~100.5	1
				2
▽		Wet	~98.3	3
				4
				5
		End of borele.	~95.5	6
		Borehole samples were from auger cuttings.		7
		NOTES:		8
		1) This drawing is to be read with the subject report and project number as presented above.		9
		3) 50.8 mm diameter well installed.		10
		4) Well screen installed from 2.74 - 5.79 m.		11
				12
				13
				14
				15

N Value: 20 40 60

Combustible Vapour Reading (ppm): 25 50 75

SAMPLES	% RECOV	SAMPLE ID	ANALYSIS	N Value	Combustible Vapour Reading (ppm)
	100	SS1		0 (H) 0 (I)	
	100	SS2		0 (H) 0 (I)	
	100	SS3		0 (H) 0 (I)	
	100	SS4		0 (H) 0 (I)	

ENVIRONMENTAL-EXP 418 & 422 GUELPH LINE, BURLINGTON.GPJ 8/2/19

EXP Services Inc.
Brampton, Ontario
Telephone: 905-793-9800
Facsimile: 905-793-0641

Time	Water Level (m)	Depth to Cave (m)
June 20, 2019	3.054	

Log of Borehole BH/MW201

Project No. HAM-00801683-A0 | Drawing No. 2

Project: Phase Two ESA | Sheet No. 1 of 1

Location: 418 & 422 Guelph Line, Burlington, ON

Refer to borehole location plan

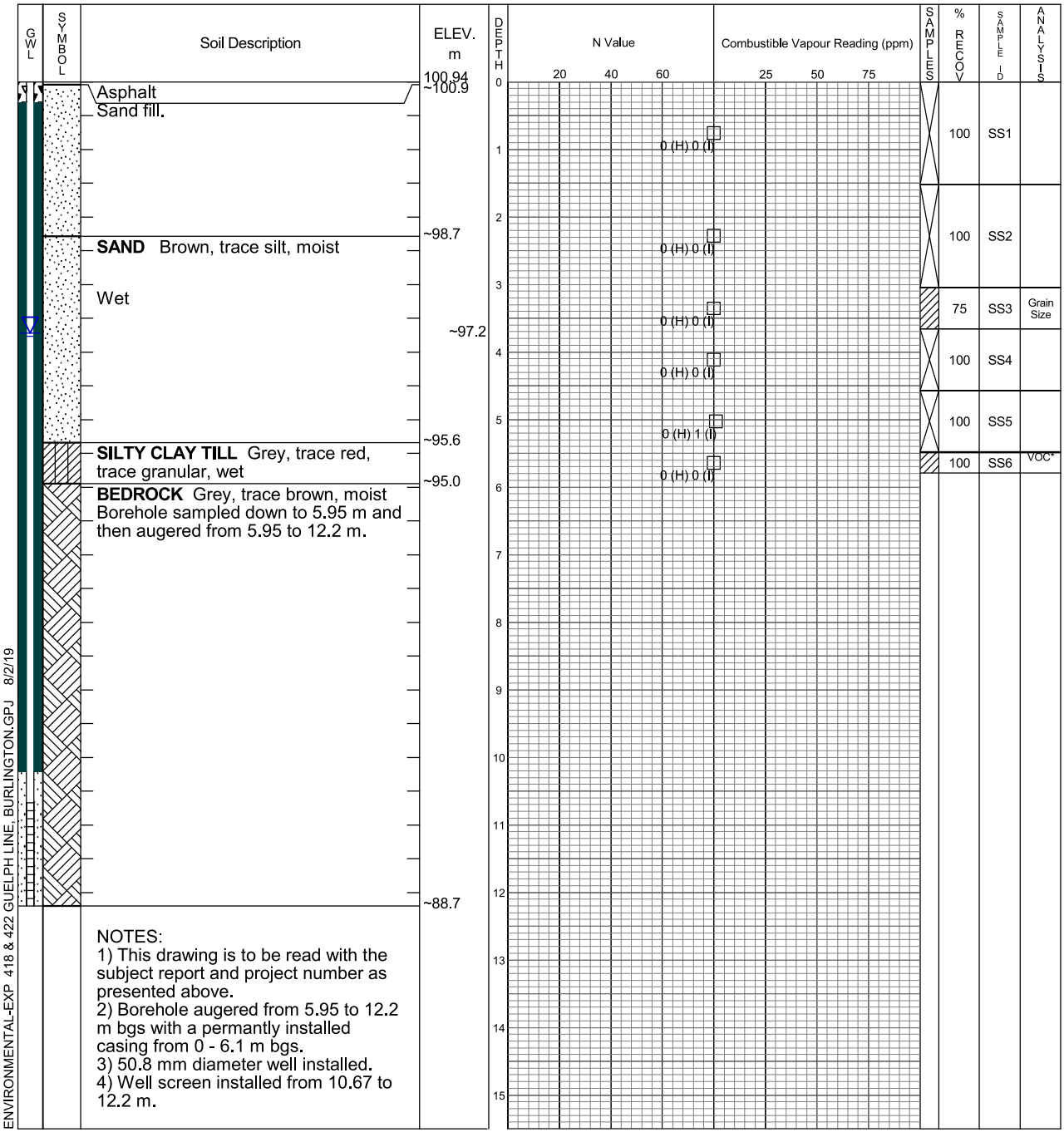
Date Drilled: June 10 & 11, 2019

Drill Type: CME 75-3

Datum: Relative

Chemical Analysis

BTEX	Benzene, Toluene, Ethylbenzene and Xylenes	*	Duplicate Sample
ING	Metals and Inorganics	PCB	Polychlorinated Biphenyls
MET	Metals	PHC	Petroleum Hydrocarbons (F1-F4)
PAH	Polycyclic Aromatic Hydrocarbons	VOC	Volatile Organic Compounds
PEST	Organochlorine Pesticides		



Time	Water Level (m)	Depth to Cave (m)
June 20, 2019	3.764	

EXP Services Inc.
Brampton, Ontario
Telephone: 905-793-9800
Facsimile: 905-793-0641

Log of Borehole BH/MW202

Project No. HAM-00801683-A0 | Drawing No. 3

Project: Phase Two ESA | Sheet No. 1 of 1

Location: 418 & 422 Guelph Line, Burlington, ON

Refer to borehole location plan

Date Drilled: June 10 & 11, 2019

Drill Type: CME 75-3

Datum: Relative

Chemical Analysis

BTEX	Benzene, Toluene, Ethylbenzene and Xylenes	*	Duplicate Sample
ING	Metals and Inorganics	PCB	Polychlorinated Biphenyls
MET	Metals	PHC	Petroleum Hydrocarbons (F1-F4)
PAH	Polycyclic Aromatic Hydrocarbons	VOC	Volatile Organic Compounds
PEST	Organochlorine Pesticides		

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
			99.92	0
		Asphalt ~99.8		
		Sand fill.		1
				2
		SAND Brown, trace silt, moist ~97.9		
▽				3
		Wet ~96.9		
				4
		SILTY CLAY TILL Grey/ brown, trace red, trace granular, wet ~95.4		
				5
		BEDROCK Grey, trace brown, moist ~94.1		6
		Borehole sampled down to 5.79 m and then augered from 5.79 to 12.2 m.		7
				8
				9
				10
				11
				12
		~87.7		13
				14
				15

N Value: 20, 40, 60

Combustible Vapour Reading (ppm): 25, 50, 75

SAMPLES	% RECOV	SAMPLE ID	ANALYSIS	N Value / Combustible Vapour Reading (ppm)
	100	SS1		0 (H) 0 (I)
	100	SS2		0 (H) 0 (I)
	100	SS3		0 (H) 0 (I)
	100	SS4		0 (H) 0 (I)

NOTES:
1) This drawing is to be read with the subject report and project number as presented above.
2) Borehole augered from 5.79 to 12.2 m bgs with a permantly installed casing from 0 - 6.1 m bgs.
3) 50.8 mm diameter well installed.
4) Well screen installed from 10.67 to 12.2 m.

ENVIRONMENTAL-EXP 418 & 422 GUELPH LINE, BURLINGTON.GPJ 8/2/19

Time	Water Level (m)	Depth to Cave (m)
June 20, 2019	3.038	

EXP Services Inc.
Brampton, Ontario
Telephone: 905-793-9800
Facsimile: 905-793-0641

Log of Borehole BH203

Project No. HAM-00801683-A0 | Drawing No. 4

Project: Phase Two ESA | Sheet No. 1 of 1

Location: 418 & 422 Guelph Line, Burlington, ON

Refer to borehole location plan

Date Drilled: June 12, 2019

Drill Type: Bosch Electric

Datum: Relative

Chemical Analysis

BTEX	Benzene, Toluene, Ethylbenzene and Xylenes	*	Duplicate Sample
ING	Metals and Inorganics	PCB	Polychlorinated Biphenyls
MET	Metals	PHC	Petroleum Hydrocarbons (F1-F4)
PAH	Polycyclic Aromatic Hydrocarbons	VOC	Volatile Organic Compounds
PEST	Organochlorine Pesticides		

GWL	SYMBOL	Soil Description	ELEV. m	DEPTH
			99.93	0
		Topsoil, trace rootlets, brown, moist	~99.8	
		SAND Brown, moist		1
				2
		Wet		3
			~97.5	4
		Borehole completed to 2.44 m.		5
		NOTES:		6
		1) This drawing is to be read with the subject report and project number as presented above.		7
				8
				9
				10
				11
				12
				13
				14
				15

N Value: 20, 40, 60

Combustible Vapour Reading (ppm): 25, 50, 75

0 ppm

0 ppm

0 ppm

0 ppm

SAMPLES	% RECOV	SAMPLE ID	ANALYSIS
	75	SS1	PHC* BTEX*
	75	SS2	
	83	SS3	
	83	SS4	Grain Size

ENVIRONMENTAL-EXP 418 & 422 GUELPH LINE, BURLINGTON.GPJ 8/2/19

EXP Services Inc.
Brampton, Ontario
Telephone: 905-793-9800
Facsimile: 905-793-0641

Time	Water Level (m)	Depth to Cave (m)

Appendix D – Analytical tables

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition Residential/Parkland/Institutional Land Use (coarse textured soil)	BH1-SS5	BH2-SS5	BH3-SS5	BH101-5	BH102-4
Lab ID		DZO990	DZO992	DZO996	-	-
Sampling Date		1-Mar-17	1-Mar-17	1-Mar-17	7-Sep-17	6-Sep-17
Soil Sample Depth (m)		3 - 3.76	3 - 3.76	3 - 3.76	3.0-3.7	2.3-2.9
Consultant		BIG	BIG	BIG	S2S	S2S
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		13-Mar-17	13-Mar-17	13-Mar-17	-	-
Certificate of Analysis Number		B743310	B743310	B743310	-	-
PHC F1 (C6-C10)	55	<10	<10	<10	<10	<10
PHC F1 (C6-C10) - BTEX	55	<10	<10	<10	-	-
PHC F2 (C10-C16)	98	<10	<10	<10	<10	<10
PHC F3 (C16-C34)	300	<50	<50	<50	<50	<50
PHC F4 (C34-C50)	2800	<50	<50	<50	<50	<50
Reached baseline at C50?	-	Yes	Yes	Yes	Yes	Yes
PHC F4 (C34-C50)-gravimetric	2800	-	-	-	-	-

All soil concentrations reported in µg/g.
< = Parameter below detection limit, as indicated
NV = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS.

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition Residential/Parkland/Institutional Land Use (coarse textured soil)	BH103-4	BH104-6	BH105-5	BH106-4	BH107-1
Lab ID		-	-	-	-	-
Sampling Date		5-Sep-17	7-Sep-17	6-Sep-17	5-Sep-17	7-Sep-17
Soil Sample Depth (m)		2.3-2.9	4.6-5.2	3.0-3.7	2.3-2.9	0 - 0.6
Consultant		S2S	S2S	S2S	S2S	S2S
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		-	-	-	-	-
Certificate of Analysis Number		-	-	-	-	-
PHC F1 (C6-C10)	55	<10	<10	<10	<10	<10
PHC F1 (C6-C10) - BTEX	55	-	-	-	-	-
PHC F2 (C10-C16)	98	<10	<10	<10	<10	<10
PHC F3 (C16-C34)	300	<50	<50	<50	<50	<50
PHC F4 (C34-C50)	2800	<50	<50	<50	<50	<50
Reached baseline at C50?	-	Yes	Yes	Yes	Yes	Yes
PHC F4 (C34-C50)-gravimetric	2800	-	-	-	-	-

All soil concentrations reported in µg/g.
< = Parameter below detection limit, as indicated
NV = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (201

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition Residential/Parkland/Institutional Land Use (coarse textured soil)	BH108-4	BH109-5	BH203-SS1	BH223-SS1
Lab ID		-	-	JZM239	JZM240
Sampling Date		5-Sep-17	7-Sep-17	12-Jun-19	12-Jun-19
Soil Sample Depth (m)		2.3-2.9	3.0-3.7	0 - 0.61	0 - 0.61
Consultant		EXP	EXP	EXP	EXP
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		-	-	18-Jun-19	18-Jun-19
Certificate of Analysis Number		-	-	B9G1769	B9G1769
PHC F1 (C6-C10)	55	<10	<10	<10	<10
PHC F1 (C6-C10) - BTEX	55	-	-	<10	<10
PHC F2 (C10-C16)	98	<10	<10	<10	<10
PHC F3 (C16-C34)	300	<50	<50	<50	<50
PHC F4 (C34-C50)	2800	<50	<50	<50	<50
Reached baseline at C50?	-	Yes	Yes	YES	YES
PHC F4 (C34-C50)-gravimetric	2800	-	-	-	-

All soil concentrations reported in µg/g.
< = Parameter below detection limit, as indicated
NV = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (201

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition Residential/Parkland/Institutional Land Use (coarse textured soil)	BH1-SS5	BH2-SS5	BH3-SS5	BH4-SS4	BH101-6	BH101-8	BH102-6	BH102-7	BH103-6	BH104-6	BH105-6	BH105-7	BH106-6	BH108-6
Lab ID		DZO990	DZO992	DZO996	DZO999	-	-	-	-	-	-	-	-	-	-
Sampling Date		1-Mar-17	1-Mar-17	1-Mar-17	1-Mar-17	7-Sep-17	7-Sep-17	6-Sep-17	6-Sep-17	5-Sep-17	7-Sep-17	6-Sep-17	6-Sep-17	5-Sep-17	5-Sep-17
Soil Sample Depth (m)		3 - 3.76	3 - 3.76	3 - 3.76	2.29 - 2.9	3.8-4.4	5.3-5.8	4.6-5.2	6.1-6.6	4.6-5.2	4.6-5.2	4.6-5.2	6.1-6.2	4.6-5.2	4.6-5.2
Consultant		BIG	BIG	BIG	BIG	S2S	S2S	S2S	S2S	S2S	S2S	S2S	S2S	S2S	S2S
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		13-Mar-17	13-Mar-17	13-Mar-17	13-Mar-17	-	-	-	-	-	-	-	-	-	-
Certificate of Analysis Number		B743310	B743310	B743310	B743310	-	-	-	-	-	-	-	-	-	-
Acetone	16	<0.50	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Benzene	0.21	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	0.081	<0.020	<0.020	<0.020	<0.020
Bromodichloromethane	1.5	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Bromoform	0.27	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Bromomethane	0.05	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Carbon Tetrachloride	0.05	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chlorobenzene	2.4	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chloroform	0.05	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dibromochloromethane	2.3	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichlorobenzene	1.2	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,3-Dichlorobenzene	4.8	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,4-Dichlorobenzene	0.083	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dichlorodifluoromethane	16	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethane	0.47	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichloroethane	0.05	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1-Dichloroethylene	0.05	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
cis-1,2-Dichloroethylene	1.9	<0.050	-	<0.050	0.19	<0.050	<0.050	<0.050	<0.050	<0.050	1.2	<0.050	<0.050	<0.050	<0.050
trans-1,2-Dichloroethylene	0.084	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,2-Dichloropropane	0.05	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
cis-1,3-Dichloropropene	0.05	<0.030	-	<0.030	<0.030	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
trans-1,3-Dichloropropene	0.05	<0.040	-	<0.040	<0.040	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Ethylbenzene	1.1	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylene Dibromide (1,2-Dibromoethane)	0.05	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Hexane (n)	2.8	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methylene chloride (Dichloromethane)	0.1	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl ethyl ketone (2-Butanone)	16	<0.50	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Methyl Isobutyl Ketone	1.7	<0.50	-	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Methyl t-butyl ether (MTBE)	0.75	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Styrene	0.7	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,1,2-Tetrachloroethane	0.058	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,2,2-Tetrachloroethane	0.05	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Tetrachloroethylene	0.28	<0.050	-	<0.050	**0.72**	**1.9**	<0.050	**0.3**	<0.050	<0.050	**18**	**0.69**	<0.050	<0.050	<0.050
Toluene	2.3	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
1,1,1-Trichloroethane	0.38	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1,1,2-Trichloroethane	0.05	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Trichloroethylene	0.061	<0.050	-	<0.050	<0.050	<0.050	<0.050	**0.081**	<0.050	<0.050	**0.92**	<0.050	<0.050	<0.050	<0.050
Trichlorofluoromethane	4	<0.050	-	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Vinyl Chloride	0.02	<0.020	-	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	**0.056**	<0.020	<0.020	<0.020	<0.020
m-Xylene + p-Xylene	NV	<0.020	<0.040	<0.020	<0.020	-									
o-Xylene	NV	<0.020	<0.020	<0.020	<0.020	-									
Xylenes (total)	3.1	<0.020	<0.040	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020

1,3-Dichloropropene (cis + trans)

All soil concentrations reported in µg/g.

"<" = Parameter below detection limit, as indicated

NV = No value

Bold Concentration exceeds MECP (2011) SCS.

Non-detect but detection limit exceeds the MECP (2011) SCS.

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition Residential/Parkland/Institutional Land Use (coarse textured soil)	BH101-5	BH102-4	BH103-4	BH104-6	BH105-5	BH106-4	BH107-1	BH108-4	BH109-5	BH201-SS6	BH201-SS66
Lab ID		-	-	-	-	-	-	-	-	-	JYV313	JYV314
Sampling Date		7-Sep-17	6-Sep-17	5-Sep-17	7-Sep-17	6-Sep-17	5-Sep-17	7-Sep-17	5-Sep-17	7-Sep-17	12-Jun-19	12-Jun-19
Soil Sample Depth (m)		3.0-3.7	2.3-2.9	2.3-2.9	4.6-5.2	3.0-3.7	2.3-2.9	0 - 0.6	2.3-2.9	3.0-3.7	5.49 - 5.79	5.49 - 5.79
Consultant		S2S	S2S	S2S	S2S	S2S	S2S	S2S	S2S	S2S	EXP	EXP
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		-	-	-	-	-	-	-	-	-	14-Jun-19	14-Jun-19
Certificate of Analysis Number		-	-	-	-	-	-	-	-	-	B9F8564	B9F8564
Acetone	16	-	-	-	-	-	-	-	-	-	<0.50	<0.50
Benzene	0.21	<0.020	<0.020	<0.020	0.081	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Bromodichloromethane	1.5	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Bromoform	0.27	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Bromomethane	0.05	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Carbon Tetrachloride	0.05	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Chlorobenzene	2.4	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Chloroform	0.05	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Dibromochloromethane	2.3	-	-	-	-	-	-	-	-	-	<0.050	<0.050
1,2-Dichlorobenzene	1.2	-	-	-	-	-	-	-	-	-	<0.050	<0.050
1,3-Dichlorobenzene	4.8	-	-	-	-	-	-	-	-	-	<0.050	<0.050
1,4-Dichlorobenzene	0.083	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Dichlorodifluoromethane	16	-	-	-	-	-	-	-	-	-	<0.050	<0.050
1,1-Dichloroethane	0.47	-	-	-	-	-	-	-	-	-	<0.050	<0.050
1,2-Dichloroethane	0.05	-	-	-	-	-	-	-	-	-	<0.050	<0.050
1,1-Dichloroethylene	0.05	-	-	-	-	-	-	-	-	-	<0.050	<0.050
cis-1,2-Dichloroethylene	1.9	-	-	-	-	-	-	-	-	-	<0.050	<0.050
trans-1,2-Dichloroethylene	0.084	-	-	-	-	-	-	-	-	-	<0.050	<0.050
1,2-Dichloropropane	0.05	-	-	-	-	-	-	-	-	-	<0.050	<0.050
cis-1,3-Dichloropropene	0.05	-	-	-	-	-	-	-	-	-	<0.030	<0.030
trans-1,3-Dichloropropene	0.05	-	-	-	-	-	-	-	-	-	<0.040	<0.040
Ethylbenzene	1.1	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylene Dibromide (1,2-Dibromoethane)	0.05	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Hexane (n)	2.8	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Methylene chloride (Dichloromethane)	0.1	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Methyl ethyl ketone (2-Butanone)	16	-	-	-	-	-	-	-	-	-	<0.50	<0.50
Methyl Isobutyl Ketone	1.7	-	-	-	-	-	-	-	-	-	<0.50	<0.50
Methyl t-butyl ether (MTBE)	0.75	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Styrene	0.7	-	-	-	-	-	-	-	-	-	<0.050	<0.050
1,1,1,2-Tetrachloroethane	0.058	-	-	-	-	-	-	-	-	-	<0.050	<0.050
1,1,2,2-Tetrachloroethane	0.05	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Tetrachloroethylene	0.28	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Toluene	2.3	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
1,1,1-Trichloroethane	0.38	-	-	-	-	-	-	-	-	-	<0.050	<0.050
1,1,2-Trichloroethane	0.05	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Trichloroethylene	0.061	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Trichlorofluoromethane	4	-	-	-	-	-	-	-	-	-	<0.050	<0.050
Vinyl Chloride	0.02	-	-	-	-	-	-	-	-	-	**0.052**	**0.056**
m-Xylene + p-Xylene	NV	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040	<0.020	<0.020
o-Xylene	NV	-	-	-	-	-	-	-	-	-	<0.020	<0.020
Xylenes (total)	3.1	-	-	-	-	-	-	-	-	-	<0.020	<0.020
1,3-Dichloropropene (cis + trans)											<0.050	<0.050

All soil concentrations reported in µg/g.
"<" = Parameter below detection limit, as indicated
NV = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SC

Sample ID	MOECC (2011) Table 3: Full Depth Generic SCS in a Non-Potable Groundwater Condition Residential/Parkland/Institutional Land Use (coarse textured soil)	BH2-SS4	BH3-SS2	BH4-SS3	BH101-1	BH101-5
Lab ID		DZO991	DZO994	DZO998	-	-
Sampling Date		1-Mar-17	1-Mar-17	1-Mar-17	7-Sep-17	7-Sep-17
Soil Sample Depth (m)		2.3 - 2.9	0.7 - 1.37	1.5 - 2.13	0 - 0.6	3 - 3.7
Consultant		BIG	BIG	BIG	S2S	S2S
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		13-Mar-17	13-Mar-17	13-Mar-17	-	-
Certificate of Analysis Number		B743310	B743310	B743310	-	-
Acenaphthene	7.9	<0.0050	<0.0050	<0.0050	0.063	<0.0050
Acenaphthylene	0.15	<0.0050	<0.0050	<0.0050	<0.050	<0.0050
Anthracene	0.67	<0.0050	<0.0050	<0.0050	0.093	<0.0050
Benzo(a)anthracene	0.5	<0.0050	0.011	<0.0050	0.3	<0.0050
Benzo(a)pyrene	0.3	<0.0050	0.011	<0.0050	0.3	<0.0050
Benzo(b)fluoranthene	0.78	0.0068	0.02	<0.0050	0.39	<0.0050
Benzo(ghi)perylene	6.6	<0.0050	0.009	<0.0050	0.2	<0.0050
Benzo(k)fluoranthene	0.78	<0.0050	0.0069	<0.0050	0.12	<0.0050
Chrysene	7	<0.0050	0.014	<0.0050	0.28	<0.0050
Dibenz(a,h)anthracene	0.1	<0.0050	<0.0050	<0.0050	<0.050	<0.0050
Fluoranthene	0.69	0.014	0.042	<0.0050	0.64	<0.0050
Fluorene	62	<0.0050	<0.0050	<0.0050	<0.050	<0.0050
Indeno(1,2,3-cd)pyrene	0.38	<0.0050	0.0094	<0.0050	0.2	<0.0050
1-Methylnaphthalene	0.99	<0.0050	<0.0050	<0.0050	-	-
2-Methylnaphthalene	0.99	<0.0050	<0.0050	<0.0050	-	-
1&2-Methylnaphthalene	0.99	<0.0071	<0.0071	<0.0071	<0.071	<0.071
Naphthalene	0.6	<0.0050	<0.0050	<0.0050	<0.050	<0.0050
Phenanthrene	6.2	0.008	0.024	<0.0050	0.51	<0.0050
Pyrene	78	0.01	0.034	<0.0050	0.55	<0.0050

All soil concentrations reported in µg/g.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS.

Sample ID	MOECC (2011) Table 3: Full Depth Generic SCS in a Non-Potable Groundwater Condition Residential/Parkland/Institutional Land Use (coarse textured soil)	BH102-1	BH103-2	BH104-5	BH105-1	BH106-1	BH108-1	BH109-5
Lab ID		-	-	-	-	-	-	-
Sampling Date		6-Sep-17	5-Sep-17	7-Sep-17	6-Sep-17	5-Sep-17	5-Sep-17	7-Sep-17
Soil Sample Depth (m)		0 - 0.2	0.8 - 1.4	3 - 3.7	0 - 0.6	0 - 0.6	0 - 0.6	3 - 3.7
Consultant		S2S	S2S	S2S	S2S	S2S	S2S	S2S
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		-	-	-	-	-	-	-
Certificate of Analysis Number		-	-	-	-	-	-	-
Acenaphthene	7.9	<0.0050	<0.0050	<0.0050	<0.0050	0.015	<0.0050	<0.0050
Acenaphthylene	0.15	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Anthracene	0.67	<0.0050	<0.0050	<0.0050	<0.0050	0.022	<0.0050	<0.0050
Benzo(a)anthracene	0.5	0.012	<0.0050	<0.0050	<0.0050	0.094	0.0098	<0.0050
Benzo(a)pyrene	0.3	0.014	<0.0050	<0.0050	<0.0050	0.1	0.013	<0.0050
Benzo(b)fluoranthene	0.78	0.02	<0.0050	<0.0050	<0.0050	0.13	0.02	<0.0050
Benzo(ghi)perylene	6.6	0.011	<0.0050	<0.0050	<0.0050	0.07	0.012	<0.0050
Benzo(k)fluoranthene	0.78	0.0064	<0.0050	<0.0050	<0.0050	0.047	0.0063	<0.0050
Chrysene	7	0.012	<0.0050	<0.0050	<0.0050	0.088	0.011	<0.0050
Dibenz(a,h)anthracene	0.1	<0.0050	<0.0050	<0.0050	<0.0050	0.014	<0.0050	<0.0050
Fluoranthene	0.69	0.028	<0.0050	<0.0050	<0.0050	0.25	0.026	<0.0050
Fluorene	62	<0.0050	<0.0050	<0.0050	<0.0050	0.0081	<0.0050	<0.0050
Indeno(1,2,3-cd)pyrene	0.38	0.011	<0.0050	<0.0050	<0.0050	0.074	0.011	<0.0050
1-Methylnaphthalene	0.99	-	-	-	-	-	-	-
2-Methylnaphthalene	0.99	-	-	-	-	-	-	-
1&2-Methylnaphthalene	0.99	<0.0071	<0.0071	<0.071	<0.071	<0.0071	<0.0071	<0.071
Naphthalene	0.6	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Phenanthrene	6.2	0.016	<0.0050	<0.0050	<0.0050	0.13	0.016	<0.0050
Pyrene	78	0.023	<0.0050	<0.0050	<0.0050	0.2	0.02	<0.0050

All soil concentrations reported in µg/g.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011)

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition Residential/Parkland/Institutional Land Use (coarse textured soil)	BH5-SS1	BH6-SS1	BH7-SS1	BH107-1
Lab ID		DZP000	DZP001	DZP002	-
Sampling Date		1-Mar-17	1-Mar-17	1-Mar-17	7-Sep-17
Soil Sample Depth (m)		0 - 0.6	0 - 0.6	0 - 0.6	0 - 0.6
Consultant		BIG	BIG	BIG	S2S
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		13-Mar-17	13-Mar-17	13-Mar-17	-
Certificate of Analysis Number		B743310	B743310	B743310	-
Aroclor 1242	NV	<0.015	<0.015	<0.015	-
Aroclor 1248	NV	<0.015	<0.015	<0.015	-
Aroclor 1254	NV	<0.015	<0.015	<0.015	-
Aroclor 1260	NV	<0.015	<0.015	<0.015	-
Total Polychlorinated Biphenyls	0.35	<0.015	<0.015	<0.015	<0.010

All soil concentrations reported in µg/g.
< = Parameter below detection limit, as indicated
NV = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS.

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition Residential/Parkland/Institutional Land Use (coarse textured soil)	BH1-SS2	BH2-SS4	BH3-SS1	BH3-SS2	BH3-SS3	BH4-SS2	BH4-SS3	BH5-SS1
Lab ID		DZO989	DZO991	DZO993	DZO994	DZO995	DZO997	DZO998	DZP000
Sampling Date		1-Mar-17	1-Mar-17	1-Mar-17	1-Mar-17	1-Mar-17	1-Mar-17	1-Mar-17	1-Mar-17
Soil Sample Depth (m)		0.7 - 1.37	2.3 - 2.9	0 - 0.6	0.7 - 1.37	1.5 - 2.13	0.7 - 1.37	1.5 - 2.13	0 - 0.6
Consultant		BIG	BIG	BIG	BIG	BIG	BIG	BIG	BIG
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		13-Mar-17	13-Mar-17	13-Mar-17	13-Mar-17	13-Mar-17	13-Mar-17	13-Mar-17	13-Mar-17
Certificate of Analysis Number		B743310	B743310	B743310	B743310	B743310	B743310	B743310	B743310
Antimony	7.5	<0.20	<0.20	-	<0.20	-	-	<0.20	0.27
Arsenic	18	1.5	1.6	-	2.3	-	-	2.5	1.8
Barium	390	9.4	9.1	-	13	-	-	7.9	17
Beryllium	4	<0.20	<0.20	-	<0.20	-	-	<0.20	0.21
Boron (Total)	120	<5.0	<5.0	-	<5.0	-	-	<5.0	<5.0
Boron (Hot water soluble)	1.5	-	0	-	-	-	-	-	-
Cadmium	1.2	<0.10	<0.10	-	<0.10	-	-	<0.10	<0.10
Chromium (total)	160	4.8	6.6	-	5.5	-	-	8.7	6.4
Chromium VI	8	-	-	-	-	-	-	-	-
Cobalt	22	2	2.4	-	2.2	-	-	2.6	2.6
Copper	140	8.4	9.4	-	11	-	-	9.4	8.7
Lead	120	2.8	3.1	-	6.6	-	-	3.6	6.2
Mercury	0.27	-	-	-	-	-	-	-	0.059
Molybdenum	6.9	<0.50	<0.50	-	<0.50	-	-	<0.50	<0.50
Nickel	100	4.4	5	-	5.1	-	-	5.3	5.4
Selenium	2.4	<0.50	<0.50	-	<0.50	-	-	<0.50	<0.50
Silver	20	<0.20	<0.20	-	<0.20	-	-	<0.20	<0.20
Thallium	1	<0.050	<0.050	-	<0.050	-	-	<0.050	<0.050
Uranium	23	0.25	0.31	-	0.26	-	-	0.3	0.25
Vanadium	86	11	19	-	13	-	-	17	16
Zinc	340	11	11	-	15	-	-	14	19
Electrical Conductivity (mS/cm)	0.7	-	-	-	-	**1.1**	-	-	0.057
Sodium Adsorption Ratio (unitless)	5	-	-	-	-	**27**	-	-	0.44
Free Cyanide	0.051	-	-	-	-	-	-	-	<0.01
pH (pH units)	5-9 (surface soil); 5-11 (subsurface soil)	-	-	8.07	-	-	7.99	-	7.25

All soil concentrations reported in µg/g.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS.

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition Residential/Parkland/Institutional Land Use (coarse textured soil)	BH6-SS1	BH7-SS1	BH101-1	BH102-1	BH102-3	BH102-6	BH103-2
Lab ID		DZP001	DZP002	-	-	-	-	-
Sampling Date		1-Mar-17	1-Mar-17	7-Sep-17	6-Sep-17	6-Sep-17	6-Sep-17	5-Sep-17
Soil Sample Depth (m)		0 - 0.6	0 - 0.6	0 - 0.6	0 - 0.6	1.5 - 2.4	4.6 - 5.2	4.6 - 5.2
Consultant		BIG	BIG	S2S	S2S	S2S	S2S	S2S
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		13-Mar-17	13-Mar-17	-	-	-	-	-
Certificate of Analysis Number		B743310	B743310	-	-	-	-	-
Antimony	7.5	0.35	0.24	<0.20	<0.20	-	-	<0.20
Arsenic	18	3	4.2	2.8	2.6	-	-	1.7
Barium	390	39	38	17	29	-	-	11
Beryllium	4	0.24	0.3	<0.20	0.26	-	-	<0.20
Boron (Total)	120	<5.0	<5.0	<5.0	<5.0	-	-	<5.0
Boron (Hot water soluble)	1.5	-	0.19	0.27	0.15	-	-	0.26
Cadmium	1.2	0.19	0.16	0.15	0.11	-	-	<0.10
Chromium (total)	160	8.4	11	7.1	11	-	-	7.8
Chromium VI	8	-	<0.2	<0.2	<0.2	-	-	<0.2
Cobalt	22	2.9	4.2	2.9	3.5	-	-	2.9
Copper	140	13	12	11	13	-	-	10
Lead	120	42	31	12	27	-	-	4.8
Mercury	0.27	0.12	<0.050	<0.050	0.16	-	-	<0.050
Molybdenum	6.9	<0.50	<0.50	<0.50	1.6	-	-	<0.50
Nickel	100	6.1	9.1	6	6.6	-	-	4.9
Selenium	2.4	<0.50	<0.50	<0.50	<0.50	-	-	<0.50
Silver	20	<0.20	<0.20	<0.20	<0.20	-	-	<0.20
Thallium	1	0.055	0.097	<0.050	<0.050	-	-	<0.050
Uranium	23	0.5	0.38	0.33	0.41	-	-	0.34
Vanadium	86	19	21	21	27	-	-	19
Zinc	340	52	67	42	34	-	-	16
Electrical Conductivity (mS/cm)	0.7	0.14	0.15	0.31	0.3	-	-	0.13
Sodium Adsorption Ratio (unitless)	5	0.28	0.26	0.19	**8.9**	**9.5**	3.2	0.31
Free Cyanide	0.051	<0.01	<0.01	<0.01	<0.01	-	-	<0.01
pH (pH units)	5-9 (surface soil); 5-11 (subsurface soil)	7.58	7.55	**9.6**	7.82	-	-	7.59

All soil concentrations reported in µg/g.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011)

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition Residential/Parkland/Institutional Land Use (coarse textured soil)	BH105-1	BH105-5	BH105-7	BH106-1	BH108-1	BH108-4
Lab ID		-	-	-	-	-	-
Sampling Date		6-Sep-17	6-Sep-17	6-Sep-17	5-Sep-17	5-Sep-17	5-Sep-17
Soil Sample Depth (m)		0 - 0.6	3.0 - 3.6	4.6 - 5.2	0 - 0.6	0 - 0.6	2.3 - 2.9
Consultant		S2S	S2S	S2S	S2S	S2S	S2S
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		-	-	-	-	-	-
Certificate of Analysis Number		-	-	-	-	-	-
Antimony	7.5	<0.20	-	-	<0.20	<0.20	-
Arsenic	18	2	-	-	2.8	2.2	-
Barium	390	15	-	-	23	32	-
Beryllium	4	<0.20	-	-	0.21	0.21	-
Boron (Total)	120	<5.0	-	-	<5.0	<5.0	-
Boron (Hot water soluble)	1.5	0.096	-	-	0.16	0.15	-
Cadmium	1.2	<0.10	-	-	0.1	<0.10	-
Chromium (total)	160	7.3	-	-	9.4	7.4	-
Chromium VI	8	<0.2	-	-	<0.2	<0.2	-
Cobalt	22	2.6	-	-	3.6	3.3	-
Copper	140	9.8	-	-	13	12	-
Lead	120	5.5	-	-	14	5.1	-
Mercury	0.27	<0.050	-	-	<0.050	<0.050	-
Molybdenum	6.9	<0.50	-	-	<0.50	<0.50	-
Nickel	100	5.3	-	-	7	6.9	-
Selenium	2.4	<0.50	-	-	<0.50	<0.50	-
Silver	20	<0.20	-	-	<0.20	<0.20	-
Thallium	1	<0.050	-	-	<0.050	<0.050	-
Uranium	23	0.28	-	-	0.44	0.36	-
Vanadium	86	20	-	-	25	18	-
Zinc	340	20	-	-	31	18	-
Electrical Conductivity (mS/cm)	0.7	0.22	-	-	0.19	0.097	-
Sodium Adsorption Ratio (unitless)	5	**6.5**	**6.7**	0.55	0.24	0.32	
Free Cyanide	0.051	<0.01	-	-	<0.01	<0.01	-
pH (pH units)	5-9 (surface soil); 5-11 (subsurface soil)	7.71		-	7.83	7.82	7.75

All soil concentrations reported in µg/g.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011)

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition Residential/Parkland/Institutional Land Use (coarse textured soil)	BH5-SS1	BH6-SS1	BH7-SS1
Lab ID		DZP000	DZP001	DZP002
Sampling Date		1-Mar-17	1-Mar-17	1-Mar-17
Soil Sample Depth (m)		0 - 0.6	0 - 0.6	0 - 0.6
Consultant		BIG	BIG	BIG
Laboratory		Maxxam	Maxxam	Maxxam
Date of Analysis		13-Mar-17	13-Mar-17	13-Mar-17
Certificate of Analysis Number		B743310	B743310	B743310
Chlordane (Total)	0.05	<0.0020	<0.0020	0.0028
o,p-DDD + p,p-DDD	NV	<0.0020	<0.0020	<0.0020
o,p-DDE + p,p-DDE	NV	0.011	0.057	0.009
o,p-DDT + p,p-DDT	NV	0.006	0.037	0.0063
Total Endosulfan	0.04	<0.0020	<0.0020	<0.0020
Aldrin	0.05	<0.0020	<0.0020	<0.0020
a-Chlordane	NV	<0.0020	<0.0020	<0.0020
g-Chlordane	NV	<0.0020	<0.0020	0.0028
o,p-DDD	NV	<0.0020	<0.0020	<0.0020
p,p-DDD	NV	<0.0020	<0.0020	<0.0020
o,p-DDE	NV	<0.0020	<0.0020	<0.0020
p,p-DDE	NV	0.011	0.057 (1)	0.009
o,p-DDT	NV	<0.0020	0.0091	<0.0020
p,p-DDT	NV	0.006	0.028	0.0063
Dieldrin	0.05	<0.0020	<0.0020	0.002
Lindane	0.056	<0.0020	<0.0020	<0.0020
Endosulfan I (alpha)	NV	<0.0020	<0.0020	<0.0020
Endosulfan II (beta)	NV	<0.0020	<0.0020	<0.0020
Endrin	0.04	<0.0020	<0.0020	<0.0020
Heptachlor	0.15	<0.0020	<0.0020	<0.0020
Heptachlor epoxide	0.05	<0.0020	<0.0020	0.0026
Hexachlorobenzene	0.52	<0.0020	<0.0020	<0.0020
Hexachlorobutadiene	0.012	<0.0020	<0.0020	<0.0020
Hexachloroethane	0.089	<0.0020	<0.0020	<0.0020
Methoxychlor	0.13	<0.0050	<0.0050	<0.0050

All soil concentrations reported in µg/g.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold — Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS.

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition All Types of Land Use (coarse textured soil)	MW1	MW1	BH/MW1	BH/MW1	MW2
Lab ID		DZS214	-	JTY916	KBS243	DZS215
Sampling Date		3-Mar-17	12-Sep-17	21-May-19	20-Jun-19	3-Mar-17
Screen Depth Interval (m)		2.13 - 5.18	2.13 - 5.18	2.13 - 5.18	2.13 - 5.18	3.05 - 6.1
Consultant		BIG	S2S	EXP	EXP	BIG
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		-	-	27-May-19	27-Jun-19	-
Certificate of Analysis Number		B744029	-	B9D6751	B9H1571	B744029
PHC F1 (C6-C10)	750	**1200 (1)**	**1800**	<25	<25	**1600**
PHC F1 (C6-C10) - BTEX	750	**1100**	-	<25	<25	**1600**
PHC F2 (C10-C16)	150	<100	<100	<100	<100	<100
PHC F3 (C16-C34)	500	<200	<200	<200	<200	<200
PHC F4 (C34-C50)	500	<200	<200	<200	<200	<200
Reached baseline at C50?	-	Yes	Yes	YES	YES	Yes
PHC F4 (C34-C50)-gravimetric	500	-	-	-	-	-

All groundwater concentrations reported in µg/L.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS.

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition All Types of Land Use (coarse textured soil)	MW2	BH/MW2	BH/MW2	BH/MW22 (DUP of BH/MW2)	MW3
Lab ID		-	JTY917	KBS244	KBS245	DZS216
Sampling Date		12-Sep-17	21-May-19	20-Jun-19	20-Jun-19	3-Mar-17
Screen Depth Interval (m)		3.05 - 6.1	3.05 - 6.1	3.05 - 6.1	3.05 - 6.1	2.9 - 5.95
Consultant		S2S	EXP	EXP	EXP	BIG
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		-	27-May-19	27-Jun-19	27-Jun-19	-
Certificate of Analysis Number		-	B9D6751	B9H1571	B9H1571	B744029
PHC F1 (C6-C10)	750	**1200**	<25	<25	<25	<25
PHC F1 (C6-C10) - BTEX	750	-	<25	<25	<25	<25
PHC F2 (C10-C16)	150	<100	<100	<100	<100	<100
PHC F3 (C16-C34)	500	<200	<200	<200	210	<200
PHC F4 (C34-C50)	500	<200	<200	<200	<200	<200
Reached baseline at C50?	-	Yes	YES	YES	YES	Yes
PHC F4 (C34-C50)-gravimetric	500	-	-	-	-	-

All groundwater concentrations reported in µg/L.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS.

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition All Types of Land Use (coarse textured soil)	MW3	MW4	BH101	BH103	BH104
Lab ID		-	-	-	-	-
Sampling Date		13-Sep-17	12-Sep-17	13-Sep-17	13-Sep-17	12-Sep-17
Screen Depth Interval (m)		2.9 - 5.95	2.4 - 5.4	2.3 - 10.7	2.1- 5.1	2.2 - 5.2
Consultant		S2S	S2S	S2S	S2S	S2S
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		-	-	-	-	-
Certificate of Analysis Number		-	-	-	-	-
PHC F1 (C6-C10)	750	<25	400	83	140	43
PHC F1 (C6-C10) - BTEX	750	-	-	-	-	-
PHC F2 (C10-C16)	150	<100	<100	<100	<100	<100
PHC F3 (C16-C34)	500	<200	<200	<200	<200	<200
PHC F4 (C34-C50)	500	<200	<200	<200	<200	<200
Reached baseline at C50?	-	Yes	Yes	Yes	Yes	Yes
PHC F4 (C34-C50)-gravimetric	500	-	-	-	-	-

All groundwater concentrations reported in µg/L.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS.

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition All Types of Land Use (coarse textured soil)	BH104	BH1044 (DUP of BH104)	BH105	BH106
Lab ID		JTY924	JTY925	-	-
Sampling Date		21-May-19	21-May-19	13-Sep-17	13-Sep-17
Screen Depth Interval (m)		2.2 - 5.2	2.2 - 5.2	2.9 - 5.9	1.5 - 4.5
Consultant		EXP	EXP	S2S	S2S
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		27-May-19	27-May-19	-	-
Certificate of Analysis Number		B9D6751	B9D6751	-	-
PHC F1 (C6-C10)	750	33	<25	42	140
PHC F1 (C6-C10) - BTEX	750	33	<25	-	-
PHC F2 (C10-C16)	150	<100	<100	<100	<100
PHC F3 (C16-C34)	500	<200	<200	<200	<200
PHC F4 (C34-C50)	500	<200	<200	<200	<200
Reached baseline at C50?	-	YES	YES	Yes	Yes
PHC F4 (C34-C50)-gravimetric	500	-	-	-	-

All groundwater concentrations reported in µg/L.
< = Parameter below detection limit, as indicated
NV = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS.

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition All Types of Land Use (coarse textured soil)	MW1	MW1	BH/MW1	BH/MW1	MW2	MW2	BH/MW2	BH/MW2	BH/ MW22 (Dup of MW2)	MW3
Lab ID		DZS214	-	JTY916	KBS243	DZS215	-	JTY917	KBS244	KBS245	DZS216
Sampling Date		3-Mar-17	12-Sep-17	21-May-19	20-Jun-19	3-Mar-17	12-Sep-17	21-May-19	20-Jun-19	20-Jun-19	3-Mar-17
Screen Depth Interval (m)		2.13 - 5.18	2.13 - 5.18	2.13 - 5.18	2.13 - 5.18	3.05 - 6.1	3.05 - 6.1	3.05 - 6.1	3.05 - 6.1	3.05 - 6.1	2.9 - 5.95
Consultant		BIG	S2S	EXP	EXP	BIG	S2S	EXP	EXP	EXP	BIG
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		-	-	27-May-19	27-Jun-19	-	-	27-May-19	27-Jun-19	27-Jun-19	-
Certificate of Analysis Number		B744029	-	B9D6751	B9H1571	B744029	-	B9D6751	B9H1571	B9H1571	B744029
Acetone	2700	<200	<200	<10	-	-	<200	<10	-	-	<10
Benzene	5	**43**	**45**	<0.20	<0.20	**5.6**	<4.0	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	16	<10	<10	<0.50	-	-	<10	<0.50	-	-	<0.50
Bromoform	25	<20	<20	<1.0	-	-	<20	<1.0	-	-	<1.0
Bromomethane	0.89	<0.50	<0.50	<0.50	-	-	<0.50	<0.50	-	-	<0.50
Carbon Tetrachloride	0.79	<0.20	<0.20	<0.20	-	-	<0.20	<0.20	-	-	<0.20
Chlorobenzene	30	<4.0	<4.0	<0.20	-	-	<4.0	<0.20	-	-	<0.20
Chloroform	2.4	<0.20	<0.20	0.47	-	-	<0.20	0.27	-	-	<0.20
Dibromochloromethane	25	<10	<10	<0.50	-	-	<10	<0.50	-	-	<0.50
1,2-Dichlorobenzene	3	<0.50	<0.50	<0.50	-	-	<0.50	<0.50	-	-	<0.50
1,3-Dichlorobenzene	59	<10	<10	<0.50	-	-	<10	<0.50	-	-	<0.50
1,4-Dichlorobenzene	1	<0.50	<0.50	<0.50	-	-	<0.50	<0.50	-	-	<0.50
Dichlorodifluoromethane	590	<20	<20	<1.0	-	-	<20	<1.0	-	-	<1.0
1,1-Dichloroethane	5	<4.0	<4.0	<0.20	-	-	<4.0	<0.20	-	-	<0.20
1,2-Dichloroethane	1.6	<0.50	<0.50	<0.50	-	-	<0.50	<0.50	-	-	<0.50
1,1-Dichloroethylene	1.6	**18**	**25**	<0.20	-	-	0.69	<0.20	-	-	<0.20
cis-1,2-Dichloroethylene	1.6	**2900**	**3800**	**12**	-	-	**110**	1.5	-	-	**3.3**
trans-1,2-Dichloroethylene	1.6	**25**	**37**	<0.50	-	-	**4.5**	<0.50	-	-	<0.50
1,2-Dichloropropane	5	<4.0	<4.0	<0.20	-	-	<4.0	<0.20	-	-	<0.20
cis-1,3-Dichloropropene	0.5	<0.30	<0.50	<0.30	-	-	<0.50	<0.30	-	-	<0.30
trans-1,3-Dichloropropene	0.5	<0.40	<0.50	<0.40	-	-	<0.50	<0.40	-	-	<0.40
Ethylbenzene	2.4	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylene Dibromide (1,2-Dibromoethane)	0.2	<0.20	<0.20	<0.20	-	-	<0.20	<0.20	-	-	<0.20
Hexane (n)	51	<20	<20	<1.0	-	-	<20	<1.0	-	-	<1.0
Methylene chloride (Dichloromethane)	50	<40	<40	<2.0	-	-	<40	<2.0	-	-	<2.0
Methyl ethyl ketone (2-Butanone)	1800	<200	<200	<10	-	-	<200	<10	-	-	<10
Methyl Isobutyl Ketone	640	<100	<100	<5.0	-	-	<100	<5.0	-	-	<5.0
Methyl t-butyl ether (MTBE)	15	<10	<10	<0.50	-	-	<10	<0.50	-	-	<0.50
Styrene	5.4	<0.50	<0.50	<0.50	-	-	<0.50	<0.50	-	-	<0.50
1,1,1,2-Tetrachloroethane	1.1	<0.50	<0.50	<0.50	-	-	<0.50	<0.50	-	-	<0.50
1,1,2,2-Tetrachloroethane	1	<0.50	<0.50	<0.50	-	-	<0.50	<0.50	-	-	<0.50
Tetrachloroethylene	1.6	**4400**	**6400**	**17**	-	-	**4100**	**34**	-	-	**47**
Toluene	24	<4.0	<4.0	<0.20	<0.20	0.53	<4.0	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	200	<4.0	<4.0	<0.20	-	-	<4.0	<0.20	-	-	<0.20
1,1,2-Trichloroethane	4.7	<0.50	<0.50	<0.50	-	-	<0.50	<0.50	-	-	<0.50
Trichloroethylene	1.6	**690**	**660**	**1.8**	-	-	**370**	**8.3**	-	-	**23**
Trichlorofluoromethane	150	<10	<10	<0.50	-	-	<10	<0.50	-	-	<0.50
Vinyl Chloride	0.5	**580**	**770**	**0.55**	-	-	**13**	<0.20	-	-	**1.8**
m-Xylene + p-Xylene	NV	<4.0	-	<0.20	<0.40	<0.40	-	<0.20	<0.40	<0.40	<0.20
o-Xylene	NV	<4.0	-	<0.20	<0.20	<0.20	-	<0.20	<0.20	<0.20	<0.20
Xylenes (total)	300	<4.0	<4.0	<0.20	<0.40	<0.40	<4.0	<0.20	<0.40	<0.40	<0.20

All groundwater concentrations reported in µg/L.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS.

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition All Types of Land Use (coarse textured soil)	MW3	MW3	MW4	MW4	MW4	MW44 (DUP of MW4)	BH101	MW101	MW102	MW102A
Lab ID		JTY918	-	DZS217	-	JTY919	JTY920	-	JTY921	JTY922	KBS239
Sampling Date		21-May-19	13-Sep-17	3-Mar-17	12-Sep-17	21-May-19	21-May-19	13-Sep-17	21-May-19	21-May-19	20-Jun-19
Screen Depth Interval (m)		2.9 - 5.95	2.9 - 5.95	2.4 - 5.4	2.4 - 5.4	2.4 - 5.4	2.4 - 5.4	2.4 - 5.4	2.4 - 5.4	2.3 - 10.7	2.74-5.79
Consultant		EXP	S2S	BIG	S2S	EXP	EXP	S2S	EXP	EXP	EXP
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		27-May-19	-	-	-	27-May-19	27-May-19	-	27-May-19	27-May-19	27-Jun-19
Certificate of Analysis Number		B9D6751	-	B744029	-	B9D6751	B9D6751	-	B9D6751	B9D6751	B9H1571
Acetone	2700	<10	<10	<50	<100	<10	<10	<10	<10	<10	<10
Benzene	5	<0.20	<0.20	2.4	**6.9**	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	16	<0.50	<0.50	<2.5	<5.0	5.5	5.4	<0.50	<0.50	<0.50	<0.50
Bromoform	25	<1.0	<1.0	<5.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	0.89	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon Tetrachloride	0.79	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chlorobenzene	30	<0.20	<0.20	<1.0	<2.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	2.4	<0.20	<0.20	<1.0	<2.0	**18**	**18**	<0.20	<0.20	0.47	0.3
Dibromochloromethane	25	<0.50	<0.50	<2.5	<5.0	3.4	3.3	<0.50	<0.50	<0.50	<0.50
1,2-Dichlorobenzene	3	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	59	<0.50	<0.50	<2.5	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dichlorodifluoromethane	590	<1.0	<1.0	<5.0	<10	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	5	<0.20	<0.20	<1.0	<2.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50
1,2-Dichloroethane	1.6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene	1.6	<0.20	<0.20	**2.8**	**5.4**	<0.20	<0.20	<0.20	<0.20	0.23	<0.50
cis-1,2-Dichloroethylene	1.6	**4.3**	0.68	**1200**	**1900**	**18**	**19**	**5.8**	**3.3**	**9.8**	**13**
trans-1,2-Dichloroethylene	1.6	<0.50	<0.50	**11**	**23**	0.75	0.71	<0.50	<0.50	0.51	0.76
1,2-Dichloropropane	5	<0.20	<0.20	<1.0	<2.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	0.5	<0.30	<0.50	<0.30	<0.50	<0.30	<0.30	<0.50	<0.30	<0.30	<0.30
trans-1,3-Dichloropropene	0.5	<0.40	<0.50	<0.40	<0.50	<0.40	<0.40	<0.50	<0.40	<0.40	<0.40
Ethylbenzene	2.4	<0.20	<0.20	<1.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylene Dibromide (1,2-Dibromoethane)	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Hexane (n)	51	<1.0	<20	<5.0	<20	<1.0	<1.0	<20	<1.0	<1.0	<1.0
Methylene chloride (Dichloromethane)	50	<2.0	<2.0	<10	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Methyl ethyl ketone (2-Butanone)	1800	<10	<10	<50	<100	<10	<10	<10	<10	<10	<10
Methyl Isobutyl Ketone	640	<5.0	<5.0	<25	<50	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl t-butyl ether (MTBE)	15	<0.50	<0.50	<2.5	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Styrene	5.4	<0.50	<0.50	<2.5	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,1,2-Tetrachloroethane	1.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethylene	1.6	**36**	**20**	**700**	**1100**	**110**	**120**	**290**	**48**	**50**	**120**
Toluene	24	<0.20	<0.20	<1.0	<2.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	200	<0.20	<0.20	<1.0	<2.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,2-Trichloroethane	4.7	<0.50	<0.50	<2.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichloroethylene	1.6	**13**	**20**	**84**	**230**	**5.7**	**5.8**	**43**	**13**	**57**	**92**
Trichlorofluoromethane	150	<0.50	<0.50	<2.5	<5.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	0.5	**2.1**	<0.20	**75**	**290**	<0.20	<0.20	0.41	<0.20	**0.91**	**0.64**
m-Xylene + p-Xylene	NV	<0.20	-	<1.0	-	<0.20	<0.20	-	<0.20	<0.20	<0.20
o-Xylene	NV	<0.20	-	<1.0	-	<0.20	<0.20	-	<0.20	<0.20	<0.20
Xylenes (total)	300	<0.20	<0.20	<1.0	<2.0	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

All groundwater concentrations reported in µg/L.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition All Types of Land Use (coarse textured soil)	MW1022A (DUP MW102A)	BH103	MW103	BH104	BH104	BH105	BH105	BH106	MW106	MW201	MW201
Lab ID		KBS240	-	JTY923	-	JTY924	-	JTY926	-	JTY927	KBS241	KDK391
Sampling Date		20-Jun-19	13-Sep-17	21-May-19	12-Sep-17	21-May-19	13-Sep-17	21-May-19	13-Sep-17	21-May-19	20-Jun-19	28-Jun-19
Screen Depth Interval (m)		2.74-5.79	2.1- 5.1	2.1- 5.1	2.2 - 5.2	2.2 - 5.2	2.9 - 5.9	2.9 - 5.9	1.5 - 4.5	1.5 - 4.5	10.67 - 12.2	10.67 - 12.2
Consultant		EXP	S2S	EXP	S2S	EXP	S2S	EXP	S2S	EXP	EXP	EXP
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		27-Jun-19	-	27-May-19	-	27-May-19	-	27-May-19	-	27-May-19	27-Jun-19	4-Jul-19
Certificate of Analysis Number		B9H1571	-	B9D6751	-	B9D6751	-	B9D6751	-	B9D6751	B9H1571	B9H8969
Acetone	2700	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Benzene	5	<0.20	0.32	<0.20	2.3	<0.20	0.41	<0.20	0.65	<0.20	<0.20	<0.20
Bromodichloromethane	16	<0.50	<0.50	2.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromoform	25	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	0.89	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon Tetrachloride	0.79	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chlorobenzene	30	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	2.4	0.3	<0.20	**8.3**	<0.20	0.43	<0.20	<0.20	<0.20	0.41	<0.20	<0.20
Dibromochloromethane	25	<0.50	<0.50	1.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichlorobenzene	3	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	59	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dichlorodifluoromethane	590	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	5	<0.50	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50
1,2-Dichloroethane	1.6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene	1.6	<0.50	0.2	<0.20	1.1	1	<0.20	<0.20	<0.20	<0.20	<0.50	<0.50
cis-1,2-Dichloroethylene	1.6	**13**	**39**	1.1	**450**	**310**	**8.5**	0.75	**23**	**3.3**	<0.50	<0.50
trans-1,2-Dichloroethylene	1.6	0.74	1.5	<0.50	**7.4**	**9**	<0.50	<0.50	1	<0.50	<0.50	<0.50
1,2-Dichloropropane	5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	0.5	<0.30	<0.50	<0.30	<0.50	<0.30	<0.50	<0.30	<0.50	<0.30	<0.30	<0.30
trans-1,3-Dichloropropene	0.5	<0.40	<0.50	<0.40	<0.50	<0.40	<0.50	<0.40	<0.50	<0.40	<0.40	<0.40
Ethylbenzene	2.4	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylene Dibromide (1,2-Dibromoethane)	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Hexane (n)	51	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride (Dichloromethane)	50	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Methyl ethyl ketone (2-Butanone)	1800	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10
Methyl Isobutyl Ketone	640	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl t-butyl ether (MTBE)	15	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Styrene	5.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,1,2-Tetrachloroethane	1.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethylene	1.6	**120**	**420**	**35**	**120**	**32**	**120**	**13**	**430**	**27**	0.5	0.5
Toluene	24	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	200	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,2-Trichloroethane	4.7	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichloroethylene	1.6	**92**	**74**	**2.2**	**24**	**31**	**34**	**2.4**	**83**	**14**	<0.20	<0.20
Trichlorofluoromethane	150	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	0.5	**0.62**	**6.4**	<0.20	**20**	<0.20	**6.5**	<0.20	**1.5**	<0.20	**0.87**	**1.1**
m-Xylene + p-Xylene	NV	<0.20	-	<0.20	-	<0.20	-	<0.20	-	<0.20	<0.20	<0.20
o-Xylene	NV	<0.20	-	<0.20	-	<0.20	-	<0.20	-	<0.20	<0.20	<0.20
Xylenes (total)	300	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

All groundwater concentrations reported in µg/L.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition All Types of Land Use (coarse textured soil)	MW202	TRIP BLANK	TRIP BLANK	TRIP BLANK	TRIP BLANK LOT # 3634
Lab ID		KBS242	-	-	JTY928	KBS246
Sampling Date		20-Jun-19	12-Sep-17	13-Sep-17	21-May-19	20-Jun-19
Screen Depth Interval (m)		10.67 - 12.2	NA	NA	NA	NA
Consultant		EXP	S2S	S2S	EXP	EXP
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		27-Jun-19	-	-	27-May-19	27-Jun-19
Certificate of Analysis Number		B9H1571	-	-	B9D6751	B9H1571
Acetone	2700	<10	<10	<10	<10	<10
Benzene	5	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	16	<0.50	<0.50	<0.50	<0.50	<0.50
Bromoform	25	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	0.89	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon Tetrachloride	0.79	<0.20	<0.20	<0.20	<0.20	<0.20
Chlorobenzene	30	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	2.4	<0.20	<0.20	<0.20	<0.20	<0.20
Dibromochloromethane	25	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichlorobenzene	3	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	59	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	1	<0.50	<0.50	<0.50	<0.50	<0.50
Dichlorodifluoromethane	590	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	5	<0.50	<0.20	<0.20	<0.20	<0.50
1,2-Dichloroethane	1.6	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene	1.6	<0.50	<0.20	<0.20	<0.20	<0.50
cis-1,2-Dichloroethylene	1.6	<0.50	<0.50	<0.50	<0.50	<0.50
trans-1,2-Dichloroethylene	1.6	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloropropane	5	<0.20	<0.20	<0.20	<0.20	<0.20
cis-1,3-Dichloropropene	0.5	<0.30	<0.50	<0.50	<0.30	<0.30
trans-1,3-Dichloropropene	0.5	<0.40	<0.50	<0.50	<0.40	<0.40
Ethylbenzene	2.4	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylene Dibromide (1,2-Dibromoethane)	0.2	<0.20	<0.20	<0.20	<0.20	<0.20
Hexane (n)	51	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene chloride (Dichloromethane)	50	<2.0	<2.0	<2.0	<2.0	<2.0
Methyl ethyl ketone (2-Butanone)	1800	<10	<10	<10	<10	<10
Methyl Isobutyl Ketone	640	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl t-butyl ether (MTBE)	15	<0.50	<0.50	<0.50	<0.50	<0.50
Styrene	5.4	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,1,2-Tetrachloroethane	1.1	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	1	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethylene	1.6	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	24	<0.20	<0.20	0.64	<0.20	<0.20
1,1,1-Trichloroethane	200	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,2-Trichloroethane	4.7	<0.50	<0.50	<0.50	<0.50	<0.50
Trichloroethylene	1.6	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	150	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	0.5	<0.20	<0.20	<0.20	<0.20	<0.20
m-Xylene + p-Xylene	NV	<0.20	-	-	<0.20	<0.20
o-Xylene	NV	<0.20	-	-	<0.20	<0.20
Xylenes (total)	300	<0.20	<0.20	<0.20	<0.20	<0.20

All groundwater concentrations reported in µg/L.
"<" = Parameter below detection limit, as indicated
"NV" = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS

Sample Location	MECP (2011) Table 3: Full Depth Generic SCS	MW1	MW2	MW3	MW4	MW101	BH103	BH104	BH105	BH106
Laboratory ID		-	-	-	-	-	-	-	-	-
Sampling Date		12-Sep-17	12-Sep-17	13-Sep-17	12-Sep-17	13-Sep-17	13-Sep-17	12-Sep-17	13-Sep-17	13-Sep-17
Screen Interval Depth (m)		2.13 - 5.18	3.05 - 6.1	2.9 - 5.95	2.4 - 5.4	2.3 - 10.7	2.1- 5.1	2.2 - 5.2	2.9 - 5.9	1.5 - 4.5
Consultant		S2S	S2S	S2S	S2S	S2S	S2S	S2S	S2S	S2S
Laboratory		Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam	Maxxam
Date of Analysis		-	-	-	-	-	-	-	-	-
Certificate of Analysis Number		-	-	-	-	-	-	-	-	-
Acenaphthene	4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Acenaphthylene	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Anthracene	2.4	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(a)anthracene	1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(a)pyrene	0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010
Benzo(b/j)fluoranthene	0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(ghi)perylene	0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Benzo(k)fluoranthene	0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Chrysene	0.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Dibenzo(a,h)anthracene	0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluoranthene	0.41	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Fluorene	120	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Indeno(1,2,3-cd)pyrene	0.2	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
1-Methylnaphthalene	-	-	-	-	-	-	-	-	-	-
2-Methylnaphthalene	-	-	-	-	-	-	-	-	-	-
1,2-Methylnaphthalene	3	<0.071	<0.071	<0.071	<0.071	<0.071	<0.071	<0.071	<0.071	<0.071
Naphthalene	11	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050
Phenanthrene	1	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030	<0.030
Pyrene	4.1	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050

All groundwater concentrations reported in µg/L.
< = Parameter below detection limit, as indicated
NV = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS.

Sample ID	MOECC (2011) Table 2: Full Depth Generic SCS in a Potable Groundwater Condition All Types of Land Use (coarse textured soil)	MW3
Lab ID		-
Sampling Date		13-Sep-17
Screen Depth Interval (m)		2.9 - 5.9
Consultant		S2S
Laboratory		Maxxam
Certificate of Analysis Number		-
Antimony	6	<0.50
Arsenic	25	<1.0
Barium	1000	110
Beryllium	4	<0.50
Boron (Total)	5000	85
Cadmium	2.7	<0.10
Chromium (total)	50	<5.0
Chromium VI	25	<5.0
Cobalt	3.8	<0.50
Copper	87	<0.50
Lead	10	<0.50
Mercury	0.29	<0.1
Molybdenum	70	0.68
Nickel	100	1.5
Selenium	10	4.3
Silver	1.5	<0.10
Thallium	2	<0.050
Uranium	20	1.7
Vanadium	6.2	0.69
Zinc	1100	42
Sodium	490000	**1200000**
Chloride	790000	**2000000**
Free Cyanide	66	<1

All groundwater concentrations reported in µg/L.
< = Parameter below detection limit, as indicated
NV = No value
Bold Concentration exceeds MECP (2011) SCS.
Non-detect but detection limit exceeds the MECP (2011) SCS.
Parameter detected and no SCS provided

Appendix E – Certificates of Analysis

Maxxam
A Bureau Veritas Group Company

Your P.O. #: HAM-ENV
Your Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your C.O.C. #: 717908-01-01

Attention: Stephanie Hsia

exp Services Inc
80 Bancroft St
Hamilton, ON
CANADA L8E 2W5

Report Date: 2019/05/27
Report #: R5727141
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B9D6751
Received: 2019/05/22, 15:35

Sample Matrix: Water
Samples Received: 13

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
1,3-Dichloropropene Sum	12	N/A	2019/05/27		EPA 8260C m
Petroleum Hydro. CCME F1 & BTEX in Water	1	N/A	2019/05/24	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Water (1)	4	2019/05/25	2019/05/27	CAM SOP-00316	CCME PHC-CWS m
Volatile Organic Compounds and F1 PHCs	3	N/A	2019/05/24	CAM SOP-00230	EPA 8260C m
Volatile Organic Compounds in Water	9	N/A	2019/05/24	CAM SOP-00228	EPA 8260C m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Your P.O. #: HAM-ENV
Your Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your C.O.C. #: 717908-01-01

Attention: Stephanie Hsia

exp Services Inc
80 Bancroft St
Hamilton, ON
CANADA L8E 2W5

Report Date: 2019/05/27
Report #: R5727141
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B9D6751
Received: 2019/05/22, 15:35

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Christine Gripton, Senior Project Manager
Email: CGripton@maxxam.ca
Phone# (519)652-9444
==========
This report has been generated and distributed using a secure automated process.
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 PHCS, BTEX/F1-F4 (WATER)

Maxxam ID		JTY925		
Sampling Date		2019/05/21 11:55		
COC Number		717908-01-01		
	UNITS	**BH1044**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons				
Benzene	ug/L	<0.20	0.20	6138471
Toluene	ug/L	<0.20	0.20	6138471
Ethylbenzene	ug/L	<0.20	0.20	6138471
o-Xylene	ug/L	<0.20	0.20	6138471
p+m-Xylene	ug/L	<0.40	0.40	6138471
Total Xylenes	ug/L	<0.40	0.40	6138471
F1 (C6-C10)	ug/L	<25	25	6138471
F1 (C6-C10) - BTEX	ug/L	<25	25	6138471
F2-F4 Hydrocarbons				
F2 (C10-C16 Hydrocarbons)	ug/L	<100	100	6140591
F3 (C16-C34 Hydrocarbons)	ug/L	<200	200	6140591
F4 (C34-C50 Hydrocarbons)	ug/L	<200	200	6140591
Reached Baseline at C50	ug/L	Yes		6140591
Surrogate Recovery (%)				
1,4-Difluorobenzene	%	100		6138471
4-Bromofluorobenzene	%	98		6138471
D10-Ethylbenzene	%	99		6138471
D4-1,2-Dichloroethane	%	103		6138471
o-Terphenyl	%	102		6140591

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID		JTY916	JTY917	JTY924		
Sampling Date		2019/05/21 12:35	2019/05/21 11:15	2019/05/21 11:55		
COC Number		717908-01-01	717908-01-01	717908-01-01		
	UNITS	**BH/MW1**	**BH/MW2**	**BH104**	**RDL**	**QC Batch**
Calculated Parameters						
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	<0.50	<0.50	0.50	6135679
Volatile Organics						
Acetone (2-Propanone)	ug/L	<10	<10	<10	10	6133921
Benzene	ug/L	<0.20	<0.20	<0.20	0.20	6133921
Bromodichloromethane	ug/L	<0.50	<0.50	<0.50	0.50	6133921
Bromoform	ug/L	<1.0	<1.0	<1.0	1.0	6133921
Bromomethane	ug/L	<0.50	<0.50	<0.50	0.50	6133921
Carbon Tetrachloride	ug/L	<0.20	<0.20	<0.20	0.20	6133921
Chlorobenzene	ug/L	<0.20	<0.20	<0.20	0.20	6133921
Chloroform	ug/L	0.47	0.27	0.43	0.20	6133921
Dibromochloromethane	ug/L	<0.50	<0.50	<0.50	0.50	6133921
1,2-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	6133921
1,3-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	6133921
1,4-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	0.50	6133921
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	<1.0	<1.0	1.0	6133921
1,1-Dichloroethane	ug/L	<0.20	<0.20	<0.20	0.20	6133921
1,2-Dichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	6133921
1,1-Dichloroethylene	ug/L	<0.20	<0.20	1.0	0.20	6133921
cis-1,2-Dichloroethylene	ug/L	12	1.5	310	0.50	6133921
trans-1,2-Dichloroethylene	ug/L	<0.50	<0.50	9.0	0.50	6133921
1,2-Dichloropropane	ug/L	<0.20	<0.20	<0.20	0.20	6133921
cis-1,3-Dichloropropene	ug/L	<0.30	<0.30	<0.30	0.30	6133921
trans-1,3-Dichloropropene	ug/L	<0.40	<0.40	<0.40	0.40	6133921
Ethylbenzene	ug/L	<0.20	<0.20	<0.20	0.20	6133921
Ethylene Dibromide	ug/L	<0.20	<0.20	<0.20	0.20	6133921
Hexane	ug/L	<1.0	<1.0	<1.0	1.0	6133921
Methylene Chloride(Dichloromethane)	ug/L	<2.0	<2.0	<2.0	2.0	6133921
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	<10	<10	10	6133921
Methyl Isobutyl Ketone	ug/L	<5.0	<5.0	<5.0	5.0	6133921
Methyl t-butyl ether (MTBE)	ug/L	<0.50	<0.50	<0.50	0.50	6133921
Styrene	ug/L	<0.50	<0.50	<0.50	0.50	6133921
1,1,1,2-Tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	6133921
1,1,2,2-Tetrachloroethane	ug/L	<0.50	<0.50	<0.50	0.50	6133921

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 VOCS BY HS & F1-F4 (WATER)

Maxxam ID		JTY916	JTY917	JTY924		
Sampling Date		2019/05/21 12:35	2019/05/21 11:15	2019/05/21 11:55		
COC Number		717908-01-01	717908-01-01	717908-01-01		
	UNITS	**BH/MW1**	**BH/MW2**	**BH104**	**RDL**	**QC Batch**
Tetrachloroethylene	ug/L	17	34	32	0.20	6133921
Toluene	ug/L	<0.20	<0.20	<0.20	0.20	6133921
1,1,1-Trichloroethane	ug/L	<0.20	<0.20	<0.20	0.20	6133921
1,1,2-Trichloroethane	ug/L	<0.50	<0.50	<0.50	0.50	6133921
Trichloroethylene	ug/L	1.8	8.3	31	0.20	6133921
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	<0.50	<0.50	0.50	6133921
Vinyl Chloride	ug/L	0.55	<0.20	<0.20	0.20	6133921
p+m-Xylene	ug/L	<0.20	<0.20	<0.20	0.20	6133921
o-Xylene	ug/L	<0.20	<0.20	<0.20	0.20	6133921
Total Xylenes	ug/L	<0.20	<0.20	<0.20	0.20	6133921
F1 (C6-C10)	ug/L	<25	<25	33 (1)	25	6133921
F1 (C6-C10) - BTEX	ug/L	<25	<25	33	25	6133921
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	<100	100	6140591
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	<200	200	6140591
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	<200	200	6140591
Reached Baseline at C50	ug/L	Yes	Yes	Yes		6140591
Surrogate Recovery (%)						
o-Terphenyl	%	102	104	104		6140591
4-Bromofluorobenzene	%	88	88	88		6133921
D4-1,2-Dichloroethane	%	117	116	115		6133921
D8-Toluene	%	101	100	100		6133921

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Result reported was mainly due to chlorinated compounds eluting inside the F1 range

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 VOCS BY HS (WATER)

Maxxam ID		JTY918			JTY918			JTY919		
Sampling Date		2019/05/21 10:30			2019/05/21 10:30			2019/05/21 12:30		
COC Number		717908-01-01			717908-01-01			717908-01-01		
	UNITS	**MW3**	**RDL**	**QC Batch**	**MW3 Lab-Dup**	**RDL**	**QC Batch**	**MW4**	**RDL**	**QC Batch**
Calculated Parameters										
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	0.50	6135679				<0.50	0.50	6135679
Volatile Organics										
Acetone (2-Propanone)	ug/L	<10	10	6138176	<10	10	6138176	<10	10	6138176
Benzene	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
Bromodichloromethane	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	5.5	0.50	6138176
Bromoform	ug/L	<1.0	1.0	6138176	<1.0	1.0	6138176	<1.0	1.0	6138176
Bromomethane	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	<0.50	0.50	6138176
Carbon Tetrachloride	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
Chlorobenzene	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
Chloroform	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	18	0.20	6138176
Dibromochloromethane	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	3.4	0.50	6138176
1,2-Dichlorobenzene	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	<0.50	0.50	6138176
1,3-Dichlorobenzene	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	<0.50	0.50	6138176
1,4-Dichlorobenzene	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	<0.50	0.50	6138176
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	1.0	6138176	<1.0	1.0	6138176	<1.0	1.0	6138176
1,1-Dichloroethane	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
1,2-Dichloroethane	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	<0.50	0.50	6138176
1,1-Dichloroethylene	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
cis-1,2-Dichloroethylene	ug/L	4.3	0.50	6138176	4.3	0.50	6138176	18	0.50	6138176
trans-1,2-Dichloroethylene	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	0.75	0.50	6138176
1,2-Dichloropropane	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
cis-1,3-Dichloropropene	ug/L	<0.30	0.30	6138176	<0.30	0.30	6138176	<0.30	0.30	6138176
trans-1,3-Dichloropropene	ug/L	<0.40	0.40	6138176	<0.40	0.40	6138176	<0.40	0.40	6138176
Ethylbenzene	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
Ethylene Dibromide	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
Hexane	ug/L	<1.0	1.0	6138176	<1.0	1.0	6138176	<1.0	1.0	6138176
Methylene Chloride(Dichloromethane)	ug/L	<2.0	2.0	6138176	<2.0	2.0	6138176	<2.0	2.0	6138176
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	10	6138176	<10	10	6138176	<10	10	6138176
Methyl Isobutyl Ketone	ug/L	<5.0	5.0	6138176	<5.0	5.0	6138176	<5.0	5.0	6138176
Methyl t-butyl ether (MTBE)	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	<0.50	0.50	6138176
Styrene	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	<0.50	0.50	6138176
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	<0.50	0.50	6138176

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 VOCS BY HS (WATER)

Maxxam ID		JTY918			JTY918			JTY919		
Sampling Date		2019/05/21 10:30			2019/05/21 10:30			2019/05/21 12:30		
COC Number		717908-01-01			717908-01-01			717908-01-01		
	UNITS	**MW3**	**RDL**	**QC Batch**	**MW3 Lab-Dup**	**RDL**	**QC Batch**	**MW4**	**RDL**	**QC Batch**
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	<0.50	0.50	6138176
Tetrachloroethylene	ug/L	36	0.20	6138176	35	0.20	6138176	110	0.20	6138176
Toluene	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
1,1,1-Trichloroethane	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
1,1,2-Trichloroethane	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	<0.50	0.50	6138176
Trichloroethylene	ug/L	13	0.20	6138176	13	0.20	6138176	5.7	0.20	6138176
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	0.50	6138176	<0.50	0.50	6138176	<0.50	0.50	6138176
Vinyl Chloride	ug/L	2.1	0.20	6138176	2.0	0.20	6138176	<0.20	0.20	6138176
p+m-Xylene	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
o-Xylene	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
Total Xylenes	ug/L	<0.20	0.20	6138176	<0.20	0.20	6138176	<0.20	0.20	6138176
Surrogate Recovery (%)										
4-Bromofluorobenzene	%	108		6138176	107		6138176	106		6138176
D4-1,2-Dichloroethane	%	115		6138176	120		6138176	120		6138176
D8-Toluene	%	90		6138176	88		6138176	87		6138176

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 VOCS BY HS (WATER)

Maxxam ID		JTY920	JTY921	JTY922	JTY923	JTY926		
Sampling Date		2019/05/21 12:30	2019/05/21 11:00	2019/05/21 13:00	2019/05/21 12:00	2019/05/21 10:35		
COC Number		717908-01-01	717908-01-01	717908-01-01	717908-01-01	717908-01-01		
	UNITS	**MW44**	**MW101**	**MW102**	**MW103**	**BH105**	**RDL**	**QC Batch**
Calculated Parameters								
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6135679
Volatile Organics								
Acetone (2-Propanone)	ug/L	<10	<10	<10	<10	<10	10	6138176
Benzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6138176
Bromodichloromethane	ug/L	5.4	<0.50	<0.50	2.4	<0.50	0.50	6138176
Bromoform	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6138176
Bromomethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6138176
Carbon Tetrachloride	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6138176
Chlorobenzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6138176
Chloroform	ug/L	18	<0.20	0.47	8.3	<0.20	0.20	6138176
Dibromochloromethane	ug/L	3.3	<0.50	<0.50	1.1	<0.50	0.50	6138176
1,2-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6138176
1,3-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6138176
1,4-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6138176
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6138176
1,1-Dichloroethane	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6138176
1,2-Dichloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6138176
1,1-Dichloroethylene	ug/L	<0.20	<0.20	0.23	<0.20	<0.20	0.20	6138176
cis-1,2-Dichloroethylene	ug/L	19	3.3	9.8	1.1	0.75	0.50	6138176
trans-1,2-Dichloroethylene	ug/L	0.71	<0.50	0.51	<0.50	<0.50	0.50	6138176
1,2-Dichloropropane	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6138176
cis-1,3-Dichloropropene	ug/L	<0.30	<0.30	<0.30	<0.30	<0.30	0.30	6138176
trans-1,3-Dichloropropene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	6138176
Ethylbenzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6138176
Ethylene Dibromide	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6138176
Hexane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6138176
Methylene Chloride(Dichloromethane)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	6138176
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	<10	<10	<10	<10	10	6138176
Methyl Isobutyl Ketone	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	6138176
Methyl t-butyl ether (MTBE)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6138176
Styrene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6138176
1,1,1,2-Tetrachloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6138176
1,1,2,2-Tetrachloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6138176

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 VOCS BY HS (WATER)

Maxxam ID		JTY920	JTY921	JTY922	JTY923	JTY926		
Sampling Date		2019/05/21 12:30	2019/05/21 11:00	2019/05/21 13:00	2019/05/21 12:00	2019/05/21 10:35		
COC Number		717908-01-01	717908-01-01	717908-01-01	717908-01-01	717908-01-01		
	UNITS	**MW44**	**MW101**	**MW102**	**MW103**	**BH105**	**RDL**	**QC Batch**
Tetrachloroethylene	ug/L	120	48	50	35	13	0.20	6138176
Toluene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6138176
1,1,1-Trichloroethane	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6138176
1,1,2-Trichloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6138176
Trichloroethylene	ug/L	5.8	13	57	2.2	2.4	0.20	6138176
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6138176
Vinyl Chloride	ug/L	<0.20	<0.20	0.91	<0.20	<0.20	0.20	6138176
p+m-Xylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6138176
o-Xylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6138176
Total Xylenes	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6138176
Surrogate Recovery (%)								
4-Bromofluorobenzene	%	105	85	105	85	106		6138176
D4-1,2-Dichloroethane	%	118	123	119	122	122		6138176
D8-Toluene	%	87	87	88	88	88		6138176

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 VOCS BY HS (WATER)

Maxxam ID		JTY927	JTY928		
Sampling Date		2019/05/21 11:30	2019/05/21		
COC Number		717908-01-01	717908-01-01		
	UNITS	**MW106**	**TRIP BLANK**	**RDL**	**QC Batch**
Calculated Parameters					
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	<0.50	0.50	6135679
Volatile Organics					
Acetone (2-Propanone)	ug/L	<10	<10	10	6138176
Benzene	ug/L	<0.20	<0.20	0.20	6138176
Bromodichloromethane	ug/L	<0.50	<0.50	0.50	6138176
Bromoform	ug/L	<1.0	<1.0	1.0	6138176
Bromomethane	ug/L	<0.50	<0.50	0.50	6138176
Carbon Tetrachloride	ug/L	<0.20	<0.20	0.20	6138176
Chlorobenzene	ug/L	<0.20	<0.20	0.20	6138176
Chloroform	ug/L	0.41	<0.20	0.20	6138176
Dibromochloromethane	ug/L	<0.50	<0.50	0.50	6138176
1,2-Dichlorobenzene	ug/L	<0.50	<0.50	0.50	6138176
1,3-Dichlorobenzene	ug/L	<0.50	<0.50	0.50	6138176
1,4-Dichlorobenzene	ug/L	<0.50	<0.50	0.50	6138176
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	<1.0	1.0	6138176
1,1-Dichloroethane	ug/L	<0.20	<0.20	0.20	6138176
1,2-Dichloroethane	ug/L	<0.50	<0.50	0.50	6138176
1,1-Dichloroethylene	ug/L	<0.20	<0.20	0.20	6138176
cis-1,2-Dichloroethylene	ug/L	3.3	<0.50	0.50	6138176
trans-1,2-Dichloroethylene	ug/L	<0.50	<0.50	0.50	6138176
1,2-Dichloropropane	ug/L	<0.20	<0.20	0.20	6138176
cis-1,3-Dichloropropene	ug/L	<0.30	<0.30	0.30	6138176
trans-1,3-Dichloropropene	ug/L	<0.40	<0.40	0.40	6138176
Ethylbenzene	ug/L	<0.20	<0.20	0.20	6138176
Ethylene Dibromide	ug/L	<0.20	<0.20	0.20	6138176
Hexane	ug/L	<1.0	<1.0	1.0	6138176
Methylene Chloride(Dichloromethane)	ug/L	<2.0	<2.0	2.0	6138176
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	<10	10	6138176
Methyl Isobutyl Ketone	ug/L	<5.0	<5.0	5.0	6138176
Methyl t-butyl ether (MTBE)	ug/L	<0.50	<0.50	0.50	6138176
Styrene	ug/L	<0.50	<0.50	0.50	6138176
1,1,1,2-Tetrachloroethane	ug/L	<0.50	<0.50	0.50	6138176
1,1,2,2-Tetrachloroethane	ug/L	<0.50	<0.50	0.50	6138176

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 VOCS BY HS (WATER)

Maxxam ID		JTY927	JTY928		
Sampling Date		2019/05/21 11:30	2019/05/21		
COC Number		717908-01-01	717908-01-01		
	UNITS	**MW106**	**TRIP BLANK**	**RDL**	**QC Batch**
Tetrachloroethylene	ug/L	27	<0.20	0.20	6138176
Toluene	ug/L	<0.20	<0.20	0.20	6138176
1,1,1-Trichloroethane	ug/L	<0.20	<0.20	0.20	6138176
1,1,2-Trichloroethane	ug/L	<0.50	<0.50	0.50	6138176
Trichloroethylene	ug/L	14	<0.20	0.20	6138176
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	<0.50	0.50	6138176
Vinyl Chloride	ug/L	<0.20	<0.20	0.20	6138176
p+m-Xylene	ug/L	<0.20	<0.20	0.20	6138176
o-Xylene	ug/L	<0.20	<0.20	0.20	6138176
Total Xylenes	ug/L	<0.20	<0.20	0.20	6138176
Surrogate Recovery (%)					
4-Bromofluorobenzene	%	84	106		6138176
D4-1,2-Dichloroethane	%	123	121		6138176
D8-Toluene	%	88	88		6138176

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

TEST SUMMARY

Maxxam ID: JTY916 **Collected:** 2019/05/21
Sample ID: BH/MW1 **Shipped:**
Matrix: Water **Received:** 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6135679	N/A	2019/05/27	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6140591	2019/05/25	2019/05/27	Prabhjot Gulati
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6133921	N/A	2019/05/24	Rebecca McClean

Maxxam ID: JTY917 **Collected:** 2019/05/21
Sample ID: BH/MW2 **Shipped:**
Matrix: Water **Received:** 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6135679	N/A	2019/05/27	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6140591	2019/05/25	2019/05/27	Prabhjot Gulati
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6133921	N/A	2019/05/24	Rebecca McClean

Maxxam ID: JTY918 **Collected:** 2019/05/21
Sample ID: MW3 **Shipped:**
Matrix: Water **Received:** 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6135679	N/A	2019/05/27	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6138176	N/A	2019/05/24	Juan Pangilinan

Maxxam ID: JTY918 Dup **Collected:** 2019/05/21
Sample ID: MW3 **Shipped:**
Matrix: Water **Received:** 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Volatile Organic Compounds in Water	GC/MS	6138176	N/A	2019/05/24	Juan Pangilinan

Maxxam ID: JTY919 **Collected:** 2019/05/21
Sample ID: MW4 **Shipped:**
Matrix: Water **Received:** 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6135679	N/A	2019/05/27	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6138176	N/A	2019/05/24	Juan Pangilinan

Maxxam ID: JTY920 **Collected:** 2019/05/21
Sample ID: MW44 **Shipped:**
Matrix: Water **Received:** 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6135679	N/A	2019/05/27	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6138176	N/A	2019/05/24	Juan Pangilinan

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

TEST SUMMARY

Maxxam ID: JTY921 **Collected:** 2019/05/21
Sample ID: MW101 **Shipped:**
Matrix: Water **Received:** 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6135679	N/A	2019/05/27	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6138176	N/A	2019/05/24	Juan Pangilinan

Maxxam ID: JTY922 **Collected:** 2019/05/21
Sample ID: MW102 **Shipped:**
Matrix: Water **Received:** 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6135679	N/A	2019/05/27	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6138176	N/A	2019/05/24	Juan Pangilinan

Maxxam ID: JTY923 **Collected:** 2019/05/21
Sample ID: MW103 **Shipped:**
Matrix: Water **Received:** 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6135679	N/A	2019/05/27	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6138176	N/A	2019/05/24	Juan Pangilinan

Maxxam ID: JTY924 **Collected:** 2019/05/21
Sample ID: BH104 **Shipped:**
Matrix: Water **Received:** 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6135679	N/A	2019/05/27	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6140591	2019/05/25	2019/05/27	Prabhjot Gulati
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6133921	N/A	2019/05/24	Rebecca McClean

Maxxam ID: JTY925 **Collected:** 2019/05/21
Sample ID: BH1044 **Shipped:**
Matrix: Water **Received:** 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	6138471	N/A	2019/05/24	Joe Paino
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6140591	2019/05/25	2019/05/27	Prabhjot Gulati

Maxxam ID: JTY926 **Collected:** 2019/05/21
Sample ID: BH105 **Shipped:**
Matrix: Water **Received:** 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6135679	N/A	2019/05/27	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6138176	N/A	2019/05/24	Juan Pangilinan

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

TEST SUMMARY

Maxxam ID: JTY927
Sample ID: MW106
Matrix: Water

Collected: 2019/05/21
Shipped:
Received: 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6135679	N/A	2019/05/27	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6138176	N/A	2019/05/24	Juan Pangilinan

Maxxam ID: JTY928
Sample ID: TRIP BLANK
Matrix: Water

Collected: 2019/05/21
Shipped:
Received: 2019/05/22

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6135679	N/A	2019/05/27	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6138176	N/A	2019/05/24	Juan Pangilinan

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.7°C

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9D6751
Report Date: 2019/05/27

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6133921	4-Bromofluorobenzene	2019/05/24	97	70 - 130	98	70 - 130	90	%		
6133921	D4-1,2-Dichloroethane	2019/05/24	118	70 - 130	110	70 - 130	111	%		
6133921	D8-Toluene	2019/05/24	101	70 - 130	103	70 - 130	100	%		
6138176	4-Bromofluorobenzene	2019/05/24	122	70 - 130	99	70 - 130	90	%		
6138176	D4-1,2-Dichloroethane	2019/05/24	111	70 - 130	106	70 - 130	112	%		
6138176	D8-Toluene	2019/05/24	106	70 - 130	108	70 - 130	91	%		
6138471	1,4-Difluorobenzene	2019/05/24	103	70 - 130	99	70 - 130	104	%		
6138471	4-Bromofluorobenzene	2019/05/24	102	70 - 130	100	70 - 130	101	%		
6138471	D10-Ethylbenzene	2019/05/24	100	70 - 130	99	70 - 130	101	%		
6138471	D4-1,2-Dichloroethane	2019/05/24	103	70 - 130	102	70 - 130	102	%		
6140591	o-Terphenyl	2019/05/27	106	60 - 130	105	60 - 130	102	%		
6133921	1,1,1,2-Tetrachloroethane	2019/05/24	100	70 - 130	101	70 - 130	<0.50	ug/L	NC	30
6133921	1,1,1-Trichloroethane	2019/05/24	94	70 - 130	97	70 - 130	<0.20	ug/L	NC	30
6133921	1,1,2,2-Tetrachloroethane	2019/05/24	116	70 - 130	110	70 - 130	<0.50	ug/L	NC	30
6133921	1,1,2-Trichloroethane	2019/05/24	116	70 - 130	111	70 - 130	<0.50	ug/L	NC	30
6133921	1,1-Dichloroethane	2019/05/24	104	70 - 130	104	70 - 130	<0.20	ug/L	NC	30
6133921	1,1-Dichloroethylene	2019/05/24	97	70 - 130	99	70 - 130	<0.20	ug/L	NC	30
6133921	1,2-Dichlorobenzene	2019/05/24	102	70 - 130	103	70 - 130	<0.50	ug/L	NC	30
6133921	1,2-Dichloroethane	2019/05/24	113	70 - 130	107	70 - 130	<0.50	ug/L	NC	30
6133921	1,2-Dichloropropane	2019/05/24	104	70 - 130	101	70 - 130	<0.20	ug/L	NC	30
6133921	1,3-Dichlorobenzene	2019/05/24	102	70 - 130	104	70 - 130	<0.50	ug/L	NC	30
6133921	1,4-Dichlorobenzene	2019/05/24	108	70 - 130	110	70 - 130	<0.50	ug/L	NC	30
6133921	Acetone (2-Propanone)	2019/05/24	132	60 - 140	119	60 - 140	<10	ug/L	3.0	30
6133921	Benzene	2019/05/24	97	70 - 130	97	70 - 130	<0.20	ug/L	8.5	30
6133921	Bromodichloromethane	2019/05/24	104	70 - 130	101	70 - 130	<0.50	ug/L	NC	30
6133921	Bromoform	2019/05/24	105	70 - 130	100	70 - 130	<1.0	ug/L	NC	30
6133921	Bromomethane	2019/05/24	106	60 - 140	107	60 - 140	<0.50	ug/L	NC	30
6133921	Carbon Tetrachloride	2019/05/24	94	70 - 130	97	70 - 130	<0.20	ug/L	NC	30
6133921	Chlorobenzene	2019/05/24	97	70 - 130	98	70 - 130	<0.20	ug/L	NC	30
6133921	Chloroform	2019/05/24	104	70 - 130	103	70 - 130	<0.20	ug/L	6.5	30
6133921	cis-1,2-Dichloroethylene	2019/05/24	101	70 - 130	99	70 - 130	<0.50	ug/L	NC	30

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6133921	cis-1,3-Dichloropropene	2019/05/24	124	70 - 130	108	70 - 130	<0.30	ug/L	NC	30
6133921	Dibromochloromethane	2019/05/24	115	70 - 130	112	70 - 130	<0.50	ug/L	NC	30
6133921	Dichlorodifluoromethane (FREON 12)	2019/05/24	76	60 - 140	79	60 - 140	<1.0	ug/L	NC	30
6133921	Ethylbenzene	2019/05/24	96	70 - 130	98	70 - 130	<0.20	ug/L	NC	30
6133921	Ethylene Dibromide	2019/05/24	112	70 - 130	106	70 - 130	<0.20	ug/L	NC	30
6133921	F1 (C6-C10) - BTEX	2019/05/24					<25	ug/L	NC	30
6133921	F1 (C6-C10)	2019/05/24	91	60 - 140	101	60 - 140	<25	ug/L	17	30
6133921	Hexane	2019/05/24	89	70 - 130	92	70 - 130	<1.0	ug/L	NC	30
6133921	Methyl Ethyl Ketone (2-Butanone)	2019/05/24	138	60 - 140	122	60 - 140	<10	ug/L	NC	30
6133921	Methyl Isobutyl Ketone	2019/05/24	126	70 - 130	114	70 - 130	<5.0	ug/L	NC	30
6133921	Methyl t-butyl ether (MTBE)	2019/05/24	99	70 - 130	96	70 - 130	<0.50	ug/L	NC	30
6133921	Methylene Chloride(Dichloromethane)	2019/05/24	110	70 - 130	106	70 - 130	<2.0	ug/L	NC	30
6133921	o-Xylene	2019/05/24	95	70 - 130	95	70 - 130	<0.20	ug/L	NC	30
6133921	p+m-Xylene	2019/05/24	91	70 - 130	94	70 - 130	<0.20	ug/L	21	30
6133921	Styrene	2019/05/24	97	70 - 130	98	70 - 130	<0.50	ug/L	NC	30
6133921	Tetrachloroethylene	2019/05/24	94	70 - 130	99	70 - 130	<0.20	ug/L	NC	30
6133921	Toluene	2019/05/24	NC	70 - 130	96	70 - 130	<0.20	ug/L	13	30
6133921	Total Xylenes	2019/05/24					<0.20	ug/L	21	30
6133921	trans-1,2-Dichloroethylene	2019/05/24	95	70 - 130	96	70 - 130	<0.50	ug/L	NC	30
6133921	trans-1,3-Dichloropropene	2019/05/24	148 (1)	70 - 130	126	70 - 130	<0.40	ug/L	NC	30
6133921	Trichloroethylene	2019/05/24	93	70 - 130	94	70 - 130	<0.20	ug/L	NC	30
6133921	Trichlorofluoromethane (FREON 11)	2019/05/24	94	70 - 130	98	70 - 130	<0.50	ug/L	NC	30
6133921	Vinyl Chloride	2019/05/24	95	70 - 130	97	70 - 130	<0.20	ug/L	NC	30
6138176	1,1,1,2-Tetrachloroethane	2019/05/24	104	70 - 130	106	70 - 130	<0.50	ug/L	NC	30
6138176	1,1,1-Trichloroethane	2019/05/24	101	70 - 130	101	70 - 130	<0.20	ug/L	NC	30
6138176	1,1,2,2-Tetrachloroethane	2019/05/24	115	70 - 130	115	70 - 130	<0.50	ug/L	NC	30
6138176	1,1,2-Trichloroethane	2019/05/24	115	70 - 130	113	70 - 130	<0.50	ug/L	NC	30
6138176	1,1-Dichloroethane	2019/05/24	111	70 - 130	109	70 - 130	<0.20	ug/L	NC	30
6138176	1,1-Dichloroethylene	2019/05/24	101	70 - 130	100	70 - 130	<0.20	ug/L	NC	30
6138176	1,2-Dichlorobenzene	2019/05/24	98	70 - 130	99	70 - 130	<0.50	ug/L	NC	30
6138176	1,2-Dichloroethane	2019/05/24	113	70 - 130	109	70 - 130	<0.50	ug/L	NC	30

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6138176	1,2-Dichloropropane	2019/05/24	113	70 - 130	111	70 - 130	<0.20	ug/L	NC	30
6138176	1,3-Dichlorobenzene	2019/05/24	95	70 - 130	97	70 - 130	<0.50	ug/L	NC	30
6138176	1,4-Dichlorobenzene	2019/05/24	97	70 - 130	99	70 - 130	<0.50	ug/L	NC	30
6138176	Acetone (2-Propanone)	2019/05/24	118	60 - 140	119	60 - 140	<10	ug/L	NC	30
6138176	Benzene	2019/05/24	106	70 - 130	104	70 - 130	<0.20	ug/L	NC	30
6138176	Bromodichloromethane	2019/05/24	107	70 - 130	105	70 - 130	<0.50	ug/L	NC	30
6138176	Bromoform	2019/05/24	105	70 - 130	106	70 - 130	<1.0	ug/L	NC	30
6138176	Bromomethane	2019/05/24	108	60 - 140	103	60 - 140	<0.50	ug/L	NC	30
6138176	Carbon Tetrachloride	2019/05/24	99	70 - 130	99	70 - 130	<0.20	ug/L	NC	30
6138176	Chlorobenzene	2019/05/24	99	70 - 130	101	70 - 130	<0.20	ug/L	NC	30
6138176	Chloroform	2019/05/24	107	70 - 130	105	70 - 130	<0.20	ug/L	NC	30
6138176	cis-1,2-Dichloroethylene	2019/05/24	106	70 - 130	105	70 - 130	<0.50	ug/L	0.86	30
6138176	cis-1,3-Dichloropropene	2019/05/24	110	70 - 130	104	70 - 130	<0.30	ug/L	NC	30
6138176	Dibromochloromethane	2019/05/24	106	70 - 130	107	70 - 130	<0.50	ug/L	NC	30
6138176	Dichlorodifluoromethane (FREON 12)	2019/05/24	89	60 - 140	88	60 - 140	<1.0	ug/L	NC	30
6138176	Ethylbenzene	2019/05/24	93	70 - 130	100	70 - 130	<0.20	ug/L	NC	30
6138176	Ethylene Dibromide	2019/05/24	111	70 - 130	110	70 - 130	<0.20	ug/L	NC	30
6138176	Hexane	2019/05/24	109	70 - 130	112	70 - 130	<1.0	ug/L	NC	30
6138176	Methyl Ethyl Ketone (2-Butanone)	2019/05/24	129	60 - 140	130	60 - 140	<10	ug/L	NC	30
6138176	Methyl Isobutyl Ketone	2019/05/24	129	70 - 130	134 (1)	70 - 130	<5.0	ug/L	NC	30
6138176	Methyl t-butyl ether (MTBE)	2019/05/24	102	70 - 130	104	70 - 130	<0.50	ug/L	NC	30
6138176	Methylene Chloride(Dichloromethane)	2019/05/24	118	70 - 130	114	70 - 130	<2.0	ug/L	NC	30
6138176	o-Xylene	2019/05/24	89	70 - 130	102	70 - 130	<0.20	ug/L	NC	30
6138176	p+m-Xylene	2019/05/24	94	70 - 130	103	70 - 130	<0.20	ug/L	NC	30
6138176	Styrene	2019/05/24	78	70 - 130	90	70 - 130	<0.50	ug/L	NC	30
6138176	Tetrachloroethylene	2019/05/24	92	70 - 130	98	70 - 130	<0.20	ug/L	2.8	30
6138176	Toluene	2019/05/24	105	70 - 130	107	70 - 130	<0.20	ug/L	NC	30
6138176	Total Xylenes	2019/05/24					<0.20	ug/L	NC	30
6138176	trans-1,2-Dichloroethylene	2019/05/24	104	70 - 130	102	70 - 130	<0.50	ug/L	NC	30
6138176	trans-1,3-Dichloropropene	2019/05/24	122	70 - 130	113	70 - 130	<0.40	ug/L	NC	30
6138176	Trichloroethylene	2019/05/24	95	70 - 130	97	70 - 130	<0.20	ug/L	2.0	30

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6138176	Trichlorofluoromethane (FREON 11)	2019/05/24	99	70 - 130	97	70 - 130	<0.50	ug/L	NC	30
6138176	Vinyl Chloride	2019/05/24	106	70 - 130	103	70 - 130	<0.20	ug/L	4.2	30
6138471	Benzene	2019/05/24	98	70 - 130	102	70 - 130	<0.20	ug/L	NC	30
6138471	Ethylbenzene	2019/05/24	102	70 - 130	106	70 - 130	<0.20	ug/L	NC	30
6138471	F1 (C6-C10) - BTEX	2019/05/24					<25	ug/L	NC	30
6138471	F1 (C6-C10)	2019/05/24	80	70 - 130	99	70 - 130	<25	ug/L	NC	30
6138471	o-Xylene	2019/05/24	99	70 - 130	104	70 - 130	<0.20	ug/L	NC	30
6138471	p+m-Xylene	2019/05/24	108	70 - 130	111	70 - 130	<0.40	ug/L	NC	30
6138471	Toluene	2019/05/24	103	70 - 130	107	70 - 130	<0.20	ug/L	NC	30
6138471	Total Xylenes	2019/05/24					<0.40	ug/L	NC	30
6140591	F2 (C10-C16 Hydrocarbons)	2019/05/27	112	50 - 130	102	60 - 130	<100	ug/L	1.6	30
6140591	F3 (C16-C34 Hydrocarbons)	2019/05/27	114	50 - 130	110	60 - 130	<200	ug/L	NC	30
6140591	F4 (C34-C50 Hydrocarbons)	2019/05/27	114	50 - 130	111	60 - 130	<200	ug/L		

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

(1) The recovery was above the upper control limit. This may represent a high bias in some results for this specific analyte. For results that were not detected (ND), this potential bias has no impact.

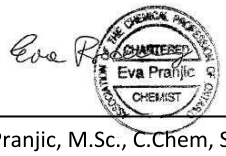
Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Maxxam Job #: B9D6751
Report Date: 2019/05/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Maxxam Analytics International Corporation o/a Maxxam Analytics 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.maxxam.ca

Your P.O. #: HAM-ENV
Your Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your C.O.C. #: 688766-07-01

Attention: Stephanie Hsia

exp Services Inc
80 Bancroft St
Hamilton, ON
CANADA L8E 2W5

Report Date: 2019/06/14
Report #: R5754598
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9F8564
Received: 2019/06/11, 17:15

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
1,3-Dichloropropene Sum	2	N/A	2019/06/13		EPA 8260C m
Moisture	2	N/A	2019/06/12	CAM SOP-00445	Carter 2nd ed 51.2 m
Sieve, 75um	1	N/A	2019/06/13	CAM SOP-00467	Carter 2nd ed m
Volatile Organic Compounds in Soil	2	N/A	2019/06/12	CAM SOP-00228	EPA 8260C m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your P.O. #: HAM-ENV
Your Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your C.O.C. #: 688766-07-01

Attention: Stephanie Hsia

exp Services Inc
80 Bancroft St
Hamilton, ON
CANADA L8E 2W5

Report Date: 2019/06/14
Report #: R5754598
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9F8564
Received: 2019/06/11, 17:15

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Christine Gripton, Senior Project Manager
Email: Christine.Gripton@bvlabs.com
Phone# (519)652-9444
==========
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B9F8564
Report Date: 2019/06/14

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 VOCS BY HS (SOIL)

BV Labs ID		JYV313	JYV314		
Sampling Date		2019/06/10 11:30	2019/06/10 11:30		
COC Number		688766-07-01	688766-07-01		
	UNITS	**BH201-SS6**	**BH201-SS66**	**RDL**	**QC Batch**
Inorganics					
Moisture	%	9.5	9.1	1.0	6172762
Calculated Parameters					
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	<0.050	0.050	6169560
Volatile Organics					
Acetone (2-Propanone)	ug/g	<0.50	<0.50	0.50	6172085
Benzene	ug/g	<0.020	<0.020	0.020	6172085
Bromodichloromethane	ug/g	<0.050	<0.050	0.050	6172085
Bromoform	ug/g	<0.050	<0.050	0.050	6172085
Bromomethane	ug/g	<0.050	<0.050	0.050	6172085
Carbon Tetrachloride	ug/g	<0.050	<0.050	0.050	6172085
Chlorobenzene	ug/g	<0.050	<0.050	0.050	6172085
Chloroform	ug/g	<0.050	<0.050	0.050	6172085
Dibromochloromethane	ug/g	<0.050	<0.050	0.050	6172085
1,2-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	6172085
1,3-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	6172085
1,4-Dichlorobenzene	ug/g	<0.050	<0.050	0.050	6172085
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	<0.050	0.050	6172085
1,1-Dichloroethane	ug/g	<0.050	<0.050	0.050	6172085
1,2-Dichloroethane	ug/g	<0.050	<0.050	0.050	6172085
1,1-Dichloroethylene	ug/g	<0.050	<0.050	0.050	6172085
cis-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	6172085
trans-1,2-Dichloroethylene	ug/g	<0.050	<0.050	0.050	6172085
1,2-Dichloropropane	ug/g	<0.050	<0.050	0.050	6172085
cis-1,3-Dichloropropene	ug/g	<0.030	<0.030	0.030	6172085
trans-1,3-Dichloropropene	ug/g	<0.040	<0.040	0.040	6172085
Ethylbenzene	ug/g	<0.020	<0.020	0.020	6172085
Ethylene Dibromide	ug/g	<0.050	<0.050	0.050	6172085
Hexane	ug/g	<0.050	<0.050	0.050	6172085
Methylene Chloride(Dichloromethane)	ug/g	<0.050	<0.050	0.050	6172085
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	<0.50	0.50	6172085
Methyl Isobutyl Ketone	ug/g	<0.50	<0.50	0.50	6172085
Methyl t-butyl ether (MTBE)	ug/g	<0.050	<0.050	0.050	6172085
Styrene	ug/g	<0.050	<0.050	0.050	6172085

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9F8564
Report Date: 2019/06/14

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 VOCS BY HS (SOIL)

BV Labs ID		JYV313	JYV314		
Sampling Date		2019/06/10 11:30	2019/06/10 11:30		
COC Number		688766-07-01	688766-07-01		
	UNITS	**BH201-SS6**	**BH201-SS66**	**RDL**	**QC Batch**
1,1,1,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	6172085
1,1,2,2-Tetrachloroethane	ug/g	<0.050	<0.050	0.050	6172085
Tetrachloroethylene	ug/g	<0.050	<0.050	0.050	6172085
Toluene	ug/g	<0.020	<0.020	0.020	6172085
1,1,1-Trichloroethane	ug/g	<0.050	<0.050	0.050	6172085
1,1,2-Trichloroethane	ug/g	<0.050	<0.050	0.050	6172085
Trichloroethylene	ug/g	<0.050	<0.050	0.050	6172085
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	<0.050	0.050	6172085
Vinyl Chloride	ug/g	0.052	0.056	0.020	6172085
p+m-Xylene	ug/g	<0.020	<0.020	0.020	6172085
o-Xylene	ug/g	<0.020	<0.020	0.020	6172085
Total Xylenes	ug/g	<0.020	<0.020	0.020	6172085
Surrogate Recovery (%)					
4-Bromofluorobenzene	%	93	93		6172085
D10-o-Xylene	%	112	115		6172085
D4-1,2-Dichloroethane	%	101	101		6172085
D8-Toluene	%	99	99		6172085

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9F8564
Report Date: 2019/06/14

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

RESULTS OF ANALYSES OF SOIL

BV Labs ID		JYV312	JYV312		
Sampling Date		2019/06/10 11:30	2019/06/10 11:30		
COC Number		688766-07-01	688766-07-01		
	UNITS	**BH201-SS3**	**BH201-SS3 Lab-Dup**	**RDL**	**QC Batch**
Miscellaneous Parameters					
Grain Size	%	COARSE	COARSE	N/A	6174385
Sieve - #200 (<0.075mm)	%	42	41	1	6174385
Sieve - #200 (>0.075mm)	%	58	59	1	6174385

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
N/A = Not Applicable

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9F8564
Report Date: 2019/06/14

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

TEST SUMMARY

BV Labs ID: JYV312
Sample ID: BH201-SS3
Matrix: Soil

Collected: 2019/06/10
Shipped:
Received: 2019/06/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sieve, 75um	SIEV	6174385	N/A	2019/06/13	Prgya Panchal

BV Labs ID: JYV312 Dup
Sample ID: BH201-SS3
Matrix: Soil

Collected: 2019/06/10
Shipped:
Received: 2019/06/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sieve, 75um	SIEV	6174385	N/A	2019/06/14	Prgya Panchal

BV Labs ID: JYV313
Sample ID: BH201-SS6
Matrix: Soil

Collected: 2019/06/10
Shipped:
Received: 2019/06/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6169560	N/A	2019/06/13	Automated Statchk
Moisture	BAL	6172762	N/A	2019/06/12	Mithunaa Sasitheepan
Volatile Organic Compounds in Soil	GC/MS	6172085	N/A	2019/06/12	Karen Hughes

BV Labs ID: JYV314
Sample ID: BH201-SS66
Matrix: Soil

Collected: 2019/06/10
Shipped:
Received: 2019/06/11

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6169560	N/A	2019/06/13	Automated Statchk
Moisture	BAL	6172762	N/A	2019/06/12	Mithunaa Sasitheepan
Volatile Organic Compounds in Soil	GC/MS	6172085	N/A	2019/06/12	Karen Hughes

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9F8564
Report Date: 2019/06/14

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	1.0°C

Results relate only to the items tested.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9F8564
Report Date: 2019/06/14

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6172085	4-Bromofluorobenzene	2019/06/12	97	60 - 140	99	60 - 140	95	%				
6172085	D10-o-Xylene	2019/06/12	125	60 - 130	96	60 - 130	97	%				
6172085	D4-1,2-Dichloroethane	2019/06/12	97	60 - 140	104	60 - 140	108	%				
6172085	D8-Toluene	2019/06/12	108	60 - 140	107	60 - 140	96	%				
6172085	1,1,1,2-Tetrachloroethane	2019/06/12	100	60 - 140	106	60 - 130	<0.050	ug/g	NC	50		
6172085	1,1,1-Trichloroethane	2019/06/12	97	60 - 140	98	60 - 130	<0.050	ug/g	NC	50		
6172085	1,1,2,2-Tetrachloroethane	2019/06/12	93	60 - 140	111	60 - 130	<0.050	ug/g	NC	50		
6172085	1,1,2-Trichloroethane	2019/06/12	99	60 - 140	111	60 - 130	<0.050	ug/g	NC	50		
6172085	1,1-Dichloroethane	2019/06/12	97	60 - 140	101	60 - 130	<0.050	ug/g	NC	50		
6172085	1,1-Dichloroethylene	2019/06/12	106	60 - 140	106	60 - 130	<0.050	ug/g	NC	50		
6172085	1,2-Dichlorobenzene	2019/06/12	91	60 - 140	96	60 - 130	<0.050	ug/g	NC	50		
6172085	1,2-Dichloroethane	2019/06/12	94	60 - 140	105	60 - 130	<0.050	ug/g	NC	50		
6172085	1,2-Dichloropropane	2019/06/12	90	60 - 140	97	60 - 130	<0.050	ug/g	NC	50		
6172085	1,3-Dichlorobenzene	2019/06/12	95	60 - 140	96	60 - 130	<0.050	ug/g	NC	50		
6172085	1,4-Dichlorobenzene	2019/06/12	101	60 - 140	102	60 - 130	<0.050	ug/g	NC	50		
6172085	Acetone (2-Propanone)	2019/06/12	90	60 - 140	115	60 - 140	<0.50	ug/g	NC	50		
6172085	Benzene	2019/06/12	96	60 - 140	100	60 - 130	<0.020	ug/g	NC	50		
6172085	Bromodichloromethane	2019/06/12	91	60 - 140	100	60 - 130	<0.050	ug/g	NC	50		
6172085	Bromoform	2019/06/12	91	60 - 140	107	60 - 130	<0.050	ug/g	NC	50		
6172085	Bromomethane	2019/06/12	98	60 - 140	101	60 - 140	<0.050	ug/g	NC	50		
6172085	Carbon Tetrachloride	2019/06/12	95	60 - 140	96	60 - 130	<0.050	ug/g	NC	50		
6172085	Chlorobenzene	2019/06/12	93	60 - 140	98	60 - 130	<0.050	ug/g	NC	50		
6172085	Chloroform	2019/06/12	90	60 - 140	95	60 - 130	<0.050	ug/g	NC	50		
6172085	cis-1,2-Dichloroethylene	2019/06/12	92	60 - 140	98	60 - 130	<0.050	ug/g	NC	50		
6172085	cis-1,3-Dichloropropene	2019/06/12	94	60 - 140	99	60 - 130	<0.030	ug/g	NC	50		
6172085	Dibromochloromethane	2019/06/12	96	60 - 140	107	60 - 130	<0.050	ug/g	NC	50		
6172085	Dichlorodifluoromethane (FREON 12)	2019/06/12	89	60 - 140	89	60 - 140	<0.050	ug/g	NC	50		
6172085	Ethylbenzene	2019/06/12	97	60 - 140	98	60 - 130	<0.020	ug/g	NC	50		
6172085	Ethylene Dibromide	2019/06/12	93	60 - 140	106	60 - 130	<0.050	ug/g	NC	50		
6172085	Hexane	2019/06/12	110	60 - 140	109	60 - 130	<0.050	ug/g	NC	50		
6172085	Methyl Ethyl Ketone (2-Butanone)	2019/06/12	92	60 - 140	121	60 - 140	<0.50	ug/g	NC	50		

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6172085	Methyl Isobutyl Ketone	2019/06/12	91	60 - 140	117	60 - 130	<0.50	ug/g	NC	50		
6172085	Methyl t-butyl ether (MTBE)	2019/06/12	84	60 - 140	91	60 - 130	<0.050	ug/g	NC	50		
6172085	Methylene Chloride(Dichloromethane)	2019/06/12	85	60 - 140	92	60 - 130	<0.050	ug/g	NC	50		
6172085	o-Xylene	2019/06/12	98	60 - 140	100	60 - 130	<0.020	ug/g	NC	50		
6172085	p+m-Xylene	2019/06/12	108	60 - 140	108	60 - 130	<0.020	ug/g	NC	50		
6172085	Styrene	2019/06/12	101	60 - 140	106	60 - 130	<0.050	ug/g	NC	50		
6172085	Tetrachloroethylene	2019/06/12	95	60 - 140	95	60 - 130	<0.050	ug/g	NC	50		
6172085	Toluene	2019/06/12	98	60 - 140	99	60 - 130	<0.020	ug/g	NC	50		
6172085	Total Xylenes	2019/06/12					<0.020	ug/g	NC	50		
6172085	trans-1,2-Dichloroethylene	2019/06/12	99	60 - 140	102	60 - 130	<0.050	ug/g	NC	50		
6172085	trans-1,3-Dichloropropene	2019/06/12	102	60 - 140	108	60 - 130	<0.040	ug/g	NC	50		
6172085	Trichloroethylene	2019/06/12	94	60 - 140	97	60 - 130	<0.050	ug/g	NC	50		
6172085	Trichlorofluoromethane (FREON 11)	2019/06/12	97	60 - 140	97	60 - 130	<0.050	ug/g	NC	50		
6172085	Vinyl Chloride	2019/06/12	101	60 - 140	102	60 - 130	<0.020	ug/g	NC	50		
6172762	Moisture	2019/06/12							4.0	20		
6174385	Sieve - #200 (<0.075mm)	2019/06/14							0.87	20	57	53 - 58
6174385	Sieve - #200 (>0.075mm)	2019/06/14							0.61	20	43	42 - 47

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9F8564
Report Date: 2019/06/14

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Brad Newman, Scientific Service Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Your P.O. #: HAM-ENV
Your Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your C.O.C. #: 721690-01-01

Attention: Stephanie Hsia

exp Services Inc
80 Bancroft St
Hamilton, ON
CANADA L8E 2W5

Report Date: 2019/06/18
Report #: R5759624
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9G1768
Received: 2019/06/13, 16:11

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Petroleum Hydro. CCME F1 & BTEX in Soil (1)	2	N/A	2019/06/18	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Soil (2)	2	2019/06/15	2019/06/17	CAM SOP-00316	CCME CWS m
Moisture	2	N/A	2019/06/14	CAM SOP-00445	Carter 2nd ed 51.2 m
Sieve, 75um	1	N/A	2019/06/17	CAM SOP-00467	Carter 2nd ed m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is the date sampled unless otherwise stated.
(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following “Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003”. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Your P.O. #: HAM-ENV
Your Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your C.O.C. #: 721690-01-01

Attention: Stephanie Hsia

exp Services Inc
80 Bancroft St
Hamilton, ON
CANADA L8E 2W5

Report Date: 2019/06/18
Report #: R5759624
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9G1768
Received: 2019/06/13, 16:11

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Christine Gripton, Senior Project Manager
Email: Christine.Gripton@bvlabs.com
Phone# (519)652-9444
==========
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B9G1768
Report Date: 2019/06/18

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 PETROLEUM HYDROCARBONS (SOIL)

BV Labs ID		JZM239	JZM240		
Sampling Date		2019/06/12 12:00	2019/06/12 12:00		
COC Number		721690-01-01	721690-01-01		
	UNITS	**BH203-SS1**	**BH223-SS1**	**RDL**	**QC Batch**
Inorganics					
Moisture	%	8.8	10	1.0	6177832
BTEX & F1 Hydrocarbons					
Benzene	ug/g	<0.020	<0.020	0.020	6181721
Toluene	ug/g	<0.020	<0.020	0.020	6181721
Ethylbenzene	ug/g	<0.020	<0.020	0.020	6181721
o-Xylene	ug/g	<0.020	<0.020	0.020	6181721
p+m-Xylene	ug/g	<0.040	<0.040	0.040	6181721
Total Xylenes	ug/g	<0.040	<0.040	0.040	6181721
F1 (C6-C10)	ug/g	<10	<10	10	6181721
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	6181721
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	10	6178893
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	50	6178893
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	50	6178893
Reached Baseline at C50	ug/g	Yes	Yes		6178893
Surrogate Recovery (%)					
1,4-Difluorobenzene	%	99	101		6181721
4-Bromofluorobenzene	%	99	100		6181721
D10-Ethylbenzene	%	103	102		6181721
D4-1,2-Dichloroethane	%	101	103		6181721
o-Terphenyl	%	90	88		6178893

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9G1768
Report Date: 2019/06/18

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

RESULTS OF ANALYSES OF SOIL

BV Labs ID		JZM241		
Sampling Date		2019/06/12 12:00		
COC Number		721690-01-01		
	UNITS	**BH203-SS4**	**RDL**	**QC Batch**
Miscellaneous Parameters				
Grain Size	%	COARSE	N/A	6179916
Sieve - #200 (<0.075mm)	%	16	1	6179916
Sieve - #200 (>0.075mm)	%	84	1	6179916

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
N/A = Not Applicable

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9G1768
Report Date: 2019/06/18

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

TEST SUMMARY

BV Labs ID: JZM239
Sample ID: BH203-SS1
Matrix: Soil

Collected: 2019/06/12
Shipped:
Received: 2019/06/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6181721	N/A	2019/06/18	Georgeta Rusu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6178893	2019/06/15	2019/06/17	Dorina Popa
Moisture	BAL	6177832	N/A	2019/06/14	Gurpreet Kaur

BV Labs ID: JZM240
Sample ID: BH223-SS1
Matrix: Soil

Collected: 2019/06/12
Shipped:
Received: 2019/06/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6181721	N/A	2019/06/18	Georgeta Rusu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6178893	2019/06/15	2019/06/17	Dorina Popa
Moisture	BAL	6177832	N/A	2019/06/14	Gurpreet Kaur

BV Labs ID: JZM241
Sample ID: BH203-SS4
Matrix: Soil

Collected: 2019/06/12
Shipped:
Received: 2019/06/13

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Sieve, 75um	SIEV	6179916	N/A	2019/06/17	Gurpreet Kaur

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9G1768
Report Date: 2019/06/18

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	2.0°C

Results relate only to the items tested.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9G1768
Report Date: 2019/06/18

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD		QC Standard	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits	% Recovery	QC Limits
6178893	o-Terphenyl	2019/06/17	96	60 - 130	94	60 - 130	100	%				
6181721	1,4-Difluorobenzene	2019/06/18	101	60 - 140	100	60 - 140	99	%				
6181721	4-Bromofluorobenzene	2019/06/18	100	60 - 140	101	60 - 140	97	%				
6181721	D10-Ethylbenzene	2019/06/18	105	60 - 140	92	60 - 140	92	%				
6181721	D4-1,2-Dichloroethane	2019/06/18	104	60 - 140	103	60 - 140	102	%				
6177832	Moisture	2019/06/14							4.1	20		
6178893	F2 (C10-C16 Hydrocarbons)	2019/06/17	94	50 - 130	86	80 - 120	<10	ug/g	NC	30		
6178893	F3 (C16-C34 Hydrocarbons)	2019/06/17	91	50 - 130	85	80 - 120	<50	ug/g	NC	30		
6178893	F4 (C34-C50 Hydrocarbons)	2019/06/17	91	50 - 130	90	80 - 120	<50	ug/g	NC	30		
6179916	Sieve - #200 (<0.075mm)	2019/06/17							2.3	20	54	53 - 58
6179916	Sieve - #200 (>0.075mm)	2019/06/17							8.0	20	46	42 - 47
6181721	Benzene	2019/06/18	95	60 - 140	94	60 - 140	<0.020	ug/g	NC	50		
6181721	Ethylbenzene	2019/06/18	95	60 - 140	90	60 - 140	<0.020	ug/g	NC	50		
6181721	F1 (C6-C10) - BTEX	2019/06/18					<10	ug/g	NC	30		
6181721	F1 (C6-C10)	2019/06/18	91	60 - 140	98	80 - 120	<10	ug/g	NC	30		
6181721	o-Xylene	2019/06/18	99	60 - 140	92	60 - 140	<0.020	ug/g	NC	50		
6181721	p+m-Xylene	2019/06/18	96	60 - 140	89	60 - 140	<0.040	ug/g	NC	50		
6181721	Toluene	2019/06/18	97	60 - 140	94	60 - 140	<0.020	ug/g	NC	50		
6181721	Total Xylenes	2019/06/18					<0.040	ug/g	NC	50		

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

QC Standard: A sample of known concentration prepared by an external agency under stringent conditions. Used as an independent check of method accuracy.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9G1768
Report Date: 2019/06/18

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anastassia Hamanov, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Your P.O. #: HAM-ENV
Your Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your C.O.C. #: 723423-03-01

Attention: Stephanie Hsia

exp Services Inc
80 Bancroft St
Hamilton, ON
CANADA L8E 2W5

Report Date: 2019/06/27
Report #: R5774400
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9H1571
Received: 2019/06/21, 16:20

Sample Matrix: Water
Samples Received: 8

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
1,3-Dichloropropene Sum	5	N/A	2019/06/26		EPA 8260C m
Petroleum Hydro. CCME F1 & BTEX in Water	3	N/A	2019/06/26	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Water (1)	3	2019/06/25	2019/06/26	CAM SOP-00316	CCME PHC-CWS m
Volatile Organic Compounds in Water	5	N/A	2019/06/25	CAM SOP-00228	EPA 8260C m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following “Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003”. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Your P.O. #: HAM-ENV
Your Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your C.O.C. #: 723423-03-01

Attention: Stephanie Hsia

exp Services Inc
80 Bancroft St
Hamilton, ON
CANADA L8E 2W5

Report Date: 2019/06/27
Report #: R5774400
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9H1571
Received: 2019/06/21, 16:20

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Christine Gripton, Senior Project Manager
Email: Christine.Gripton@bvlabs.com
Phone# (519)652-9444
==========
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B9H1571
Report Date: 2019/06/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: SG

O.REG 153 PHCS, BTEX/F1-F4 (WATER)

BV Labs ID		KBS243	KBS244	KBS245		
Sampling Date		2019/06/20 15:05	2019/06/20 13:50	2019/06/20 13:50		
COC Number		723423-03-01	723423-03-01	723423-03-01		
	UNITS	**BH/MW1**	**BH/MW2**	**BH/MW22**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons						
Benzene	ug/L	<0.20	<0.20	<0.20	0.20	6196908
Toluene	ug/L	<0.20	<0.20	<0.20	0.20	6196908
Ethylbenzene	ug/L	<0.20	<0.20	<0.20	0.20	6196908
o-Xylene	ug/L	<0.20	<0.20	<0.20	0.20	6196908
p+m-Xylene	ug/L	<0.40	<0.40	<0.40	0.40	6196908
Total Xylenes	ug/L	<0.40	<0.40	<0.40	0.40	6196908
F1 (C6-C10)	ug/L	<25	<25	<25	25	6196908
F1 (C6-C10) - BTEX	ug/L	<25	<25	<25	25	6196908
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	<100	100	6195797
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	210	200	6195797
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	<200	200	6195797
Reached Baseline at C50	ug/L	Yes	Yes	Yes		6195797
Surrogate Recovery (%)						
1,4-Difluorobenzene	%	102	101	103		6196908
4-Bromofluorobenzene	%	99	96	98		6196908
D10-Ethylbenzene	%	110	111	113		6196908
D4-1,2-Dichloroethane	%	100	101	102		6196908
o-Terphenyl	%	105	103	103		6195797

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9H1571
Report Date: 2019/06/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: SG

O.REG 153 VOCS BY HS (WATER)

BV Labs ID		KBS239	KBS240	KBS241	KBS242	KBS246		
Sampling Date		2019/06/20 13:00	2019/06/20 13:00	2019/06/20 14:30	2019/06/20 15:40	2019/06/20		
COC Number		723423-03-01	723423-03-01	723423-03-01	723423-03-01	723423-03-01		
	UNITS	**MW102A**	**MW1022A**	**MW201**	**MW202**	**TRIP BLANK LOT # 3634**	**RDL**	**QC Batch**
Calculated Parameters								
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6191309
Volatile Organics								
Acetone (2-Propanone)	ug/L	<10	<10	<10	<10	<10	10	6192557
Benzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6192557
Bromodichloromethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557
Bromoform	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6192557
Bromomethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557
Carbon Tetrachloride	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6192557
Chlorobenzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6192557
Chloroform	ug/L	0.30	0.30	<0.20	<0.20	<0.20	0.20	6192557
Dibromochloromethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557
1,2-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557
1,3-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557
1,4-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6192557
1,1-Dichloroethane	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6192557
1,2-Dichloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557
1,1-Dichloroethylene	ug/L	0.21	0.21	<0.20	<0.20	<0.20	0.20	6192557
cis-1,2-Dichloroethylene	ug/L	13	13	<0.50	<0.50	<0.50	0.50	6192557
trans-1,2-Dichloroethylene	ug/L	0.76	0.74	<0.50	<0.50	<0.50	0.50	6192557
1,2-Dichloropropane	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6192557
cis-1,3-Dichloropropene	ug/L	<0.30	<0.30	<0.30	<0.30	<0.30	0.30	6192557
trans-1,3-Dichloropropene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	6192557
Ethylbenzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6192557
Ethylene Dibromide	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6192557
Hexane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6192557
Methylene Chloride(Dichloromethane)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	6192557
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	<10	<10	<10	<10	10	6192557
Methyl Isobutyl Ketone	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	6192557
Methyl t-butyl ether (MTBE)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557
Styrene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557
1,1,1,2-Tetrachloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9H1571
Report Date: 2019/06/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: SG

O.REG 153 VOCS BY HS (WATER)

BV Labs ID		KBS239	KBS240	KBS241	KBS242	KBS246		
Sampling Date		2019/06/20 13:00	2019/06/20 13:00	2019/06/20 14:30	2019/06/20 15:40	2019/06/20		
COC Number		723423-03-01	723423-03-01	723423-03-01	723423-03-01	723423-03-01		
	UNITS	**MW102A**	**MW1022A**	**MW201**	**MW202**	**TRIP BLANK LOT # 3634**	**RDL**	**QC Batch**
1,1,2,2-Tetrachloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557
Tetrachloroethylene	ug/L	120	120	0.50	<0.20	<0.20	0.20	6192557
Toluene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6192557
1,1,1-Trichloroethane	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6192557
1,1,2-Trichloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557
Trichloroethylene	ug/L	92	92	<0.20	<0.20	<0.20	0.20	6192557
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6192557
Vinyl Chloride	ug/L	0.64	0.62	0.87	<0.20	<0.20	0.20	6192557
p+m-Xylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6192557
o-Xylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6192557
Total Xylenes	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6192557
Surrogate Recovery (%)								
4-Bromofluorobenzene	%	89	89	90	88	88		6192557
D4-1,2-Dichloroethane	%	112	111	110	113	113		6192557
D8-Toluene	%	93	94	95	95	95		6192557

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

TEST SUMMARY

BV Labs ID: KBS239 **Collected:** 2019/06/20
Sample ID: MW102A **Shipped:**
Matrix: Water **Received:** 2019/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6191309	N/A	2019/06/26	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6192557	N/A	2019/06/25	Rebecca McClean

BV Labs ID: KBS240 **Collected:** 2019/06/20
Sample ID: MW1022A **Shipped:**
Matrix: Water **Received:** 2019/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6191309	N/A	2019/06/26	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6192557	N/A	2019/06/25	Rebecca McClean

BV Labs ID: KBS241 **Collected:** 2019/06/20
Sample ID: MW201 **Shipped:**
Matrix: Water **Received:** 2019/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6191309	N/A	2019/06/26	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6192557	N/A	2019/06/25	Rebecca McClean

BV Labs ID: KBS242 **Collected:** 2019/06/20
Sample ID: MW202 **Shipped:**
Matrix: Water **Received:** 2019/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6191309	N/A	2019/06/26	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6192557	N/A	2019/06/25	Rebecca McClean

BV Labs ID: KBS243 **Collected:** 2019/06/20
Sample ID: BH/MW1 **Shipped:**
Matrix: Water **Received:** 2019/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	6196908	N/A	2019/06/26	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6195797	2019/06/25	2019/06/26	Prabhjot Gulati

BV Labs ID: KBS244 **Collected:** 2019/06/20
Sample ID: BH/MW2 **Shipped:**
Matrix: Water **Received:** 2019/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	6196908	N/A	2019/06/26	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6195797	2019/06/25	2019/06/26	Prabhjot Gulati

BV Labs Job #: B9H1571
Report Date: 2019/06/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: SG

TEST SUMMARY

BV Labs ID: KBS245
Sample ID: BH/MW22
Matrix: Water

Collected: 2019/06/20
Shipped:
Received: 2019/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	6196908	N/A	2019/06/26	Lincoln Ramdahin
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6195797	2019/06/25	2019/06/26	Prabhjot Gulati

BV Labs ID: KBS246
Sample ID: TRIP BLANK LOT # 3634
Matrix: Water

Collected: 2019/06/20
Shipped:
Received: 2019/06/21

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6191309	N/A	2019/06/26	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6192557	N/A	2019/06/25	Rebecca McClean

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9H1571
Report Date: 2019/06/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: SG

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	4.7°C

Results relate only to the items tested.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9H1571
Report Date: 2019/06/27

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: SG

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6192557	4-Bromofluorobenzene	2019/06/24	99	70 - 130	100	70 - 130	95	%		
6192557	D4-1,2-Dichloroethane	2019/06/24	106	70 - 130	101	70 - 130	105	%		
6192557	D8-Toluene	2019/06/24	104	70 - 130	105	70 - 130	94	%		
6195797	o-Terphenyl	2019/06/25	104	60 - 130	113	60 - 130	99	%		
6196908	1,4-Difluorobenzene	2019/06/26	102	70 - 130	100	70 - 130	100	%		
6196908	4-Bromofluorobenzene	2019/06/26	99	70 - 130	101	70 - 130	96	%		
6196908	D10-Ethylbenzene	2019/06/26	114	70 - 130	104	70 - 130	107	%		
6196908	D4-1,2-Dichloroethane	2019/06/26	101	70 - 130	100	70 - 130	101	%		
6192557	1,1,1,2-Tetrachloroethane	2019/06/24	101	70 - 130	99	70 - 130	<0.50	ug/L	NC	30
6192557	1,1,1-Trichloroethane	2019/06/24	93	70 - 130	92	70 - 130	<0.20	ug/L	NC	30
6192557	1,1,2,2-Tetrachloroethane	2019/06/24	113	70 - 130	105	70 - 130	<0.50	ug/L	NC	30
6192557	1,1,2-Trichloroethane	2019/06/24	113	70 - 130	106	70 - 130	<0.50	ug/L	NC	30
6192557	1,1-Dichloroethane	2019/06/24	101	70 - 130	98	70 - 130	<0.20	ug/L	NC	30
6192557	1,1-Dichloroethylene	2019/06/24	105	70 - 130	103	70 - 130	<0.20	ug/L	NC	30
6192557	1,2-Dichlorobenzene	2019/06/24	90	70 - 130	88	70 - 130	<0.50	ug/L	NC	30
6192557	1,2-Dichloroethane	2019/06/24	108	70 - 130	101	70 - 130	<0.50	ug/L	NC	30
6192557	1,2-Dichloropropane	2019/06/24	99	70 - 130	95	70 - 130	<0.20	ug/L	NC	30
6192557	1,3-Dichlorobenzene	2019/06/24	88	70 - 130	87	70 - 130	<0.50	ug/L	NC	30
6192557	1,4-Dichlorobenzene	2019/06/24	94	70 - 130	93	70 - 130	<0.50	ug/L	NC	30
6192557	Acetone (2-Propanone)	2019/06/24	129	60 - 140	103	60 - 140	<10	ug/L	20	30
6192557	Benzene	2019/06/24	100	70 - 130	98	70 - 130	<0.20	ug/L	NC	30
6192557	Bromodichloromethane	2019/06/24	98	70 - 130	95	70 - 130	<0.50	ug/L	NC	30
6192557	Bromoform	2019/06/24	106	70 - 130	99	70 - 130	<1.0	ug/L	NC	30
6192557	Bromomethane	2019/06/24	103	60 - 140	95	60 - 140	<0.50	ug/L	NC	30
6192557	Carbon Tetrachloride	2019/06/24	90	70 - 130	90	70 - 130	<0.20	ug/L	NC	30
6192557	Chlorobenzene	2019/06/24	96	70 - 130	94	70 - 130	<0.20	ug/L	NC	30
6192557	Chloroform	2019/06/24	92	70 - 130	90	70 - 130	<0.20	ug/L	NC	30
6192557	cis-1,2-Dichloroethylene	2019/06/24	98	70 - 130	95	70 - 130	<0.50	ug/L	0.48	30
6192557	cis-1,3-Dichloropropene	2019/06/24	103	70 - 130	94	70 - 130	<0.30	ug/L	NC	30
6192557	Dibromochloromethane	2019/06/24	106	70 - 130	100	70 - 130	<0.50	ug/L	NC	30
6192557	Dichlorodifluoromethane (FREON 12)	2019/06/24	89	60 - 140	87	60 - 140	<1.0	ug/L	NC	30

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6192557	Ethylbenzene	2019/06/24	94	70 - 130	94	70 - 130	<0.20	ug/L	NC	30
6192557	Ethylene Dibromide	2019/06/24	108	70 - 130	100	70 - 130	<0.20	ug/L	NC	30
6192557	Hexane	2019/06/24	110	70 - 130	108	70 - 130	<1.0	ug/L	NC	30
6192557	Methyl Ethyl Ketone (2-Butanone)	2019/06/24	136	60 - 140	114	60 - 140	<10	ug/L	NC	30
6192557	Methyl Isobutyl Ketone	2019/06/24	128	70 - 130	115	70 - 130	<5.0	ug/L	NC	30
6192557	Methyl t-butyl ether (MTBE)	2019/06/24	91	70 - 130	89	70 - 130	<0.50	ug/L	NC	30
6192557	Methylene Chloride(Dichloromethane)	2019/06/24	93	70 - 130	88	70 - 130	<2.0	ug/L	NC	30
6192557	o-Xylene	2019/06/24	93	70 - 130	97	70 - 130	<0.20	ug/L	NC	30
6192557	p+m-Xylene	2019/06/24	103	70 - 130	104	70 - 130	<0.20	ug/L	NC	30
6192557	Styrene	2019/06/24	99	70 - 130	101	70 - 130	<0.50	ug/L	NC	30
6192557	Tetrachloroethylene	2019/06/24	87	70 - 130	87	70 - 130	<0.20	ug/L	NC	30
6192557	Toluene	2019/06/24	96	70 - 130	95	70 - 130	<0.20	ug/L	NC	30
6192557	Total Xylenes	2019/06/24					<0.20	ug/L	NC	30
6192557	trans-1,2-Dichloroethylene	2019/06/24	99	70 - 130	97	70 - 130	<0.50	ug/L	NC	30
6192557	trans-1,3-Dichloropropene	2019/06/24	117	70 - 130	100	70 - 130	<0.40	ug/L	NC	30
6192557	Trichloroethylene	2019/06/24	92	70 - 130	91	70 - 130	<0.20	ug/L	1.5	30
6192557	Trichlorofluoromethane (FREON 11)	2019/06/24	91	70 - 130	90	70 - 130	<0.50	ug/L	NC	30
6192557	Vinyl Chloride	2019/06/24	103	70 - 130	100	70 - 130	<0.20	ug/L	NC	30
6195797	F2 (C10-C16 Hydrocarbons)	2019/06/26	96	50 - 130	113	60 - 130	<100	ug/L	NC	30
6195797	F3 (C16-C34 Hydrocarbons)	2019/06/26	92	50 - 130	119	60 - 130	<200	ug/L	NC	30
6195797	F4 (C34-C50 Hydrocarbons)	2019/06/26	93	50 - 130	117	60 - 130	<200	ug/L	NC	30
6196908	Benzene	2019/06/26	115	70 - 130	108	70 - 130	<0.20	ug/L	NC	30
6196908	Ethylbenzene	2019/06/26	111	70 - 130	103	70 - 130	<0.20	ug/L	NC	30
6196908	F1 (C6-C10) - BTEX	2019/06/26					<25	ug/L	NC	30
6196908	F1 (C6-C10)	2019/06/26	95	70 - 130	99	70 - 130	<25	ug/L	NC	30
6196908	o-Xylene	2019/06/26	111	70 - 130	106	70 - 130	<0.20	ug/L	NC	30
6196908	p+m-Xylene	2019/06/26	112	70 - 130	105	70 - 130	<0.40	ug/L	NC	30
6196908	Toluene	2019/06/26	115	70 - 130	108	70 - 130	<0.20	ug/L	NC	30

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6196908	Total Xylenes	2019/06/26					<0.40	ug/L	NC	30

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

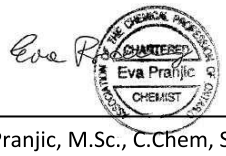
Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9H1571
Report Date: 2019/06/27

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: SG

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Your P.O. #: HAM-ENV
Your Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your C.O.C. #: 723423-05-01

Attention: Stephanie Hsia

exp Services Inc
80 Bancroft St
Hamilton, ON
CANADA L8E 2W5

Report Date: 2019/07/04
Report #: R5782710
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9H8969
Received: 2019/06/28, 16:15

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
1,3-Dichloropropene Sum	1	N/A	2019/07/04		EPA 8260C m
Volatile Organic Compounds in Water	1	N/A	2019/07/03	CAM SOP-00228	EPA 8260C m

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported; unless indicated otherwise, associated sample data are not blank corrected. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by BV Labs, unless otherwise agreed in writing. BV Labs is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

Your P.O. #: HAM-ENV
Your Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your C.O.C. #: 723423-05-01

Attention: Stephanie Hsia

exp Services Inc
80 Bancroft St
Hamilton, ON
CANADA L8E 2W5

Report Date: 2019/07/04
Report #: R5782710
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9H8969
Received: 2019/06/28, 16:15

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Christine Gripton, Senior Project Manager
Email: Christine.Gripton@bvlabs.com
Phone# (519)652-9444
==========
This report has been generated and distributed using a secure automated process.
BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: B9H8969
Report Date: 2019/07/04

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 VOCS BY HS (WATER)

BV Labs ID		KDK391		
Sampling Date		2019/06/28 08:30		
COC Number		723423-05-01		
	UNITS	**MW201**	**RDL**	**QC Batch**
Calculated Parameters				
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	0.50	6204204
Volatile Organics				
Acetone (2-Propanone)	ug/L	<10	10	6204907
Benzene	ug/L	<0.20	0.20	6204907
Bromodichloromethane	ug/L	<0.50	0.50	6204907
Bromoform	ug/L	<1.0	1.0	6204907
Bromomethane	ug/L	<0.50	0.50	6204907
Carbon Tetrachloride	ug/L	<0.20	0.20	6204907
Chlorobenzene	ug/L	<0.20	0.20	6204907
Chloroform	ug/L	<0.20	0.20	6204907
Dibromochloromethane	ug/L	<0.50	0.50	6204907
1,2-Dichlorobenzene	ug/L	<0.50	0.50	6204907
1,3-Dichlorobenzene	ug/L	<0.50	0.50	6204907
1,4-Dichlorobenzene	ug/L	<0.50	0.50	6204907
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	1.0	6204907
1,1-Dichloroethane	ug/L	<0.20	0.20	6204907
1,2-Dichloroethane	ug/L	<0.50	0.50	6204907
1,1-Dichloroethylene	ug/L	<0.20	0.20	6204907
cis-1,2-Dichloroethylene	ug/L	<0.50	0.50	6204907
trans-1,2-Dichloroethylene	ug/L	<0.50	0.50	6204907
1,2-Dichloropropane	ug/L	<0.20	0.20	6204907
cis-1,3-Dichloropropene	ug/L	<0.30	0.30	6204907
trans-1,3-Dichloropropene	ug/L	<0.40	0.40	6204907
Ethylbenzene	ug/L	<0.20	0.20	6204907
Ethylene Dibromide	ug/L	<0.20	0.20	6204907
Hexane	ug/L	<1.0	1.0	6204907
Methylene Chloride(Dichloromethane)	ug/L	<2.0	2.0	6204907
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	10	6204907
Methyl Isobutyl Ketone	ug/L	<5.0	5.0	6204907
Methyl t-butyl ether (MTBE)	ug/L	<0.50	0.50	6204907
Styrene	ug/L	<0.50	0.50	6204907
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50	6204907
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50	6204907

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9H8969
Report Date: 2019/07/04

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

O.REG 153 VOCS BY HS (WATER)

BV Labs ID		KDK391		
Sampling Date		2019/06/28 08:30		
COC Number		723423-05-01		
	UNITS	**MW201**	**RDL**	**QC Batch**
Tetrachloroethylene	ug/L	<0.20	0.20	6204907
Toluene	ug/L	<0.20	0.20	6204907
1,1,1-Trichloroethane	ug/L	<0.20	0.20	6204907
1,1,2-Trichloroethane	ug/L	<0.50	0.50	6204907
Trichloroethylene	ug/L	<0.20	0.20	6204907
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	0.50	6204907
Vinyl Chloride	ug/L	1.1	0.20	6204907
p+m-Xylene	ug/L	<0.20	0.20	6204907
o-Xylene	ug/L	<0.20	0.20	6204907
Total Xylenes	ug/L	<0.20	0.20	6204907
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	96		6204907
D4-1,2-Dichloroethane	%	108		6204907
D8-Toluene	%	92		6204907

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9H8969
Report Date: 2019/07/04

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

TEST SUMMARY

BV Labs ID: KDK391
Sample ID: MW201
Matrix: Water

Collected: 2019/06/28
Shipped:
Received: 2019/06/28

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6204204	N/A	2019/07/04	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6204907	N/A	2019/07/03	Chandni Khawas

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9H8969
Report Date: 2019/07/04

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	3.7°C

Results relate only to the items tested.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9H8969
Report Date: 2019/07/04

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6204907	4-Bromofluorobenzene	2019/07/03	99	70 - 130	100	70 - 130	98	%		
6204907	D4-1,2-Dichloroethane	2019/07/03	106	70 - 130	104	70 - 130	107	%		
6204907	D8-Toluene	2019/07/03	102	70 - 130	103	70 - 130	95	%		
6204907	1,1,1,2-Tetrachloroethane	2019/07/03	106	70 - 130	103	70 - 130	<0.50	ug/L	NC	30
6204907	1,1,1-Trichloroethane	2019/07/03	102	70 - 130	99	70 - 130	<0.20	ug/L	NC	30
6204907	1,1,2,2-Tetrachloroethane	2019/07/03	109	70 - 130	103	70 - 130	<0.50	ug/L	NC	30
6204907	1,1,2-Trichloroethane	2019/07/03	104	70 - 130	99	70 - 130	<0.50	ug/L	NC	30
6204907	1,1-Dichloroethane	2019/07/03	100	70 - 130	96	70 - 130	<0.20	ug/L	NC	30
6204907	1,1-Dichloroethylene	2019/07/03	102	70 - 130	99	70 - 130	<0.20	ug/L	NC	30
6204907	1,2-Dichlorobenzene	2019/07/03	94	70 - 130	91	70 - 130	<0.50	ug/L	NC	30
6204907	1,2-Dichloroethane	2019/07/03	104	70 - 130	97	70 - 130	<0.50	ug/L	NC	30
6204907	1,2-Dichloropropane	2019/07/03	93	70 - 130	89	70 - 130	<0.20	ug/L	NC	30
6204907	1,3-Dichlorobenzene	2019/07/03	91	70 - 130	89	70 - 130	<0.50	ug/L	NC	30
6204907	1,4-Dichlorobenzene	2019/07/03	96	70 - 130	94	70 - 130	<0.50	ug/L	NC	30
6204907	Acetone (2-Propanone)	2019/07/03	103	60 - 140	91	60 - 140	<10	ug/L	NC	30
6204907	Benzene	2019/07/03	98	70 - 130	93	70 - 130	<0.20	ug/L	0	30
6204907	Bromodichloromethane	2019/07/03	102	70 - 130	97	70 - 130	<0.50	ug/L	NC	30
6204907	Bromoform	2019/07/03	112	70 - 130	106	70 - 130	<1.0	ug/L	NC	30
6204907	Bromomethane	2019/07/03	115	60 - 140	108	60 - 140	<0.50	ug/L	NC	30
6204907	Carbon Tetrachloride	2019/07/03	101	70 - 130	98	70 - 130	<0.20	ug/L	NC	30
6204907	Chlorobenzene	2019/07/03	92	70 - 130	89	70 - 130	<0.20	ug/L	NC	30
6204907	Chloroform	2019/07/03	98	70 - 130	94	70 - 130	<0.20	ug/L	NC	30
6204907	cis-1,2-Dichloroethylene	2019/07/03	94	70 - 130	90	70 - 130	<0.50	ug/L	NC	30
6204907	cis-1,3-Dichloropropene	2019/07/03	99	70 - 130	90	70 - 130	<0.30	ug/L	NC	30
6204907	Dibromochloromethane	2019/07/03	109	70 - 130	104	70 - 130	<0.50	ug/L	NC	30
6204907	Dichlorodifluoromethane (FREON 12)	2019/07/03	99	60 - 140	97	60 - 140	<1.0	ug/L	NC	30
6204907	Ethylbenzene	2019/07/03	86	70 - 130	84	70 - 130	<0.20	ug/L	0	30
6204907	Ethylene Dibromide	2019/07/03	104	70 - 130	98	70 - 130	<0.20	ug/L	NC	30
6204907	Hexane	2019/07/03	102	70 - 130	99	70 - 130	<1.0	ug/L	NC	30
6204907	Methyl Ethyl Ketone (2-Butanone)	2019/07/03	103	60 - 140	92	60 - 140	<10	ug/L	NC	30
6204907	Methyl Isobutyl Ketone	2019/07/03	103	70 - 130	96	70 - 130	<5.0	ug/L	NC	30

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6204907	Methyl t-butyl ether (MTBE)	2019/07/03	86	70 - 130	82	70 - 130	<0.50	ug/L	NC	30
6204907	Methylene Chloride(Dichloromethane)	2019/07/03	108	70 - 130	102	70 - 130	<2.0	ug/L	NC	30
6204907	o-Xylene	2019/07/03	86	70 - 130	87	70 - 130	<0.20	ug/L	1.1	30
6204907	p+m-Xylene	2019/07/03	91	70 - 130	89	70 - 130	<0.20	ug/L	1.7	30
6204907	Styrene	2019/07/03	91	70 - 130	92	70 - 130	<0.50	ug/L	NC	30
6204907	Tetrachloroethylene	2019/07/03	96	70 - 130	94	70 - 130	<0.20	ug/L	NC	30
6204907	Toluene	2019/07/03	96	70 - 130	93	70 - 130	<0.20	ug/L	17	30
6204907	Total Xylenes	2019/07/03					<0.20	ug/L	0.48	30
6204907	trans-1,2-Dichloroethylene	2019/07/03	102	70 - 130	99	70 - 130	<0.50	ug/L	NC	30
6204907	trans-1,3-Dichloropropene	2019/07/03	106	70 - 130	95	70 - 130	<0.40	ug/L	NC	30
6204907	Trichloroethylene	2019/07/03	101	70 - 130	98	70 - 130	<0.20	ug/L	NC	30
6204907	Trichlorofluoromethane (FREON 11)	2019/07/03	104	70 - 130	102	70 - 130	<0.50	ug/L	NC	30
6204907	Vinyl Chloride	2019/07/03	104	70 - 130	101	70 - 130	<0.20	ug/L	NC	30

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

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

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

BV Labs Job #: B9H8969
Report Date: 2019/07/04

exp Services Inc
Client Project #: HAM-00801683-A0
Site Location: GUELPH LINE, BURLINGTON
Your P.O. #: HAM-ENV
Sampler Initials: PM

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).



Anastassia Hamanov, Scientific Specialist

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 6740 Campobello Road, Mississauga, Ontario, L5N 2L8 Tel: (905) 817-5700 Toll-Free: 800-563-6266 Fax: (905) 817-5777 www.bvlabs.com

Appendix F – P2CSM

Phase Two Conceptual Site Model – 418 & 422 Guelph line, Burlington, Ontario

This section presents a Phase Two Conceptual Site Model (P2CSM) providing a narrative, graphical and tabulated description integrating information related to the Site geologic and hydrogeologic conditions, areas of potential environmental concern/potential contaminating activities, the presence and distribution of potential contaminants of concern, contaminant fate and transport, and potential exposure pathways. These components are discussed in the following sections. The Phase Two CSM was completed in accordance with O. Reg.153/04 as defined by the Ministry of the Environment, Conservation, and Parks (MECP).

1. Introduction

The Site is located on the southwest side of Guelph Line, approximately 35 m southeast of New Street in Burlington, Ontario. The Site is approximately 0.38 hectares (0.94 acres) in size, and is occupied by a one-storey commercial building with a basement and a two-storey residential structure with a basement ("Site buildings"). The Site building at 422 Guelph Line has a footprint of approximately 930 m^2 (10,000 ft^2) and was constructed circa 1958. The basement of this structure covers the entire footprint of the building. The Site building at 418 Guelph Line was reportedly constructed in 1949. At the time of this Phase One ESA, the Site buildings were vacant. The Phase One Study Area consists of properties within a distance of approximately 250 metres from the Site boundaries. The Phase One Study Area and a Surrounding Land Use Plan are shown on Figure 2.

Based on a review of historical aerial photographs, chain of title information, historical maps, and other records, the Site was developed circa 1949.

Refer to Table 1 for the Site identification information.

Table 1: Site Identification Information

Municipal Address	418 Guelph Line, Burlington Ontario
Current Land Use	Commercial
Proposed Land Use	Residential
Legal Description	Part Lot 15 Con 4 NEL SDS as in 388093
Property Identification Number (PIN)	07197-0095 (LT)
Approximate Universal Transverse Mercator (UTM) coordinates	NAD83 17T 598498 m E 4799003 m N
Accuracy Estimate of UTM	10-15 m
Measurement Method	Georeferenced aerial photograph
Site Area	0.19 ha (0.48 acres)
Property Owners, Owner Contact and Address	418 Waldemar Inc. 3410 S Service Road Burlington, ON L7N 3T2

Municipal Address	422 Guelph Line, Burlington Ontario
Current Land Use	Commercial
Proposed Land Use	Residential
Legal Description	Part Lot 16 Con 4 NEL SDS as in 442287
Property Identification Number (PIN)	07197-0094 (LT)
Approximate Universal Transverse Mercator (UTM) coordinates	NAD83 17T 598478 m E 4799019 m N
Accuracy Estimate of UTM	10-15 m
Measurement Method	Georeferenced aerial photograph
Site Area	0.19 ha (0.48 acres)
Property Owners, Owner Contact and Address	422 Waldemar Inc. 3410 S Service Road Burlington, ON L7N 3T2

2. Potentially Contaminating Activities and Areas of Potential Environmental Concern

2.1 Potentially Contaminating Activities

A Phase One ESA, in accordance with O.Reg.153/04, has been conducted by EXP in July 2019 for the Phase One Property. Several potentially contaminating activities (PCAs) were identified on-Site and within 250 m from the Phase One Property site boundaries. All PCAs that were identified within 250 m property are shown on Figure 2. Each PCA was further evaluated to determine if the activity may be contributing to an area of potential environmental concern (APEC) at the Phase One Property.

The QP determined that select PCAs may contribute to an APEC for the property, while several PCAs were determined to not contribute to an APEC at the Phase One Property/Site due to various factors including, but not limited to, relative distance to the Phase One Property/Site, orientation to the Phase One Property/Site; degree and nature of PCA operations, potentially impacted media, etc. Refer to Table 2 for the evaluation of the PCAs in the Phase One Study Area.

Table 2: Potentially Contaminating Activities in the Phase One Study Area

PCA Identifier	Address	Location of Activity (in relation to Site)(1)	Potentially Contaminating Activity (PCA)(2)	Approximate timeline that PCA occurred	Contributes to APEC (Yes or No)?
Site					
1	Site	North of the Site building addressed as 418 Guelph Line	PCA#28-Gasoline and Associated Products Storage in Fixed Tanks	During the Phase One ESA Site visit, a potential vent pipe associated with a potential former AST was observed on the north side of the building at 418 Guelph Line.	Yes, based on the PCA occurring on-Site.

PCA Identifier	Address	Location of Activity (in relation to Site)(1)	Potentially Contaminating Activity (PCA)(2)	Approximate timeline that PCA occurred	Contributes to APEC (Yes or No)?
2		Greenhouses on east portion of Site	PCA#40 – Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	Based on a review of the previous report, greenhouses formerly occupied the east portion of the Site. According the City Directories, the Site building addressed as 418 Guelph Line was occupied by a florist from 1961 to 1971. There is a potential for the operations associated with the greenhouses to utilize pesticides.	Yes, based on the PCA occurring on-Site.
3		Asphalt parking on northwest portion of Site.	PCA "Other" – Use of salt for de-icing purposes (asphalt paved areas)	De-icing salt is used on paved parking and roadway areas on the site during the winter months. As such, the shallow soil at the Site may be impacted with salt related contaminants, including electrical conductivity and sodium adsorption ratio.	Yes, based on the PCA occurring on-Site.
Surrounding Properties					
4	Historical UST northeast of the Site (422 Guelph Line).	Northeast adjacent	PCA#28-Gasoline and Associated Products Storage in Fixed Tanks	Based on observations made at the time of the Site visit, and previous reports, one (1) UST was situated northeast adjacent to the Site and used to store heating oil for the Site building. Vent and fill pipes were observed in the basement of the Site building.	Yes, based on the close proximity of the Site
5	2432 New Street (formerly 2440A New Street)	West adjacent	PCA52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems	Based on the reviewed FIPs the property was occupied by an Auto Repair Centre in 1971 and is shown on a Site plan from 1987. Various auto repair centres were listed on the property in the City Directories from 1967 to 2011.	Yes, based on the close proximity to the Site.
6A	2434 - 2450 New Street	North adjacent	PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain	A review of the City Directories indicated the property addressed as 2434 New Street was occupied by Special Effects Motorcycle Co. in 2011. At the time of the Site visit, suspected fill and vent pipes were observed on the north and south exterior portion of the building addressed as 2434 -2450 New Street.	Yes, due to the proximity to the Site.

PCA Identifier	Address	Location of Activity (in relation to Site)(1)	Potentially Contaminating Activity (PCA)(2)	Approximate timeline that PCA occurred	Contributes to APEC (Yes or No)?
			transportation systems		
6B	2434 - 2450 New Street	North adjacent	PCA#28: Gasoline and Associated Products Storage in Fixed Tanks.	At the time of the Site visit, suspected fill and vent pipes were observed on the north and south exterior portion of the building addressed as 2434 -2450 New Street.	Yes, due to the proximity to the Site.
7	415 Guelph Line	25 m east	PCA#37 – Operation of dry-cleaning equipment where chemicals are used.	A review of the City Directories indicated the property was occupied by City Laundry & Dry Cleaners from 1961 to 1967	Yes, due to the proximity to the Site.
8	417 Guelph Line	25 m east	PCA#39 - Paints Manufacturing, Processing and Bulk Storage	According to the City Directories, the property was occupied by Tone Craft Paints and McFarland John Paint & Wallpaper company from 1967 – 1976.	Yes, due to the proximity to the Site.
9	433 Guelph Line	30 m northeast	PCA#28- Gasoline and Associated Products Storage in Fixed Tanks	Based on the reviewed 1971 FIP one (1) UST was located on the property. A service station was listed in the City Directories from 1957 to 1967.	Yes, based on the proximity to the Site.
10	458 Guelph Line (formerly 2439 New Street and 448 New Street)	60 m north/ northwest	PCA#28- Gasoline and Associated Products Storage in Fixed Tanks	Based on the 1971 FIP, the property was occupied by a gasoline service station with and associated UST. This property was noted to be occupied by a service station in the reviewed City Directories from 1961 to 2011. The ERIS report indicated three (USTs) were noted to be active on the property and gasoline was noted in a borehole due to a gasoline leak in 2001. The gas station was present at the time of the Site visit.	Yes, based on the up-gradient location of this property with respect to the anticipated groundwater flow direction.
11A	3001 New Street (formerly 457 Guelph Line)	75 m north / northeast	PCA#28- Gasoline and Associated Products Storage in Fixed Tanks	Based on the 1971 FIP, the property was occupied by an auto clinic with an associated UST. . This property was noted to be occupied by a service station in the reviewed City Directories from 1957 to 1991.	Yes, based on the up-gradient location of this property with respect to the anticipated groundwater flow direction.

PCA Identifier	Address	Location of Activity (in relation to Site)(1)	Potentially Contaminating Activity (PCA)(2)	Approximate timeline that PCA occurred	Contributes to APEC (Yes or No)?
11B	3001 New Street (formerly 457 Guelph Line)	75 m north/ northeast	PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems	Based on the 1971 FIP, the property was occupied by an auto clinic with an associated UST.	Yes, based on the up-gradient location of this property with respect to the anticipated groundwater flow direction
12	480 Guelph Line	180 m northwest	PCA#37 - Operation of Dry-Cleaning Equipment (where chemicals are used)	According to the ERIS report, James H Parker Ltd. / Parkers Cleaner's occupied the property and was listed as a generator of halogenated solvents from 1986 to 2017. The operation listed as 'Parkers of Burlington Fine Drycleaners and Launderers' is noted to be a dry-cleaning facility with waste reporting data between 2004 and 2016.	Yes, due to up-gradient from the Site.
13	2442 New Street	North adjacent	PCA Other – Commercial printing operation	According to the ERIS report and City Directories, the property was occupied by Print Three – a commercial printing operation, from 1991 to 1996.	Yes, due to the proximity to the Site and the historic timeframe of the operation.
14	409 Guelph Line	30 m east	PCA Other – Commercial printing operation	According to the ERIS report and City Directories, the property was occupied by Print Three – a commercial printing operation, from 2001 to 2011.	No due to the recent timeframe of the operation and the trans-gradient location with respect to the anticipated groundwater flow direction
15	2411 New Street	110 m west	PCA#37 - Operation of Dry-Cleaning Equipment (where chemicals are used).	According to the City Directories, the property was occupied by Lulu's Cleaning Service from 1986.	No, due to the separation distance from the Site and trans-gradient to the Site

PCA Identifier	Address	Location of Activity (in relation to Site)(1)	Potentially Contaminating Activity (PCA)(2)	Approximate timeline that PCA occurred	Contributes to APEC (Yes or No)?
16	466 Guelph Line	125 m north	PCA Other – Hazardous waste generator	According to the ERIS report, the property was occupied by DRSSL Limited and a registered waste generator of halogenated solvents and residues from 2016 to 2018.	No, due to the separation distance from the Site
17	3040 New Street	125 m northeast	PCA#37 - Operation of Dry-Cleaning Equipment (where chemicals are used)	According to the ERIS report, Parkers Cleaners (Burlington) Ltd. was listed as a registered generator of aliphatic solvents and residues in 2018. Parkers of Burlington Dry-Cleaning & Landers occupied the property at the time of the Site visit.	No, due to the separation distance from the Site
18	451 Guelph Line	165 m north	PCA#37 – Operation of dry-cleaning equipment where chemicals are used.	Based on the reviewed 1971 FIP, the property was occupied by a dry-cleaner. The ERIS report indicated the property was occupied by Star Cleaners and a registered waste generator of halogenated solvents from 1986 to 2005. ERIS also indicated Fracarsan Corp. was a tenant and listed as a waste generator of halogenated solvents in 2013. A review of the City Directories identified the property was occupied by various dry-cleaning operations from 1961 to 2006.	No, based on the separation distance from the Site.
19	3009 New Street	180 m north	PCA Other – Hazardous waste generator	According to the ERIS report, Dr. David Robertson was a tenant of the property and listed as a waste generator of halogenated solvents in 2016.	No, due to the separation distance from the Site
20	3017 New Street	190 m north	PCA#37 - Operation of Dry Cleaning Equipment (where chemicals are used)	Roseland Dry Cleaners occupied the property and it was noted to be a same day service facility, and as such; dry cleaning operations are likely to occur on the property.	No, due to the separation distance from the Site

(1 a) Distances are approximately only. Precise distances are not possible due to the age of some listings and the aggregation and/or loss of addresses.

(2) Potentially contaminating activity means a use or activity set out in Column A of Table 2 of Schedule D (O.Reg 153/04, as amended) that is occurring or had occurred in a phase one study area

2.2 Areas of Potential Environmental Concern

Based on the evaluation of the PCAs located within the Phase One Study Area, areas of potential environmental concern (APECs) were identified, as presented in Figure 4, and summarized in Table 3 below.

Table 3: Areas of Potential Environmental Concern (APECs)

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)[1]	Location of PCA (on-Site or off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, soil and/or sediment)
APEC 1: Vent pipe for potential former AST	North of the Site building addressed as 418 Guelph Line	PCA#28- Gasoline and Associated Products Storage in Fixed Tanks	On-Site	Petroleum Hydrocarbons (PHCs) and Benzene, Toluene, ethylbenzene and Xylenes (BTEX), and Metals	Soil and Groundwater
APEC 2: Presence of greenhouses on Site	East portion of Site	PCA#40 – Pesticides (including Herbicides, Fungicides and Anti-Fouling Agents) Manufacturing, Processing, Bulk Storage and Large-Scale Applications	On-Site	OC Pesticides	Soil
APEC 3: De-icing salt application to parking areas	On-Site parking areas on northwest portion of the Site	PCA"Other"-De-icing Salt	On-Site	Electrical Conductivity (EC), Sodium Absorption Ratio (SAR)	Soil
APEC 4: Fill and vent pipes associated with off Site UST at 422 Guelph Line	Northeast portion of the Site at 422 Guelph Line	PCA#28- Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	PHCs, BTEX, and Metals	Soil and Groundwater
APEC 5: Various automotive repair facilities on west adjacent at 2432 New Street	West portion of the Site	PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems	Off-Site	PHCs, and Volatile Organic Compounds (VOCs)	Groundwater
APEC 6A: Former Motorcycle Repair Center north adjacent to Site at 2434 New Street	North portion of the Site	PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems	Off-Site	PHCs, and VOCs	Groundwater

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)[1]	Location of PCA (on-Site or off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, soil and/or sediment)
APEC 6B: Fill / vent pipe on building situated on north adjacent property (2434 New Street)	North portion of the Site	PCA#28: Gasoline and Associated Products Storage in Fixed Tanks.	Off-Site	PHCs, BTEX	Groundwater
APEC 7: Dry cleaning facility 25 m east of the Site at 415 Guelph Line	East boundary of the Site	PCA#37 - Operation of Dry Cleaning Equipment (where chemicals are used)	Off-Site	VOCs	Groundwater
APEC 8: Bulk paint storage 25 m east of the Site at 417 Guelph Line	North portion of the Site	PCA#28: Gasoline and Associated Products Storage in Fixed Tanks.	Off-Site	PHCs, BTEX	Groundwater
APEC 9: Automotive Service Station 30 m north of the Site at 433 Guelph Line	Northeast boundary of the Site	PCA#28 – Gasoline and Associated products in fixed tanks.	Off-Site	PHCs, VOCs	Groundwater
APEC 10: Service Centre 60 m north/northwest of Site at 458 Guelph Line with associated USTs	North portion of Site	PCA#28 – Gasoline and Associated products in fixed tanks.	Off-Site	PHCs, BTEX	Groundwater
APEC 11A: Automotive service centre 75 m north of Site at 3001 New Street (formerly 457 Guelph Line) with associated USTs	North boundary of the Site	PCA#28 – Gasoline and Associated products in fixed tanks	Off-Site	PHCs, BTEX	Groundwater
APEC 11B: Automotive service centre 75 m north of Site at 3001 New Street (formerly 457 Guelph Line) with associated USTs	North boundary of the Site	PCA#52 – Storage, maintenance, fueling and repair of equipment, vehicles, and material used to maintain transportation systems	Off-Site	PHCs, VOCs	Groundwater
APEC 12: Dry cleaning facility 180 m northwest of the Site at 480 Guelph Line	Northwest boundary of the Site	PCA#37 - Operation of Dry-Cleaning Equipment (where chemicals are used)	Off-Site	VOCs	Groundwater

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)[1]	Location of PCA (on-Site or off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, soil and/or sediment)
APEC 13: Commercial printing establishment north adjacent of Site at 2442 New Street	North portion of the Site	PCA Other – Commercial printing establishment	Off-Site	VOCs	Groundwater

Notes:

Area of Potential Environmental Concern means the area on, in or under a phase one study area where one or more contaminants are potentially present, as determined through the PI ESA, including through (a) identification of post or present uses on, in or under the phase one property, and (b) identification of potentially contaminating activities.

(1) Potentially contaminating activity means a use or activity set out in Column A of Table 2 of Schedule D (O.Reg.153/04, as amended) that is occurring or has occurred in a phase one Study area.

(2) Distances are approximately only. Precise distances are not possible due to the age of some listings and the aggregation and/or loss of addresses.

Refer to Figures 4 and 5B for the location of APECs on the Site. Boreholes/monitoring wells advanced on the Site to investigate the identified APECs are shown on Figures 5A and 5B.

2.3 Underground Utilities

The Site utilities and services were identified at the Site based on the survey plan provided by the client (provided in Appendix B) and relevant utility infrastructure observed during the Site reconnaissance. The Site utilities are shown on Figure 3, where available. The hydro is overhead along Guelph Line, and along the western perimeter, gas and communication utility lines are located north of the Site.

3. Physical Site Description

3.1 Geological and Hydrogeological Conditions

The Site and surrounding areas are expected to be consist of Glaciomarine deposits, consisting primarily of sand and gravel as well as nearshore and beach deposits.

The bedrock in the general area was part of the Queenston Formation. The bedrock is described as consisting of shale, limestone, dolostone, and siltstone.

A review of the topographic map indicated that the closest body of water is the Lake Ontario, which is located approximately 810 m southeast of the Site. EXP notes that the direction of localized groundwater flow may be influenced by disturbed soil (fill), underground utilities and/or underground building structures in the area. As such, the measured groundwater flow direction may not be representative of the regional area.

Based on the review of available resources from the Ministry of Natural Resources, City of Niagara Falls and MECP, no areas of natural significance were identified at the Site or within the Phase One Study Area.

The general stratigraphy at the Site, as observed in the boreholes, consisted of asphalt/ topsoil generally overlying layers of fill followed by sand, overlain by silty clay/ bedrock. A brief description of the soil stratigraphy at the Site, in order of depth, is summarized in the following sections.

3.1.1 Surface Material

Topsoil with thickness of approximately 100 mm and asphalt of approximately 50 - 100 mm was encountered at the surface of all boreholes.

3.1.2 Fill Material

Fill material was encountered below the asphalt/ topsoil in majority of the boreholes extending to depths between 0.05 m bgs and 2.13 m bgs. The fill comprised generally of sand, with trace silt and gravel.

3.1.3. Native Material

Fine sand, and silty clay material was encountered below the fill material and extended to depths of approximately 5.95 m bgs.

3.1.4 Bedrock

Bedrock was encountered at BH201and BH202 to the maximum investigated depth of 12.2 m.

3.2 Hydrogeology

Based on the groundwater contour map delineated for the Site, the groundwater is anticipated to flow in a south/southeast direction. Refer to Table 4 for the Site hydrogeology characteristics based on groundwater monitoring observations.

Table 4: Site Hydrogeology Characteristics

Location	Observation
Depth to Groundwater	1.56 m bgs to 3.76 m bgs
Groundwater Elevation	96.88 m to 98.41 m
Direction of Groundwater Flow	South/southeast
Horizontal Hydraulic Gradient	0.005 m/m (between BH105 and BH/MW4) and 0.006 m/m (between BH/MW2 and BH/MW1)
Vertical Hydraulic Gradient	0.048 m/m (between BH104 and MW201) and 0.129 m/m (between BH/MW4 and MW202)

3.3 Site Sensitivity

The Site Sensitivity classification with respect to the conditions set out under Section 41 and 43.1 of O.Reg.153/04 were evaluated to determine if the Site is sensitive, as presented in Table 5.

Table 5: Site Sensitivity

Sensitivity	Classification	Does Sensitivity Apply to Site?
Section 41 applies if	(i) property is within an area of natural significance	No
	(ii) property includes or is adjacent to an area of natural significance or part of such an area	No

Sensitivity	Classification	Does Sensitivity Apply to Site?
Section 43.1 applies if	(iii) property includes land that is within 30 m of an area of natural significance or part of such an area	No
	(iv) soil at property has a pH value for surface soil less than 5 or greater than 9	No
	(v) soil at property has a pH value for sub-surface soil less than 5 or greater than 11	No
	(vi) a qualified person is of the opinion that, given the characteristics of the property and the certifications the qualified person would be required to make in a record of site condition in relation to the property as specified in Schedule A, it is appropriate to apply this section to the property	No
	(i) property is a shallow soil property	No
	(ii) property includes all or part of a water body or is adjacent to a water body or includes land that is within 30 m of a water body (Rowntree Creek)	No

3.3.1 Soil Importation

Fill material is typically brought to a property as a base for buildings and pavement areas. Fill can also be used to re-grade a property, and to backfill excavations.

Based on the reviewed information, EXP does not suspect large amounts of fill at the Site. In addition, no fill material has been brought to the Site during the Phase Two ESA.

3.4 Land Use

It is understood that the Site is intended to be further developed for residential land use.

4. Contaminants of Concern

For assessment purposes, EXP selected the MECP (2011) Table 2: Full depth Background Site condition Standards in a Potable Ground Water Condition for Residential/Parkland/Institutional Property Use and coarse textured soil was considered applicable for determining contaminants of concern (COCs), based on the rationale presented in Table 6.

Table 6: Site specific Condition

Description	Site Specific Condition
Section 41 Site Sensitivity	Not applicable • The soil at the Site has pH values between 5 and 11 for subsurface soil. It is noted that the pH value from the soil sample at BH101 (0-0.6 m bgs) is 9.6 which exceeds the 5 to 9 range for surface soil samples. It is understood that additional soil samples will be collected in this area to confirm the pH value at this location as it is deemed to be anomalous. Therefore, the site is not identified as an environmentally sensitive area and the restrictions identified in Section 41 of O. Reg. 153/04 do not apply. • The Site is not located within a Significant Area, and/or located adjacent to an area of natural significance/an environmentally sensitive area.

Description	Site Specific Condition
Section 43.1 Site Sensitivity	Not applicable • The Site is not considered a shallow soil property, based on the recovered soil cores, which indicated that more than two-thirds of the Site has an overburden thickness in excess of 2 m. • The Site is not located within 30 m of a surface water body; the nearest surface water body, Don River, is located approximately 1.9 km east of the Site.
Ground Water	Potable • The Site and surrounding properties within 250 m of the Site are supplied by a municipal drinking water system, and no potable water wells are located on the Site or within 250 m of the Site. • However, the Site is located within a highly vulnerable aquifer, as identified in the Region's Source Water protection Planning under the Clean Water Act, 2006.
Land Use	Residential/Parkland/Institutional • The proposed future use of the Site is for residential use.
Soil Texture	Coarse textured • The predominant texture of soils at the Site is considered to be coarse textured, based on soil characteristics identified in the borehole logs and 75 micron sieve.

A chemical constituent was selected as a COC if it was detected in soil or groundwater samples obtained from the Site at a concentration in excess of the applicable Table 2 SCS.

4.1 Soil and Groundwater Impacts

A chemical constituent was selected as a COC if it was detected in soil or groundwater samples obtained from the Site at a concentration in excess of the applicable Table 2 SCS.

Soil samples were submitted for the analysis of petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene and xylenes (BTEX), and/or volatile organic compounds (VOCs). Some parameters were measured above the Table 2 SCS, and the following COCs were identified:

- Soil: Vinyl Chloride in soil sample BH201 – SS6 and duplicate BH201- SS66.

All remaining tested parameters for PHC, and VOC in the soil samples were either non-detected or detected below their applicable MECP (2011) Table 2 SCS.

Groundwater samples were submitted for the analysis of PHCs, BTEX, and/or VOCs. Some parameters were measured above the Table 2 SCS, and the following COCs were identified:

- Groundwater:
    - Chloroform in groundwater samples MW4 (DUP MW44), and MW103;
    - Cis-1,2-Dichloroethylene in groundwater samples BH/MW1, MW3, MW4 (DUP MW44), MW101, MW102, BH104, MW106, and MW102A (DUP MW1022A);
    - Tetrachloroethylene in groundwater samples BH/MW1, BH/MW2, MW3, MW4 (DUP MW44), MW101, MW102, MW103, BH104, BH105, MW106, and MW102A (DUP MW1022A);
    - Trichloroethylene in groundwater samples BH/MW1, BH/MW2, MW3, MW4 (DUP MW44), MW101, MW102, MW103, BH104, BH105, MW106, and MW102A (DUP MW1022A); and

- Vinyl Chloride in groundwater samples BH/MW1, MW3, MW102, MW102A (DUP MW1022A), and MW201.

The remaining samples were either non-detected or detected below their applicable Table 2 SCS.

Analytical results for COCs in identified soil and groundwater samples collected on the Site are presented for soil in plan view on Figures 7 to 14 and distribution of all impacts in groundwater are on Figures 15 to 20.

4.2 Contaminant Fate and Transport

4.2.1 Soil Media

The soil COCs noted at the Site from current and previous investigations include: tetrachloroethylene, trichloroethylene, vinyl chloride, electrical conductivity (EC) and sodium adsorption ratio (SAR).

The exceedance of the VOC parameters are likely associated with off-Site activities (ie. former dry cleaner). The EC/SAR exceedances are likely associated with de-icing activities on the asphalt paved areas.

4.2.2 Groundwater Media

The groundwater COCs noted at the Site from current and previous investigations include: chloroform, various chlorinated solvents (1,1-dichloroethylene, cis-1,2-dichloroethylene, trans-1,2-dichloroethylene, tetrachloroethylene, trichloroethylene, vinyl chloride), sodium and chloride.

The exceedance of the VOC parameters are likely associated with off-Site activities (i.e. former dry cleaner), and the exceedance of the chloroform in groundwater may be associated with the municipal watermain. The sodium and chloride exceedances are likely associated with de-icing activities on the asphalt paved areas.

4.2.2 Preferential Pathways

The preferential pathways for contaminants present in soil and groundwater media, include various underground utilities, building footings and subsurface features.

Underground utilities were identified at the Site. As such, there is a potential for underground utilities to affect the distribution and transport of groundwater and soil vapour contaminants located on the Site.

Details on the preferential pathways for the impacts are summarized in Table 13.

Table 13: Preferential Pathways

Anything known about migration of the contaminants present on, in or under the phase two property at a concentration greater than the applicable site condition standard away from any area of potential environmental concern, including the identification of any preferential pathways,	Current utilities may affect groundwater and soil vapour migration. Future utilities may affect groundwater and soil vapour migration. Current and future building footings may affect groundwater and soil vapour and migration.

4.2.3 Climatic Conditions

It is noted that climatic or meteorological conditions may influence the distribution and migration of COCs at the Site. Seasonal fluctuations in groundwater due to cyclical increases and decreases in precipitation can affect groundwater recharge. Groundwater levels may be elevated in the spring and fall due to snow melt and/or increases in precipitation; and, groundwater levels may be lowered in the winter and summer due to snow storage and/or increased evaporation. Such

fluctuations can increase the vertical distribution of COCs in the capillary zone, as well as alter the direction of groundwater flow paths based on changes in infiltration rates. However, based on the conditions observed at the Site, it is not anticipated that the climatic or meteorological changes will result in significant alterations in the distribution of contaminants.

4.2.4 Soil Vapour Migration

Given the presence of volatile COCs in groundwater, vapour intrusion is a potential contaminant transport mechanism for volatile COCs in groundwater. Intrusion of vapour-phase contaminants into the indoor air occurs from volatilization of chemicals from the dissolved or non-aqueous phases in the subsurface.

The relevant mechanisms for vapour intrusion are soil gas advection and vapour migration from diffusion through the building foundation. Soil gas advection is the dominant mechanism when the pressure gradient is greater than 1 Pascal (MECP 2011b), as is the case in many residential buildings due to building depressurization. Soil gas advection can occur through any unsealed entry points, cracks or openings present in the building foundation.

Soil vapour flow is greatest within 1 m to 2 m below the building foundation (MECP 2011b); as such, the soil permeability of backfill beneath the building foundation will affect the soil vapour flow rate. Furthermore, pressure gradients (i.e. depressurization of the indoor airspace of the building) created by temperature differences between indoor and outdoor air may affect soil gas flow rate by creating a "stack effect" where, as warm air rises, it is replaced by air infiltrating through doors and windows, and soil gas migrating through the foundation.

As such, in the event that the vapour intrusion pathway is present there may be potential for unacceptable health risks to building occupants via inhalation of indoor air.

Details on soil vapour migration are summarized in Table 14.

Table 14: Soil Vapour Migration

If applicable, information concerning soil vapour intrusion of the contaminants into buildings including,	There is a potential for soil vapours to be present within the subsurface (sourced from groundwater); to migrate along preferential pathways such as underground utility services; and, eventually to migrate into the atmosphere or overlying buildings.
1. relevant construction features of a building, such as a basement or crawl space,	The Site is currently developed with two (2) commercial buildings (one-storey commercial building with a basement and a two-storey residential structure with a basement). The proposed future development plans consist of multi-storey residential building with two (2) levels of underground parking garage. Soil vapours may contact the building slab and migrate through cracks in the basement or floor.
2. building heating, ventilating and air conditioning design and operation, and	The HVAC systems are designed to prevent air from the underground parking garage from entering the above grade structures, through the use of airlocks. Furthermore, the future building will be designed in accordance with the Building Code, which does not allow garage air to enter the above grade building structure.
3. subsurface utilities,	Underground utilities could affect soil vapour migration, given that several lines are currently connected to the on-Site buildings. Underground utilities could affect soil vapour migration, given that several lines will be connected to the future building.

5 Exposure Pathways

5.1 Human Health Receptors and Exposure Pathways

The Site is currently occupied by a one-storey commercial building with a basement and a two-storey residential structure with a basement ("Site buildings"). The Site building at 422 Guelph Line has a footprint of approximately 930 m^2 (10,000 ft^2) and

was constructed circa 1958. The basement of this structure covers the entire footprint of the building. The Site building at 418 Guelph Line was reportedly constructed in 1949. At the time of this Phase One ESA, the Site buildings were vacant

The Site is proposed to be redeveloped for residential purposes. Based on future residential land use of the Site, the receptors that are anticipated to be present include property residents and visitors/trespassers (all ages), indoor long-term workers (adult (i.e., maintenance worker, concierge) and outdoor long-term workers (adult (i.e., landscaper). Subsurface (construction) workers are also considered potential receptors where future utilities or site renovations are planned. These pathways will be discussed further in the Risk Assessment report.

Groundwater at the Site is considered potable. Drinking water for the City of Burlington is sourced from Lake Ontario and is municipally serviced. The minimum depth to groundwater at the Site is 1.56 m bgs.

5.2 Ecological Receptors and Exposure Pathways

The Site is located in an urban environment capable of supporting some terrestrial ecological receptors. There are no on-Site waterbodies. The nearest waterbody is Lake Ontario, located approximately 810 m southeast. Consistent with the MECP (2011b), the potential on-Site ecological receptors include terrestrial vegetation such as trees, grasses and shrubs; soil invertebrates such as earthworms; terrestrial birds such as woodcocks and blackbirds; and, terrestrial mammals such as voles and shrews. Please refer to the risk assessment for a detailed discussion regarding the ecological receptors and exposure pathways.

Appendix G – Non-Potable Groundwater Letter

Legislative & Planning Services
Planning Services
1151 Bronte Road
Oakville ON L6M 3L1

June 13, 2019

Patricia McMullan
Exp
1595 Clark Blvd
Brampton, ON L6T 4V1

Dear Patricia McMullan:

RE: **Notification of Intent to Use Non-Potable Groundwater Site Condition Standards**
Subject Property: **418-422 Guelph Line, Burlington**

Further to your correspondence received by Halton Region Planning Services on **May 23, 2019**, Regional Municipality of Halton staff has prepared this letter in response to your O. Reg. 153/04 Records of Site Condition – Part XV.1 of the Environmental Protection Act request to assume that the groundwater beneath the subject property "does not or will not serve as a raw water supply for a drinking water system, as defined in the Safe Drinking Water Act (2002)".

The key features for this request are presented in Table 1 below:

Table 1: Key Features Assessment

Key Feature	Is the property located within or nearby these Key Features (yes/no)
Wellhead Protection Area	**No**
Highly Vulnerable Aquifer	**Yes**
Environmentally Sensitive Area (within 30m)	**No**
Rural Area	**No**
Water Well Records Within 250 metres	**No**

Region of Halton records indicate that the property is located within the **City of Burlington** and **is not** within a wellhead protection area, **but is** located within a highly vulnerable aquifer, as identified in the Region's Source Water Protection Planning under the Clean Water Act, 2006. The property **is not** located within 30m of environmentally sensitive areas (see definition in O. Reg. 153/04). There are **no** potable well records that are located within 250m of the property.

Based on this information, Halton Region **objects** to the intention to apply non-potable water use criteria for the assessment of the subject property. **Potable standards** must be used for this property.

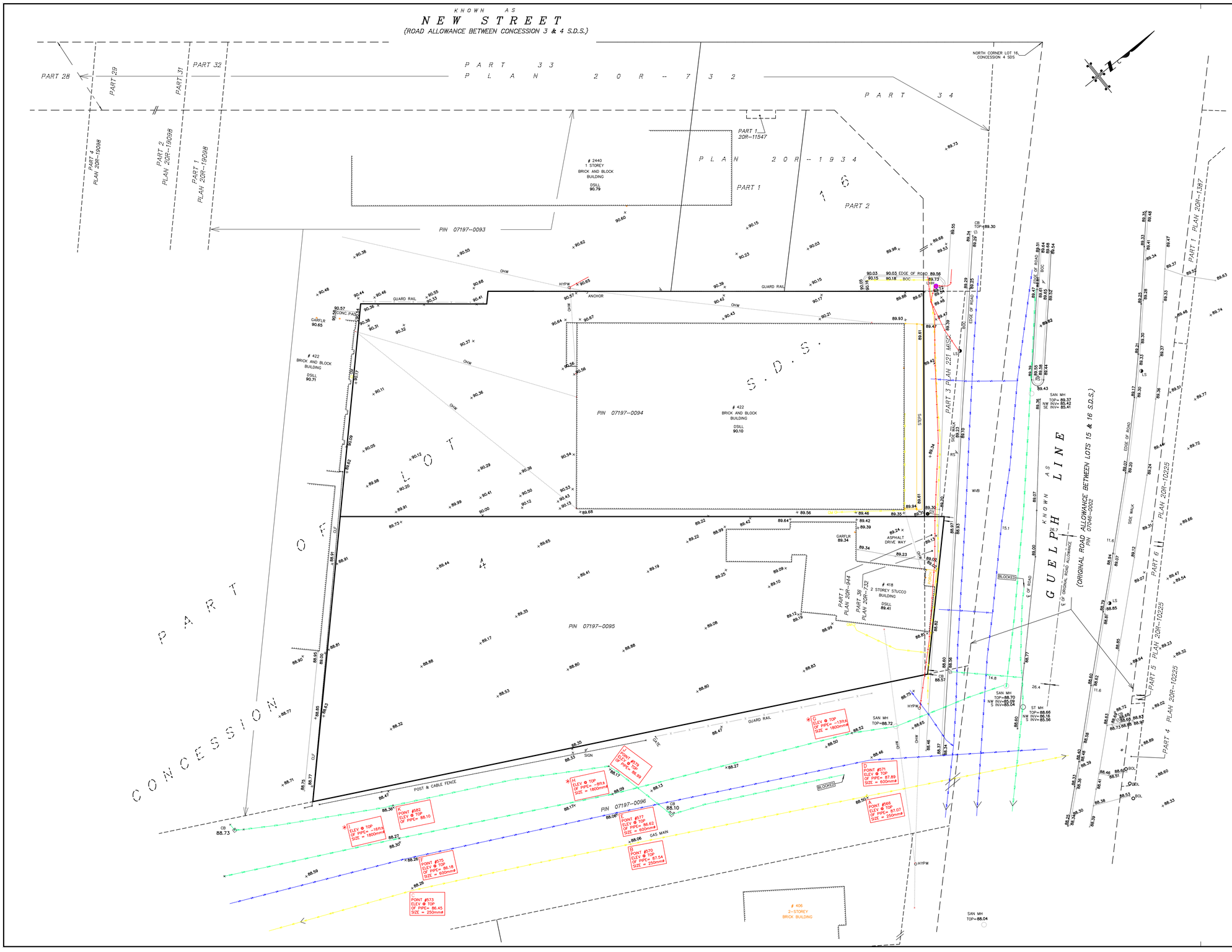
If you have any questions regarding this information, please contact the undersigned at ext. 3241.

Sincerely,

Behnam Doulatyari
Planner – Groundwater and Hydrology, Sustainable Planning

c. Tim Edwards, District Engineer, Ministry of the Environment, Halton-Peel District Office
Nicole Mathews, Manager, Environmental Health, Halton Region (email)
Ang Capone, City of Burlington (email)

DRAWINGS/ATTACHMENTS



SUBSURFACE UTILITY & TOPOGRAPHIC MAPPING

GEOGRAPHIC LOCATION NOTE

PART OF LOT 16 CONCESSION 4 S.D.S.

(GEOGRAPHIC TOWNSHIP OF NELSON)

NOW IN THE

CITY OF BURLINGTON

REGIONAL MUNICIPALITY OF HALTON

SCALE 1 : 200

0 5 10 20 metres

MacKAY, MacKAY & PETERS LIMITED – ONTARIO LAND SURVEYORS

© 2019

ADDRESS: 422 & 418 GUELPH LINE | CLIENT: PRO FUNDS MORTGAGES

Legend :

PIN DENOTES PROPERTY IDENTIFICATION NUMBER
℄ DENOTES CENTRE LINE
+ DENOTES ROUND
SDS DENOTES SOUTH OF DUNDAS STREET
BF DENOTES BOARD FENCE
OHW DENOTES OVERHEAD WIRE
HYPW DENOTES HYDRO POLE (WOOD)
WV DENOTES WATER VALVE
GV DENOTES GAS VALVE
GM DENOTES GAS METER
CB DENOTES CATCH BASIN
ST MH DENOTES STORM MANHOLE
SAN MH DENOTES SANITARY MANHOLE
RS DENOTES ROAD SIGN
LS DENOTES UTILITY LIGHT STANDARD
BOL DENOTES BOLLARD
DSILL DENOTES DOOR SILL ELEVATION
GARLR DENOTES GARAGE FLOOR ELEVATION
BOC DENOTES BACK OF CURB
UHH DENOTES UTILITY HAND HOLE
WFHY DENOTES WATER FIRE HYDRANT
WHYV DENOTES WATER HYDRANT VALVE
WVCH DENOTES WATER VALVE CHAMBER
WVB DENOTES WATER VALVE BOX
NTS DENOTES NOT TO SCALE
GM DENOTES GAS MAIN
GS DENOTES GAS SERVICE
HYDRO DENOTES HYDRO
WM DENOTES WATER MAIN
WS DENOTES WATER SERVICE
SANMH DENOTES SANITARY SEWER
STM DENOTES STORM SEWER
A DENOTES HYDROVAC LOCATION (SEPTEMBER 26, 2019)
B DENOTES HYDROVAC LOCATION (SEPTEMBER 26, 2019)
C DENOTES HYDROVAC LOCATION (SEPTEMBER 26, 2019)
D DENOTES HYDROVAC LOCATION (SEPTEMBER 26, 2019)
E DENOTES HYDROVAC LOCATION (SEPTEMBER 26, 2019)
F DENOTES HYDROVAC LOCATION (SEPTEMBER 26, 2019)
G DENOTES HYDROVAC LOCATION (SEPTEMBER 26, 2019)
H DENOTES HYDROVAC LOCATION (SEPTEMBER 26, 2019)
I DENOTES HYDROVAC LOCATION (SEPTEMBER 26, 2019)
J DENOTES HYDROVAC LOCATION (SEPTEMBER 26, 2019)
K DENOTES HYDROVAC LOCATION (SEPTEMBER 26, 2019)
* DENOTES COLLAPSED HYDROVAC LOCATION

Benchmark Note:

CITY OF BURLINGTON BENCHMARK No. 273 ELEVATION = 80.809 METRES (CGVD 1928 : 1978 ADJUSTMENT)

BRASS CAP IN TOP OF CURB AT THE NORTHERLY END OF THE RAMP LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF LAKESHORE ROAD AND GUELPH LINE. THE MONUMENT IS LOCATED 5.5 METRES FROM THE END OF THE CURB RETURN ON THE SOUTHEAST CORNER OF THE INTERSECTION, 2.68 METRES FROM A NAIL IN THE FACE OF A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHEAST CORNER, AND 19.2 METRES FROM A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHWEST CORNER OF THE INTERSECTION.

DISCLAIMER:

LOCATE VALID FOR THIRTY DAYS POST COMPLETION DATE. EXCAVATORS ARE EXPECTED TO FOLLOW CANADIAN COMMON GROUND ALLIANCE "UNDERGROUND INFRASTRUCTURE DAMAGE PREVENTION" BEST PRACTICES VERSION 2 SECTION 4 – EXCAVATION BEST PRACTICES. DETAILED INFORMATION CAN BE FOUND AT HTTP://ORCOA.COM/WP-CONTENT/UPLOADS/2016/12/1-CCGA-BEST-PRACTICES-VOLUME.2.01. LOCATE NOT VALID IF FIELD MARKINGS BECOME UNCLEAR OR WORK AREA HAS BEEN CHANGED. FIELD MARKINGS ARE ESTIMATES ONLY. THE EXACT LOCATION OF UNDERGROUND UTILITIES MUST BE DETERMINED BE HAND DIGGING (HYDRO-VAC AND AIR-VAC) PRIOR TO EXCAVATION WITH MECHANICAL EQUIPMENT. CONTRACTOR/APPLICANT MUST HAND DIG (HYDRO-VAC AND AIR-VAC) WITHIN ONE METRE OF MARKINGS. IT IS THE RESPONSIBILITY OF THE CONTRACTOR/APPLICANT TO OBTAIN FULL PUBLIC LOCATES IN ORDER FOR THE PRIVATE LOCATE TO BE VALID. PRIVATE LOCATES ARE RELIANT UPON THE AVAILABILITY AND ACQUISITION OF COMPLETE RECORDS, TOGETHER WITH THE CONDUCTIVITY OF FACILITIES BEING LOCATED. IF CONTACT IS MADE OR EVEN SUSPECTED WITH ANY UNDERGROUND FACILITY "STOP WORK IMMEDIATELY", SHUT DOWN ALL POWERED EQUIPMENT, FOLLOW HEALTH AND SAFETY PROTOCOL AND NOTIFY THE FACILITY OWNER.

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

DISCLAIMER

UTILITY LOCATES ARE FOR DESIGN PURPOSES ONLY.
VALID PUBLIC AND PRIVATE LOCATES MUST BE OBTAINED BEFORE GROUND DISTURBANCE.

BOUNDARY DATA SHOWN HEREON WAS COMPILED FROM SURVEY RECORDS & REGISTRY OFFICE INFORMATION.

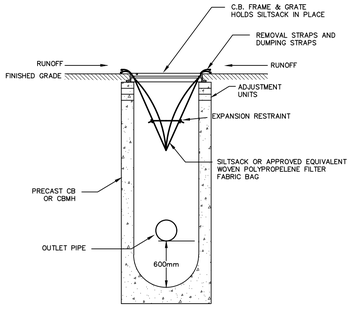
HYDROVAC LOCATED	OCTOBER 10, 2019
DRAFTING COMPLETED	JUNE 7, 2019
FIELD WORK COMPLETED	MAY 31, 2019

COPYRIGHT © 2019

MMP LAND SURVEYORS & MAPPERS
MMP Utility Locates
a division of
MacKay, MacKay & Peters Limited
3380 South Service Road
Unit 101
Burlington, ON
L7N 3J5
(905) 639-1375
halton@mmplimited.com
mmpsurveyors.ca
mmplocators.ca

PARTY CHIEF:	A.B.
LOCATOR:	C.P.
DRAWN BY:	M.S.
CHECKED BY:	K.J.D.
PROJECT NO.:	19-1021-UL

MTE FILE No: 45401-100-C1.1
CONSTRUCTION MANAGEMENT PLAN
P:\P\45401\100\45401-100-C2

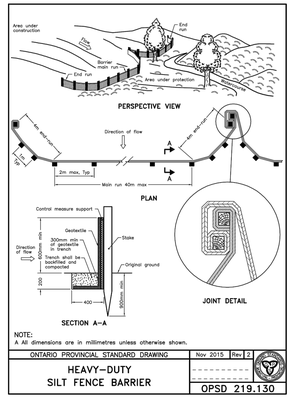


MAINTENANCE SCHEDULE

–INSPECT AFTER EVERY MAJOR RAIN EVENT.
–INSPECT EVERY 3 WEEKS MINIMUM.
–SILTSACK SHOULD NEVER BE OVER HALF FULL.
–FULL BAG CAN BE REMOVED, DUMPED, CLEANED AND REUSED
(TO REMOVE INSERT 25mm REBAR INTO REMOVAL FLAP POCKETS)
(TO DUMP INSERT 25mm REBAR INTO BOTH DUMPING STRAPS)

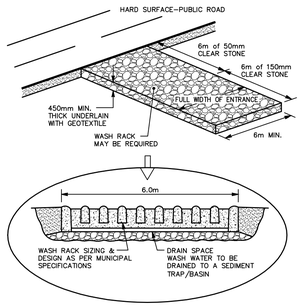
TEMPORARY SILTSACK SILTATION CONTROL IN CB

N.T.S.



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

ONTARIO PROVINCIAL STANDARD DRAWING	Nov 2015	Rev 2
HEAVY–DUTY SILT FENCE BARRIER		OPSD 219.130



CONSTRUCTION ACCESS DETAIL

N.T.S.

CONSTRUCTION NOTES AND SPECIFICATIONS

1. GENERAL NOTES

1.1. CONSTRUCTION FENCING IS REQUIRED AROUND THE CONSTRUCTION SITE.

1.2. TRADES PARKING AND TRUCK STAGING WILL BE PROVIDED BY THE ADJACENT PARKING LOT ON WATERFRONT TRAIL. DEVELOPER WILL APPLY FOR ANY RELEVANT PERMITS PRIOR TO CONSTRUCTION.

1.3. ALL HEALTH AND SAFETY RELATED SIGNAGE MUST BE POSTED AT THE SITE AS REQUIRED BY APPLICABLE LAW AND BEST MANAGEMENT PRACTICES.

1.4. CONTRACTOR TO ENSURE SIDEWALK AND BIKE PATHS ARE MAINTAINED AND SAFE PEDESTRIAN ACCESS IS PROVIDED THROUGHOUT DURATION OF CONSTRUCTION.

1.5. CONTRACTOR TO ENSURE DAILY SWEEPING AND DUST CONTROL OF THE RIGHT OF WAY.

1.5 CONTRACTOR TO PROVIDE CONSTRUCTION STAGING PLAN TO THE PRIME CONSULTANT AND THE CITY FOR ACCEPTANCE BY THE CITY PRIOR TO THE COMMENCEMENT OF CONSTRUCTION. SIGNIFICANT DEVIATIONS FROM THIS PLAN WILL NOT BE ACCEPTED WITHOUT PERMISSION FROM THE CITY. ANY CONSTRUCTION HOARDING OR FENCING AROUND THE SITE MUST COMPLY WITH OCCUPATIONAL HEALTH AND SAFETY ACT AND REGULATIONS FOR CONSTRUCTION PROJECTS, INCLUDING O. REG. 213/91 S. 65, AS AMENDED.

1.6 CONTRACTOR TO IDENTIFY IN THE UPDATED CONSTRUCTION STAGING PLAN UNLOADING/LOADING AREAS, TRADE/SUBTRADE PARKING, ONSITE TRAFFIC FLOW DIRECTIONS, TOWER CRANE AND/OR WHEELED CRANE DESIGNATED AREAS, LOCATION OF PROJECT SIGN CONTAINING 24–HR EMERGENCY CONTACT NAME & TELEPHONE NUMBER, LOCATION OF SITE TRAILER(S), MATERIAL STOCKPILES, AND OTHER DETAILS THAT MAY BE REQUESTED BY THE CITY.

1.6. FOR EMERGENCY RESPONSE, CONTRACTOR MUST MAINTAIN CONSTRUCTION ACCESS FREE AND CLEAR OF DEBRIS, MATERIALS, VEHICLES AND EQUIPMENT.

1.7. A TRAFFIC CONTROL PLAN BASED ON ONTARIO TRAFFIC MANUAL (OTM) BOOK 7 SHALL BE COMPLETED FOR ANY WORK WITHIN THE RIGHT OF WAY AND APPROVED BY THE CITY. A COPY IS TO BE MAINTAINED ON SITE AT ALL TIMES.

1.8. STOCKPILE LOCATION TO BE REFINED DURING THE CONSTRUCTION STAGE. THE CONTRACTOR TO ENSURE THE STOCKPILE IS COMPLETELY SURROUNDED BY HEAVY DUTY SILT FENCE AND IF SCHEDULED TO BE LEFT UNDISTURBED FOR MORE THAN 3 DAYS THE STOCKPILE MUST BE STABILIZED WITH SEED.

1.9. THE ESC STRATEGIES OUTLINED ON THE PLANS ARE NOT STATIC AND MAY NEED TO BE UPGRADED/AMENDED AS SITE CONDITIONS CHANGE TO PREVENT SEDIMENT RELEASES TO THE NATURAL ENVIRONMENT. FAILED ESC MEASURES WILL BE REPAIRED IMMEDIATELY.

1.10. ALL DAMAGED ESC MEASURES SHOULD BE REPAIRED AND/OR REPLACED WITHIN 48 HOURS OF THE INSPECTION.

1.11. DISTURBED AREAS LEFT FOR 30 DAYS OR LONGER MUST BE STABILIZED (SEED, SOD, COVER WITH EROSION CONTROL BLANKET).

1.12. ALL EROSION AND SEDIMENT CONTROL MEASURES (TEMPORARY SEDIMENT CONTROL FENCES, STORM SEWER BULKHEADS, ROCK CHECK DAMS, WORK LIMIT FENCES, SEDIMENT BASINS, ETC.) MUST BE INSTALLED PRIOR TO COMMENCEMENT OF CONSTRUCTION AND MAINTAIN IN GOOD CONDITION UNTIL CONSTRUCTION IS COMPLETED AND VEGETATIVE COVER IS ESTABLISHED.

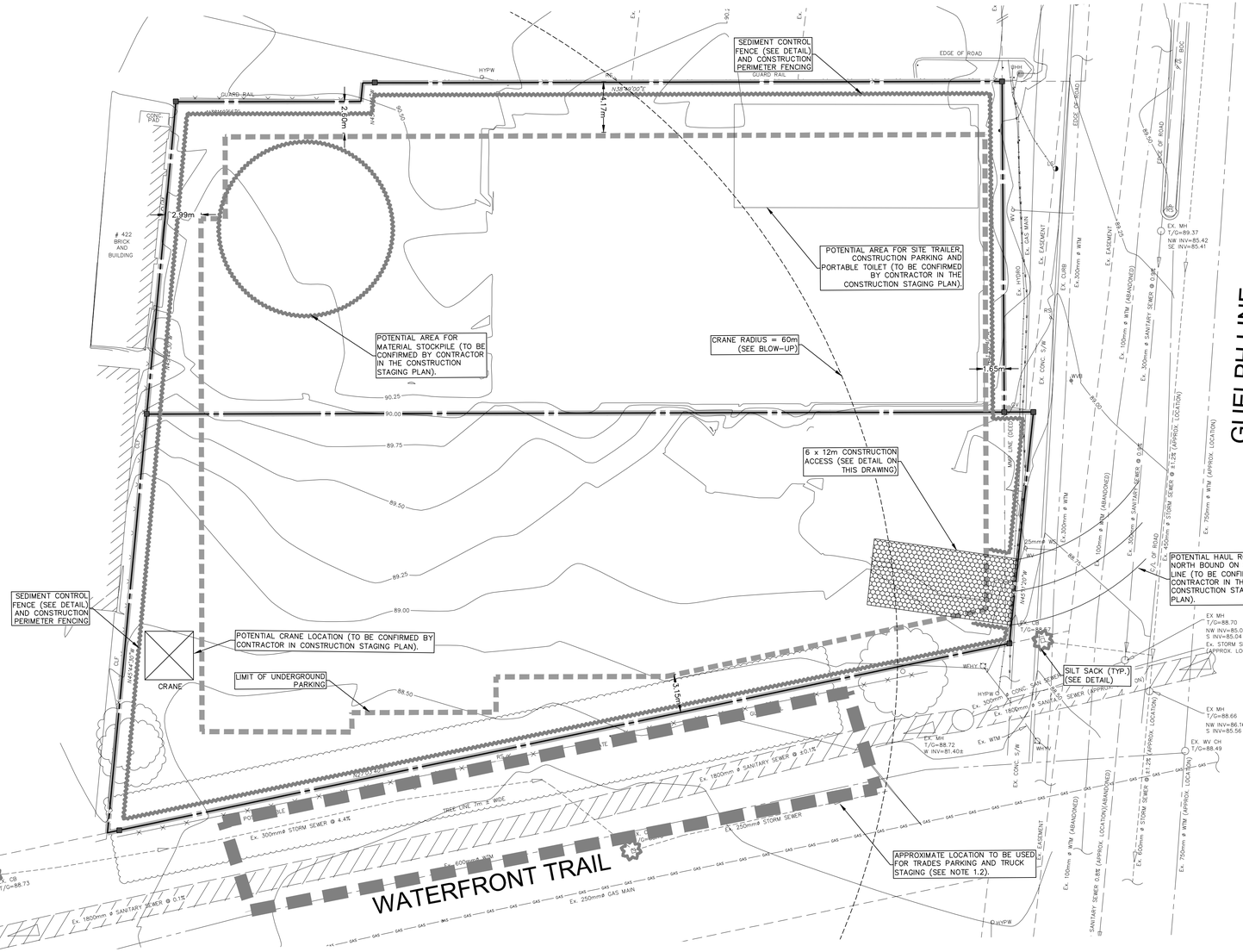
1.13. TEMPORARY VEHICLE TRACKING CONTROLS TO BE CONSTRUCTED AS PER REQUIREMENTS IN "EROSION & SEDIMENT CONTROL GUIDELINE FOR URBAN CONSTRUCTION" DATED DECEMBER 2006, AT ALL ACCESS POINTS. CONTRACTOR SHALL MAINTAIN THESE AS REQUIRED AND AS DIRECTED BY THE CITY ENGINEER.

1.14. CATCH BASIN SEDIMENT CONTROL DEVICE, I.E. "SILTSACK" BY ACF ENVIRONMENT OR APPROVED EQUIVALENT, TO BE PLACED AS PER MANUFACTURER'S RECOMMENDATIONS (SEE DETAIL). REGULAR MAINTENANCE IS REQUIRED ("SILTSACK" SUMPS SHALL BE INSPECTED FOR SEDIMENT ACCUMULATION AND FILTER CLOTH BLOCKAGE ON A WEEKLY BASIS). THESE SEDIMENT TRAPS ARE NOT TO BE REMOVED UNTIL THE CURBS AND THE BOULEVARDS SODDED. SEDIMENT TRAPS SHALL ALSO BE PLACED AS PER DETAIL AT ALL CATCH BASINS LOCATIONS IN AREAS TO BE VEGETATED AND MAINTAINED UNTIL GROUND COVER IS ESTABLISHED.

1.15. REGULAR MAINTENANCE FOR ALL CATCH BASINS (ON THE PUBLIC ROADWAY AND ON PRIVATE PROPERTY) AND INLET CHAMBERS IS REQUIRED (SEDIMENT TRAPS AND SUMPS SHALL BE INSPECTED FOR SEDIMENT ACCUMULATION, TRASH BUILDUP AND FILTER CLOTH BLOCKAGE ON A WEEKLY BASIS AND AFTER ANY MAJOR RAINFALL EVENT). ACCUMULATED SEDIMENT SHALL BE REMOVED BY MECHANICAL MEANS. FLUSHING OF SEDIMENT INTO THE STORM SEWER SYSTEM IS PROHIBITED. IF STANDING WATER REMAINS IN THE CATCH BASIN 24 HOURS (MINIMUM) AFTER A STORM THEN CLEANING OR REPLACEMENT CLOTH IS REQUIRED.

1.16. INSPECTION OF THE PROPOSED EROSION AND SEDIMENT CONTROL MEASURES WILL OCCUR;

- ON A WEEKLY BASIS,
- AFTER EVERY SIGNIFICANT RAINFALL EVENT,
- AFTER SIGNIFICANT SNOWMELT EVENTS, AND
- DAILY DURING EXTENDED RAIN OR SNOWMELT PERIODS.



LEGEND OF PROPOSED FEATURES

- SEDIMENT CONTROL FENCE (SEE DETAIL)
- SILT SACK (SEE DETAIL)
- CONSTRUCTION ACCESS (SEE DETAIL)



CRANE SWING RADIUS BLOW–UP

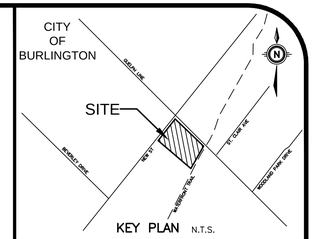
SCALE: 1:750

NOTES TO CONTRACTOR:

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

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

3. SHOP DRAWINGS
CONTRACTOR TO PROVIDE SHOP DRAWINGS TO THE ENGINEER FOR REVIEW AND APPROVAL FOR ALL CHAMBERS AND STRUCTURES PRIOR THE START OF CONSTRUCTION AND PRIOR TO ORDERING ANY STRUCTURES AND PARTS.



GEODETIC BM ELEV. = 80.809m
CITY OF BURLINGTON BENCHMARK No. 273
BRASS CAP IN TOP OF CURB AT THE NORTHERLY END OF THE RAMP LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF LAKESHORE ROAD AND GUELPH LINE, THE MONUMENT IS LOCATED 5.5 METRES FROM THE END OF THE CURB RETURN ON THE SOUTHEAST CORNER OF THE INTERSECTION, 2.68 METRES FROM A NAIL IN THE FACE OF A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHEAST CORNER, AND 19.2 METRES FROM A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHWEST CORNER OF THE INTERSECTION.

SITE BENCHMARK ELEV. = m

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR ZBA	KRR	DEC.06/2019

MTE
Engineers | Scientists | Surveyors
(905) 639-2552 www.mte85.com

LICENSED PROFESSIONAL ENGINEER K.R.RAMSEWAK 100100928 DEC 6/19 PROVINCE OF ONTARIO

NOT FOR CONSTRUCTION

CLIENT
WALDEMAR LIMITED
3410 SOUTH SERVICE ROAD, SUITE G5 BURLINGTON, ON

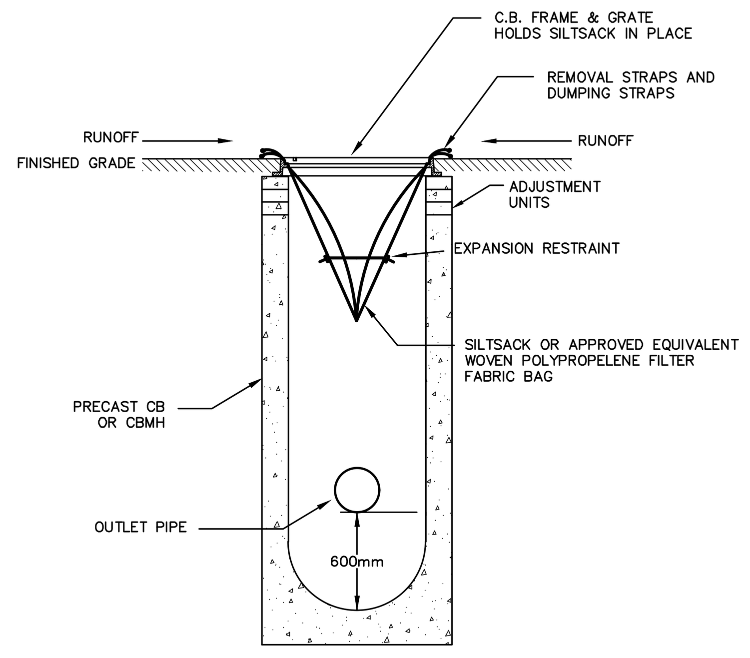
PROJECT
418 & 422 GUELPH LINE
13 STOREY APARTMENT BUILDING
418 & 422 GUELPH LINE BURLINGTON, ON

DRAWING
CONSTRUCTION MANAGEMENT PLAN

Project Manager: K. RAMSEWAK	Project No.: 45401-100
Design By: ALP	Checked By: KRR
Drawn By: GXS/RNC	Checked By: ALP
Surveyed By: OTHERS	Drawing No.: C1.1
Date: Feb.08/19	
Scale: 1:200	Sheet 1 of 5

December 6, 2019 – 5:36 p.m. – Plotted By: rzhou

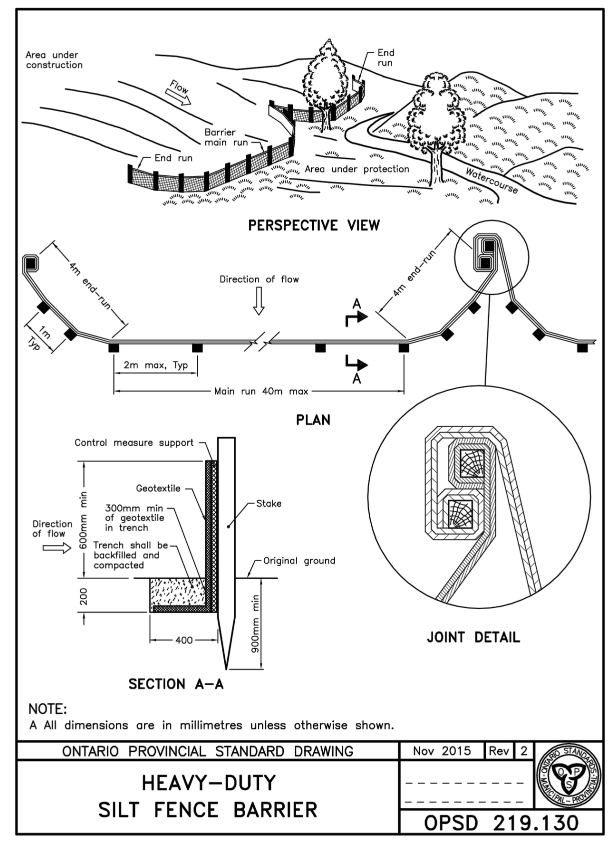
MTE FILE No: 45401-100-C1.2
EROSION AND SEDIMENT CONTROLPLAN
P:\P\45401\100\45401-100-C2

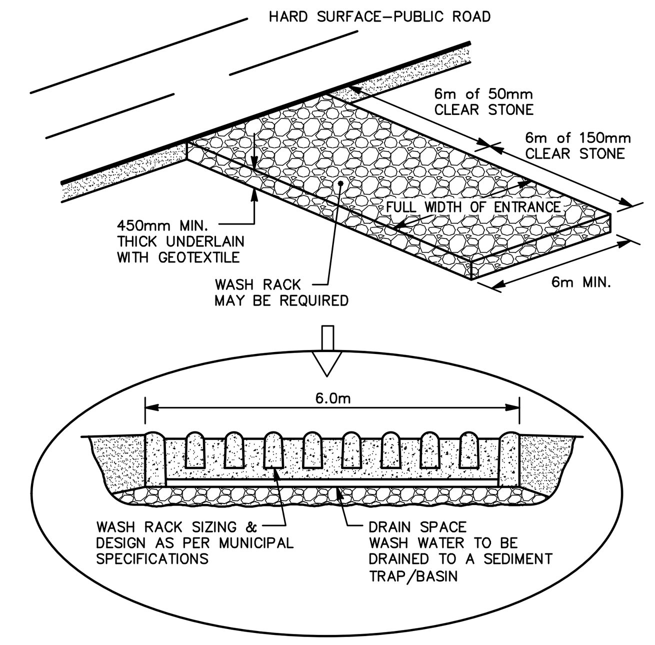


MAINTENANCE SCHEDULE

- –INSPECT AFTER EVERY MAJOR RAIN EVENT.
- –INSPECT EVERY 3 WEEKS MINIMUM.
- –SILTSACK SHOULD NEVER BE OVER HALF FULL.
- –FULL BAG CAN BE REMOVED, DUMPED, CLEANED AND REUSED (TO REMOVE INSERT 25mm REBAR INTO REMOVAL FLAP POCKETS) (TO DUMP INSERT 25mm REBAR INTO BOTH DUMPING STRAPS)

TEMPORARY SILTSACK SILTATION CONTROL IN CB
N.T.S.





CONSTRUCTION ACCESS DETAIL
N.T.S.

EROSION AND SEDIMENT CONTROL NOTES

1.1. CONTRACTOR TO INSTALL EROSION CONTROL MEASURES AS SHOWN PRIOR TO CONSTRUCTION AND MAINTAIN IN GOOD CONDITION UNTIL CONSTRUCTION IS COMPLETED AND ALL DISTURBED GROUND SURFACES HAVE BEEN RESTABILIZED EITHER BY PAVING OR RESTORATION OF VEGETATIVE COVER.

1.2. ALL SEDIMENT CONTROL FENCING TO BE INSTALLED PRIOR TO ANY AREA GRADING, EXCAVATING OR DEMOLITION COMMENCING.

1.3. EROSION CONTROL FENCING TO BE INSTALLED AROUND BASE OF ALL STOCKPILES. ALL STOCKPILES TO BE KEPT 2.5m MINIMUM FROM PROPERTY LINE.

1.4. EROSION PROTECTION TO BE PROVIDED AROUND ALL STORM AND SANITARY MHs AND CBs.

1.5. CATCH BASIN SEDIMENT CONTROL DEVICE, I.E. "SILTSACK" BY ACF ENVIRONMENT OR APPROVED EQUIVALENT, TO BE PLACED AS PER MANUFACTURER'S RECOMMENDATIONS (SEE DETAIL). REGULAR MAINTENANCE IS REQUIRED ("SILTSACK" SUMPS SHALL BE INSPECTED FOR SEDIMENT ACCUMULATION AND FILTER CLOTH BLOCKAGE ON A WEEKLY BASIS). THESE SEDIMENT TRAPS ARE NOT TO BE REMOVED UNTIL THE CURBS AND THE BOULEVARDS SODDED. SEDIMENT TRAPS SHALL ALSO BE PLACED AS PER DETAIL AT ALL CATCH BASINS LOCATIONS IN AREAS TO BE VEGETATED AND MAINTAINED UNTIL GROUND COVER IS ESTABLISHED.

1.6. REGULAR MAINTENANCE FOR ALL CATCH BASINS (ON THE PUBLIC ROADWAY AND ON PRIVATE PROPERTY) AND INLET CHAMBERS IS REQUIRED (SEDIMENT TRAPS AND SUMPS SHALL BE INSPECTED FOR SEDIMENT ACCUMULATION, TRASH BUILDUP AND FILTER CLOTH BLOCKAGE ON A WEEKLY BASIS AND AFTER ANY MAJOR RAINFALL EVENT). ACCUMULATED SEDIMENT SHALL BE REMOVED BY MECHANICAL MEANS. FLUSHING OF SEDIMENT INTO THE STORM SEWER SYSTEM IS PROHIBITED. IF STANDING WATER REMAINS IN THE CATCH BASIN 24 HOURS (MINIMUM) AFTER A STORM THEN CLEANING OR REPLACEMENT CLOTH IS REQUIRED.

1.7. CONSTRUCTION ACCESS (MUD MAT) TO BE PROVIDED ON–SITE AT ALL LOCATIONS WHERE CONSTRUCTION VEHICLES EXIT THE SITE. CONSTRUCTION ACCESS (MUD MAT) SHALL BE A MINIMUM OF 6.0m WIDE, 12.0m LONG (LENGTH MAY VARY DEPENDING ON SITE LAYOUT) AND 0.3m DEEP AND SHALL CONSIST OF 200mm CLEAR STONE MATERIAL OR APPROVED EQUIVALENT. PROPOSED EROSION FENCING TO TIE INTO MUD MAT. CONTRACTOR TO ENSURE ALL VEHICLES LEAVE THE SITE VIA THE MUD MAT AND THAT THE MAT IS MAINTAINED IN A MANNER TO MAXIMIZE EFFECTIVENESS AT ALL TIMES.

1.8. ADDITIONAL EROSION CONTROL MEASURES MAY BE REQUIRED AS SITE DEVELOPMENT PROGRESSES. CONTRACTOR TO PROVIDE ALL ADDITIONAL EROSION CONTROL STRUCTURES.

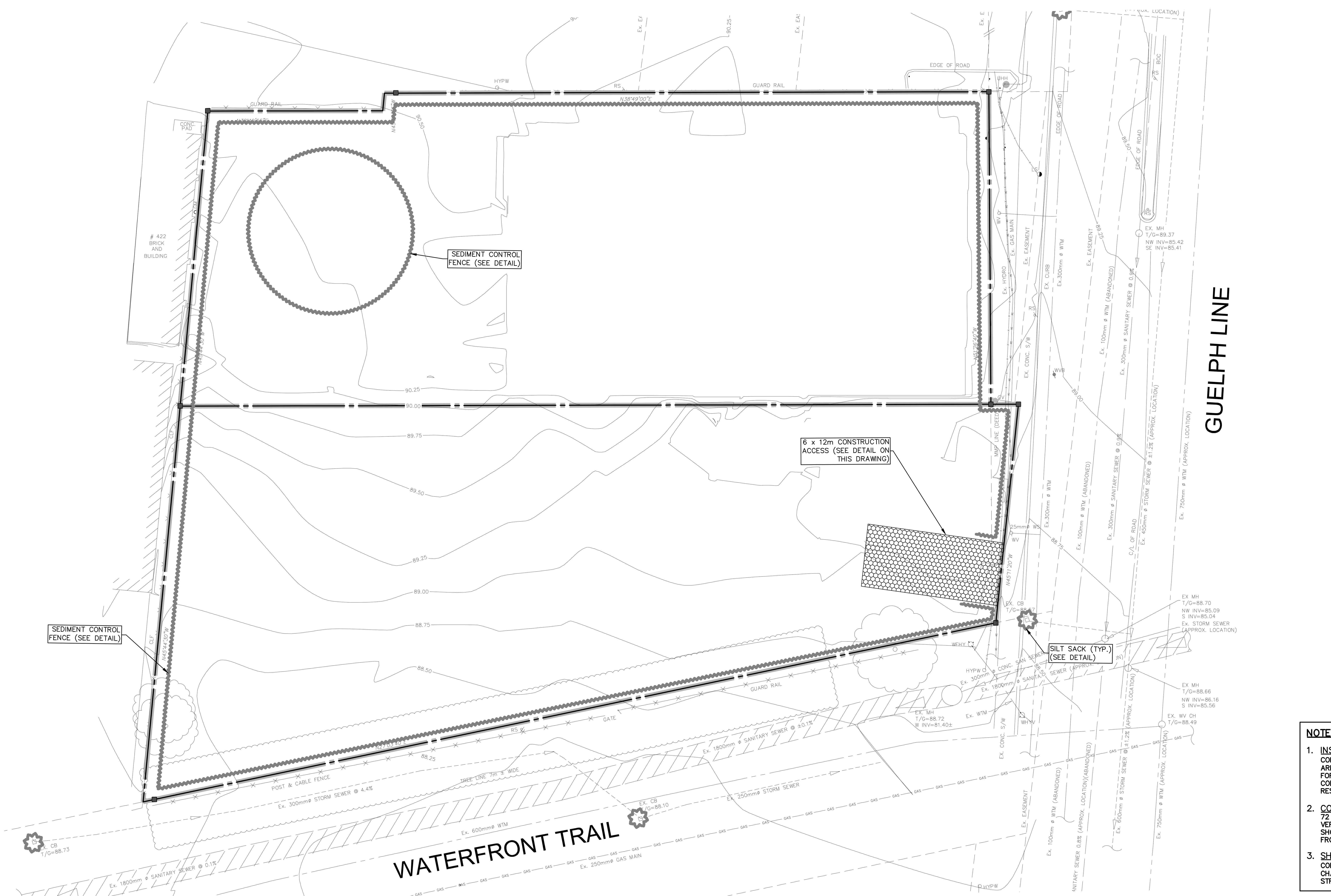
1.9. EROSION CONTROL STRUCTURES TO REMAIN IN PLACE UNTIL ALL DISTURBED GROUND SURFACES HAVE BEEN RESTABILIZED.

1.10. NO ALTERNATE METHODS OF EROSION PROTECTION SHALL BE PERMITTED UNLESS APPROVED BY THE ENGINEER AND THE LOCAL MUNICIPALITY'S DEPARTMENT OF PUBLIC WORKS.

1.11. CONTRACTOR TO CLEAN ROADWAY AND SIDEWALKS OF SEDIMENTS RESULTING FROM CONSTRUCTION TRAFFIC FROM THE SITE EACH DAY.

1.12. CONTRACTOR MUST REMOVE EROSION AND SEDIMENTATION FENCING PRIOR TO COMPLETION OF PROJECT. CONTRACTOR TO HAVE EROSION AND SEDIMENTATION FENCE INSPECTED WHEN VEGETATION HAS ESTABLISHED, BUT PRIOR TO FENCE BECOMING OVERGROWN. ENGINEER'S REPRESENTATIVE TO DETERMINE IF VEGETATION HAS REACHED THE CRITICAL POINT AND WILL THEN INSTRUCT CONTRACTOR TO REMOVE FENCE.

1.13. ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL B VISUALLY INSPECTED AFTER EACH WORKING DAY AND MAINTAINED WHEN REQUIRED AS DIRECTED BY THE CONSULTANT AND TO THE SATISFACTION OF THE CITY/CONSERVATION AUTHORITY. THE CONSULTANT SHALL KEEP A DAILY RECORD OF INSPECTION, MAINTENANCE, ETC. AND PRESENT THE CITY WITH A COPY OF REPORT ON A MONTHLY BASIS.



LEGEND OF PROPOSED FEATURES

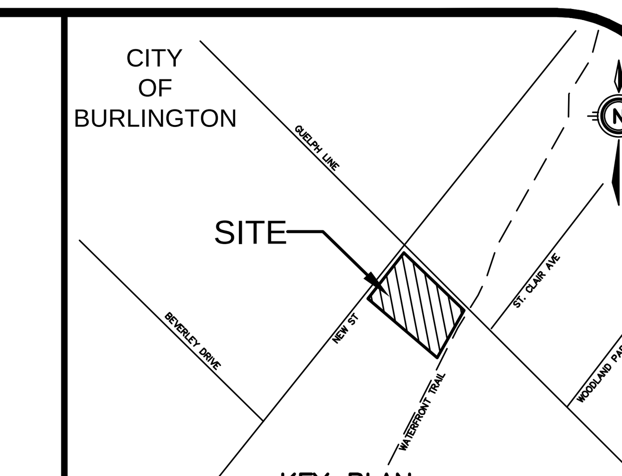
SEDIMENT CONTROL FENCE (SEE DETAIL)

SILT SACK (SEE DETAIL)

CONSTRUCTION ACCESS (SEE DETAIL)

NOTES TO CONTRACTOR:

1. INSPECTION
CONTRACTOR IS RESPONSIBLE FOR CONTACTING ENGINEER 48 HRS PRIOR TO COMMENCING WORK TO ARRANGE FOR INSPECTION. ENGINEER TO DETERMINE DEGREE OF INSPECTION AND TESTING REQUIRED FOR CERTIFICATION OF UNDERGROUND SERVICE INSTALLATION AS MANDATED BY ONTARIO BUILDING CODE DIVISION C, PART 1, SECTION 1.2.2, GENERAL REVIEW. FAILURE TO NOTIFY ENGINEER WILL RESULT IN EXTENSIVE POST CONSTRUCTION INSPECTION AT CONTRACTORS EXPENSE.
2. CONFIRMATION OF EXISTING INVERTS
72 HOURS PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR IS TO LOCATE, EXPOSE AND VERIFY INVERTS OF EXISTING SEWERS AT CONNECTION POINTS AND REPORT FINDINGS TO MTE. SHOULD THE CONTRACTOR PROCEED WITHOUT COMPLETING THESE LOCATES, EXTRA COSTS RESULTING FROM DELAYS AND STANDBY TIME WILL NOT BE CONSIDERED.
3. SHOP DRAWINGS
CONTRACTOR TO PROVIDE SHOP DRAWINGS TO THE ENGINEER FOR REVIEW AND APPROVAL FOR ALL CHAMBERS AND STRUCTURES PRIOR THE START OF CONSTRUCTION AND PRIOR TO ORDERING ANY STRUCTURES AND PARTS.



KEY PLAN N.T.S.

GEODETIC BM ELEV. = 80.809m
CITY OF BURLINGTON BENCHMARK No. 273
BRASS CAP IN TOP OF CURB AT THE NORTHERLY END OF THE RAMP LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF LAKESHORE ROAD AND GUELPH LINE. THE MONUMENT IS LOCATED 5.5 METRES FROM THE END OF THE CURB RETURN ON THE SOUTHEAST CORNER OF THE INTERSECTION, 2.68 METRES FROM A NAIL IN THE FACE OF A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHEAST CORNER, AND 19.2 METRES FROM A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHWEST CORNER OF THE INTERSECTION.

SITE BENCHMARK ELEV. = m

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR ZBA	KRR	NOV.08/2019

MTE
Engineers |Scientists |Surveyors
(905) 639-2552 www.mte85.com

LICENSED PROFESSIONAL ENGINEER K.R.RAMSEWAK 100100928 NOV 8/19 PROVINCE OF ONTARIO

NOT FOR CONSTRUCTION

CLIENT
WALDEMAR LIMITED
3410 SOUTH SERVICE ROAD, SUITE G5 BURLINGTON, ON

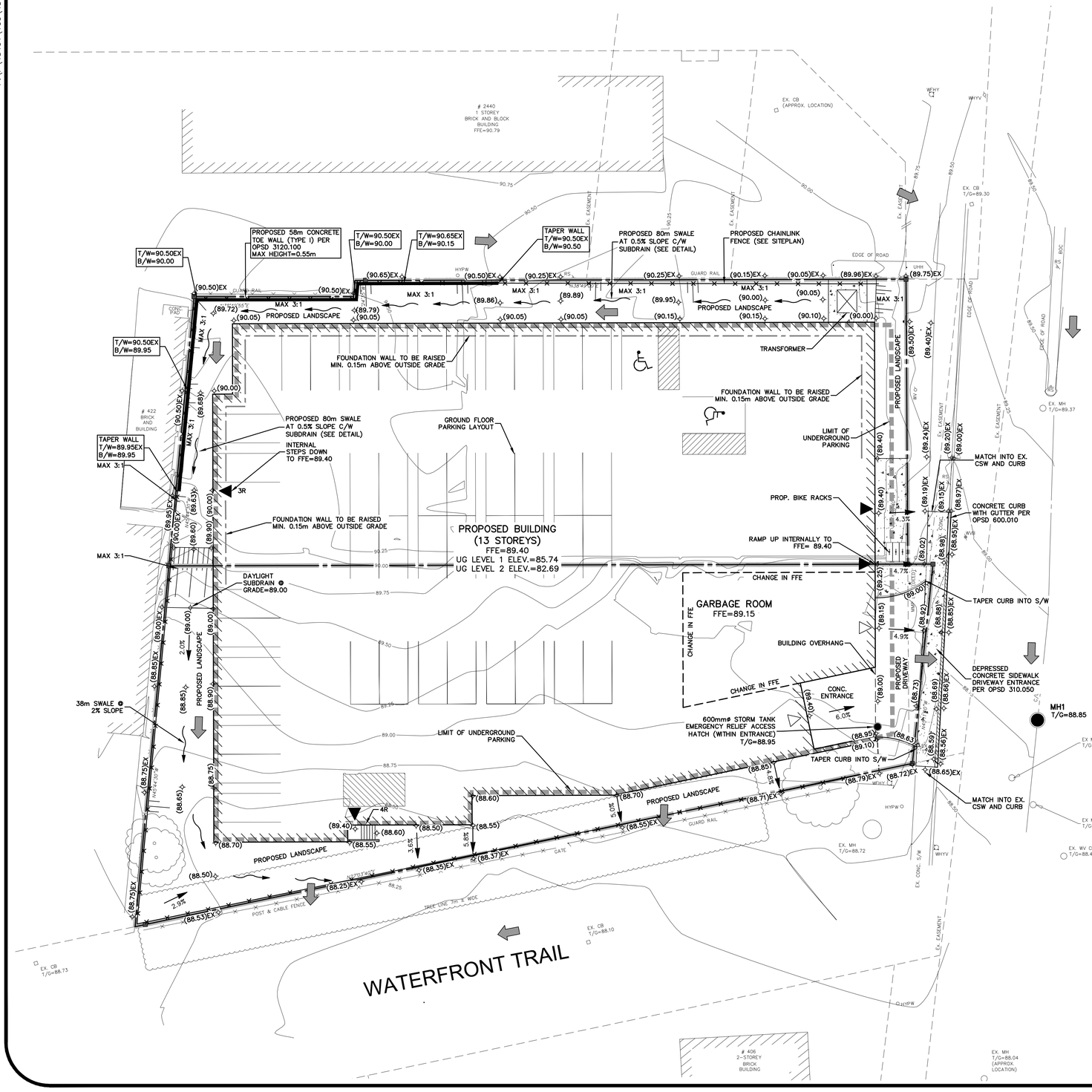
PROJECT
418 & 422 GUELPH LINE
13 STOREY APARTMENT BUILDING
418 & 422 GUELPH LINE BURLINGTON, ON

DRAWING
EROSION AND SEDIMENT CONTROL PLAN

Project Manager K. RAMSEWAK	Project No. 45401-100
Design By ALP	Checked By KRR
Drawn By GXS/RNC	Checked By ALP
Surveyed By OTHERS	Drawing No. C1.2
Date Feb.08/19	
Scale 1:200	Sheet 2 of 5

November 7, 2019 — 2:27 p.m. — Plotted By: jasztalos

MTE FILE No: 45401-100-C2.1
PRELIMINARY SITE GRADING PLAN
P:\P\45401\100\45401-100-C2



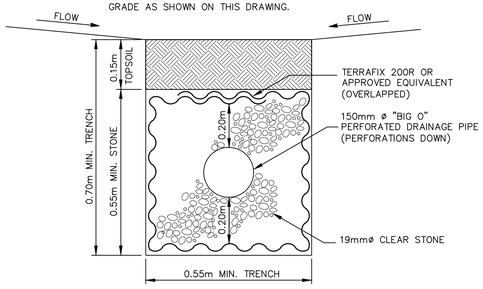
LEGEND OF EXISTING FEATURES

- SITE BOUNDARY
- EASEMENT
- EXISTING CONTOURS (326.00)
- EXISTING CURB (Ex. Drop Curb)
- EXISTING BUILDING
- EXISTING FENCE
- EXISTING MAN DOOR

LEGEND OF PROPOSED FEATURES

- PROPOSED SPOT ELEVATIONS (326.00); T/C=326.00; FFE=326.00
  EX =MAINTAIN EXISTING
  T/C =TOP OF CASTING/GRATE
  INV =INVERT ELEVATION
  FFE =FINISHED FLOOR ELEVATION
- DIRECTION OF DRAINAGE/SWALE (1.0% 1.0%)
- DRAINAGE SPLIT (RIDGE)
- EMBANKMENT (SLOPE AS NOTED) (TOP) 3:1 (BOTTOM)
- PROPOSED BUILDING
- OVERHEAD DOOR
- MAN DOOR
- CONCRETE CURB (DROP CURB)
- OVERLAND FLOW ROUTE (MAJOR STORM)
- PROPOSED CONCRETE
- LIMIT OF UNDERGROUND PARKING
- CHANGE IN FFE
- CONCRETE TOE WALL

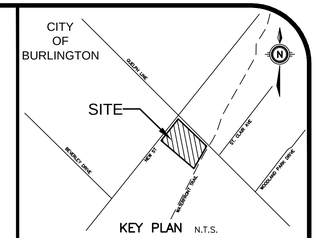
NOTE:
INSTALLATION OF SUB-DRAIN AT DIRECTION OF ENGINEER. SUB-DRAIN TO DAYLIGHT AT GRADE AS SHOWN ON THIS DRAWING.



PERFORATED SUB-DRAIN DETAIL
N.T.S.

NOTES TO CONTRACTOR:

1. INSPECTION
   CONTRACTOR IS RESPONSIBLE FOR CONTACTING ENGINEER 48 HRS PRIOR TO COMMENCING WORK TO ARRANGE FOR INSPECTION. ENGINEER TO DETERMINE DEGREE OF INSPECTION AND TESTING REQUIRED FOR CERTIFICATION OF UNDERGROUND SERVICE INSTALLATION AS MANDATED BY ONTARIO BUILDING CODE DIVISION C, PART 1, SECTION 1.2.2, GENERAL REVIEW. FAILURE TO NOTIFY ENGINEER WILL RESULT IN EXTENSIVE POST CONSTRUCTION INSPECTION AT CONTRACTORS EXPENSE.
2. CONFIRMATION OF EXISTING INVERTS
   72 HOURS PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR IS TO LOCATE, EXPOSE AND VERIFY INVERTS OF EXISTING SEWERS AT CONNECTION POINTS AND REPORT FINDINGS TO MTE. SHOULD THE CONTRACTOR PROCEED WITHOUT COMPLETING THESE LOCATES, EXTRA COSTS RESULTING FROM DELAYS AND STANDBY TIME WILL NOT BE CONSIDERED.
3. SHOP DRAWINGS
   CONTRACTOR TO PROVIDE SHOP DRAWINGS TO THE ENGINEER FOR REVIEW AND APPROVAL FOR ALL CHAMBERS AND STRUCTURES PRIOR THE START OF CONSTRUCTION AND PRIOR TO ORDERING ANY STRUCTURES AND PARTS.



GEODETIC BM ELEV. = 80.809m
CITY OF BURLINGTON BENCHMARK No. 273
BRASS CAP IN TOP OF CURB AT THE NORTHERLY END OF THE RAMP LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF LAKESHORE ROAD AND GUELPH LINE. THE MONUMENT IS LOCATED 5.5 METRES FROM THE END OF THE CURB RETURN ON THE SOUTHEAST CORNER OF THE INTERSECTION, 2.68 METRES FROM A NAIL IN THE FACE OF A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHEAST CORNER, AND 19.2 METRES FROM A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHWEST CORNER OF THE INTERSECTION.

SITE BENCHMARK ELEV. = m

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR ZBA	KRR	NOV.08/2019

MTE
Engineers | Scientists | Surveyors
(905) 639-2552 www.mte85.com

LICENSED PROFESSIONAL ENGINEER K.R.RAMSEWAK 100100928 NOV 8/19 PROVINCE OF ONTARIO

NOT FOR CONSTRUCTION

CLIENT
WALDEMAR LIMITED
3410 SOUTH SERVICE ROAD, SUITE G5 BURLINGTON, ON

PROJECT
418 & 422 GUELPH LINE
13 STOREY APARTMENT BUILDING
418 & 422 GUELPH LINE BURLINGTON, ON

DRAWING
PRELIMINARY SITE GRADING PLAN

Project Manager: K. RAMSEWAK	Project No.: 45401-100
Design By: RDZ	Checked By: KRR
Drawn By: AJT/GXS	Checked By: KRR
Surveyed By: OTHERS	Drawing No.: C2.1
Date: Feb.08/19	
Scale: 1:200	Sheet 3 of 5

November 7, 2019 - 2:27 p.m. - Plotted By: jaszalos

45401-100-C2.2

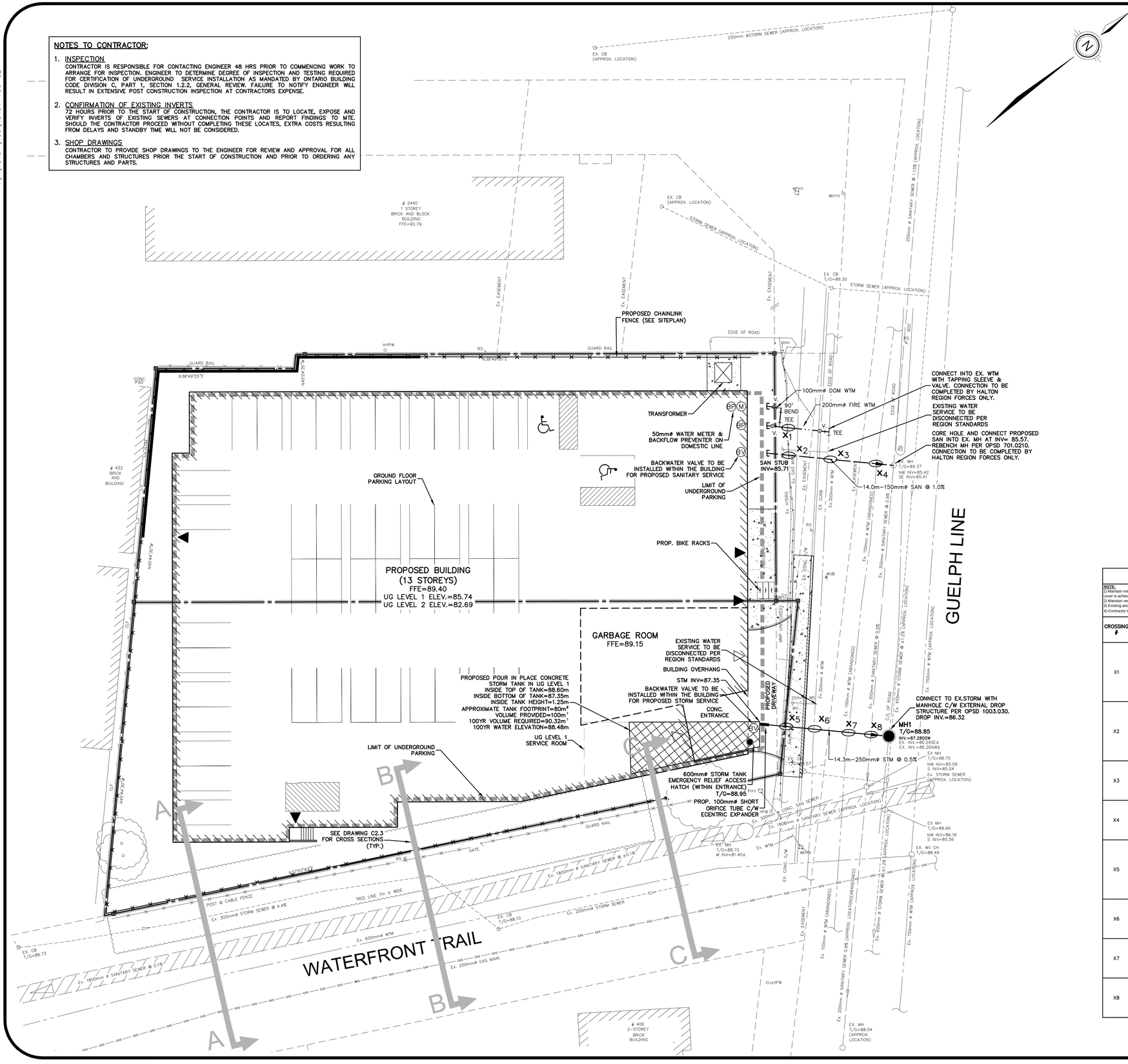
MTE FILE No:

PRELIMINARY SITE SERVICING PLAN

P:\P\45401\100\45401-100-C2

NOTES TO CONTRACTOR:

1. INSPECTION
   CONTRACTOR IS RESPONSIBLE FOR CONTACTING ENGINEER 48 HRS PRIOR TO COMMENCING WORK TO ARRANGE FOR INSPECTION. ENGINEER TO DETERMINE DEGREE OF INSPECTION AND TESTING REQUIRED FOR CERTIFICATION OF UNDERGROUND SERVICE INSTALLATION AS MANDATED BY ONTARIO BUILDING CODE DIVISION C, PART 1, SECTION 1.2.2., GENERAL REVIEW. FAILURE TO NOTIFY ENGINEER WILL RESULT IN EXTENSIVE POST CONSTRUCTION INSPECTION AT CONTRACTORS EXPENSE.
2. CONFIRMATION OF EXISTING INVERTS
   72 HOURS PRIOR TO THE START OF CONSTRUCTION, THE CONTRACTOR IS TO LOCATE, EXPOSE AND VERIFY INVERTS OF EXISTING SEWERS AT CONNECTION POINTS AND REPORT FINDINGS TO MTE. SHOULD THE CONTRACTOR PROCEED WITHOUT COMPLETING THESE LOCATES, EXTRA COSTS RESULTING FROM DELAYS AND STANDBY TIME WILL NOT BE CONSIDERED.
3. SHOP DRAWINGS
   CONTRACTOR TO PROVIDE SHOP DRAWINGS TO THE ENGINEER FOR REVIEW AND APPROVAL FOR ALL CHAMBERS AND STRUCTURES PRIOR THE START OF CONSTRUCTION AND PRIOR TO ORDERING ANY STRUCTURES AND PARTS.



LEGEND OF EXISTING FEATURES

- SITE BOUNDARY
- Ex. 300mmø SAN / Ex. MH — EXISTING SANITARY SEWER
- Ex. 200mmø WTM / Ex. HYD. SET — EXISTING WATERMAIN
- Ex. 375mmø STM / Ex. MH — EXISTING STORM SEWER
- Ex. Drop Curb — EXISTING CURB
- EXISTING BUILDING
- EXISTING FENCE
- EXISTING MAN DOOR

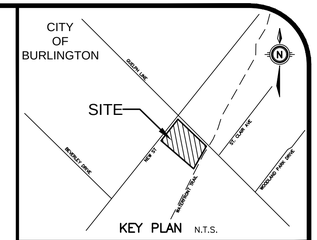
LEGEND OF PROPOSED FEATURES

- MH 14.6m–200mmø SAN @ 1.5% — SANITARY SEWER
- MH 21.3m–300mmø STM @ 1.3% — STORM SEWER
- HYD. SET, 200mmø WTM, V., TEE — WATERMAIN
- X_1 — SEWER CROSSING (REFER TO CROSSING CHART)
- PROPOSED BUILDING
- OVERHEAD DOOR
- MAN DOOR
- CONCRETE CURB (DROP CURB)
- PROPOSED CONCRETE
- LIMIT OF UNDERGROUND LEVEL
- CHANGE IN FFE
- BP M SV — BACKFLOW PREVENTER/WATER METER/BACKWATER VALVE
- CONCRETE TOE WALL

SEWER CROSSING CHART

NOTE:
1) Maintain minimum 0.5m vertical clearance between all watermains and sewers. Where watermain is deflected, ensure 1.7m cover is achieved or watermain is insulated.
2) Maintain vertical clearance at all other crossings.
3) Existing and proposed watermain depths are approximate only. Notify Design Engineer of any discrepancies.
4) Contractor to verify all existing inverts prior to product ordering. Notify Design Engineer of any discrepancies.

CROSSING #	SEWER TYPE	SEWER SIZE (mmø)	CROSSING ELEVATION	NOTES
X1	WTM	150	OBV=87.95±	MAINTAIN MINIMUM 0.3m VERTICAL CLEARANCE w/ EX. GAS AND HYDRO
	EX. GAS	---	UNKNOWN	
	EX. HYDRO	---	UNKNOWN	
X2	SAN	150	OBV=85.87	MAINTAIN MINIMUM 0.3m VERTICAL CLEARANCE w/ EX. GAS AND HYDRO
	EX. GAS	---	UNKNOWN	
	EX. HYDRO	---	UNKNOWN	
X3	SAN	150	OBV=85.77	EX. WTM INVERT INFORMATION ACQUIRED FROM HALTON REGION AS-CONSTRUCTED DRAWING B-12495 DATED JULY 30, 2010
	EX. WTM	300	INV=87.00	
X4	SAN	150	OBV=85.67	EX. WTM IS ABANDONED
	EX. WTM	100	INV=87.40±	
X5	STM	250	OBV=87.59	MAINTAIN MINIMUM 0.3m VERTICAL CLEARANCE w/ EX. GAS AND HYDRO
	EX. GAS	---	UNKNOWN	
	EX. HYDRO	---	UNKNOWN	
X6	STM	250	INV=87.32	EX. WTM OBVERT INFORMATION ACQUIRED FROM HALTON REGION AS-CONSTRUCTED DRAWING B-12495 DATED JULY 30, 2010
	EX. WTM	300	OBV=86.80	
X7	STM	250	INV=87.30	EX. WTM IS ABANDONED
	EX. WTM	100	OBV=87.10±	
X8	STM	250	INV=87.29	
	EX. SAN	300	OBV=85.44	



GEODETIC BM ELEV. = 80.809m

CITY OF BURLINGTON BENCHMARK No. 273
BRASS CAP IN TOP OF CURB AT THE NORTHERLY END OF THE RAMP LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF LAKESHORE ROAD AND GUELPH LINE. THE MONUMENT IS LOCATED 5.5 METRES FROM THE END OF THE CURB RETURN ON THE SOUTHEAST CORNER OF THE INTERSECTION, 2.68 METRES FROM A NAIL IN THE FACE OF A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHEAST CORNER, AND 19.2 METRES FROM A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHWEST CORNER OF THE INTERSECTION.

SITE BENCHMARK ELEV. = m

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR ZBA	KRR	NOV.08/2019

MTE
Engineers | Scientists | Surveyors
(905) 639-2552 www.mte85.com

LICENSED PROFESSIONAL ENGINEER K.R.RAMSEWAK 100100928 NOV 8/19 PROVINCE OF ONTARIO

NOT FOR CONSTRUCTION

CLIENT
WALDEMAR LIMITED
3410 SOUTH SERVICE ROAD, SUITE G5 BURLINGTON, ON

PROJECT
418 & 422 GUELPH LINE
13 STOREY APARTMENT BUILDING
418 & 422 GUELPH LINE BURLINGTON, ON

DRAWING
PRELIMINARY SITE SERVICING PLAN

Project Manager: K. RAMSEWAK	Project No.: 45401-100
Design By: RDZ	Checked By: KRR
Drawn By: AJT/GXS	Checked By: KRR
Surveyed By: OTHERS	Drawing No.: C2.2
Date: Feb.08/19	
Scale: 1:200	Sheet 4 of 5

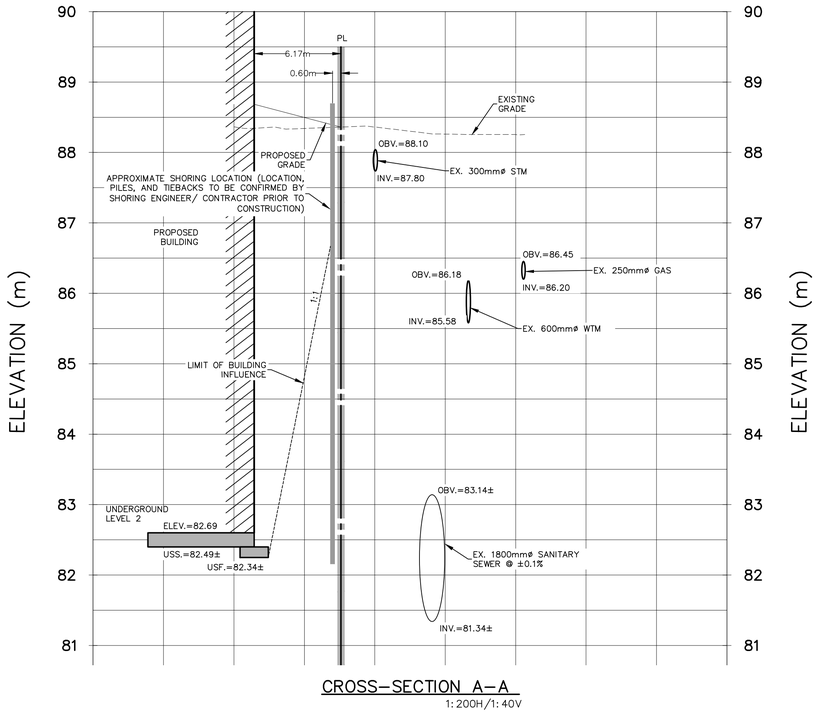
November 7, 2019 — 2:27 p.m. — Plotted By: jaztolos

45401-100-C2.3

MTE FILE No:

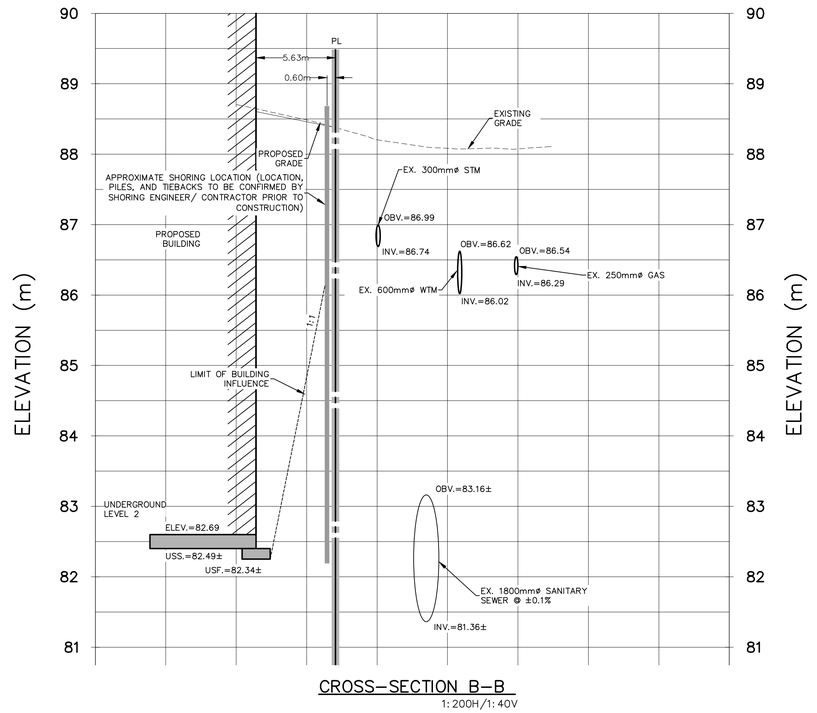
PRELIMINARY CROSS SECTIONS PLAN

P:\P\45401\100\45401-100-C2



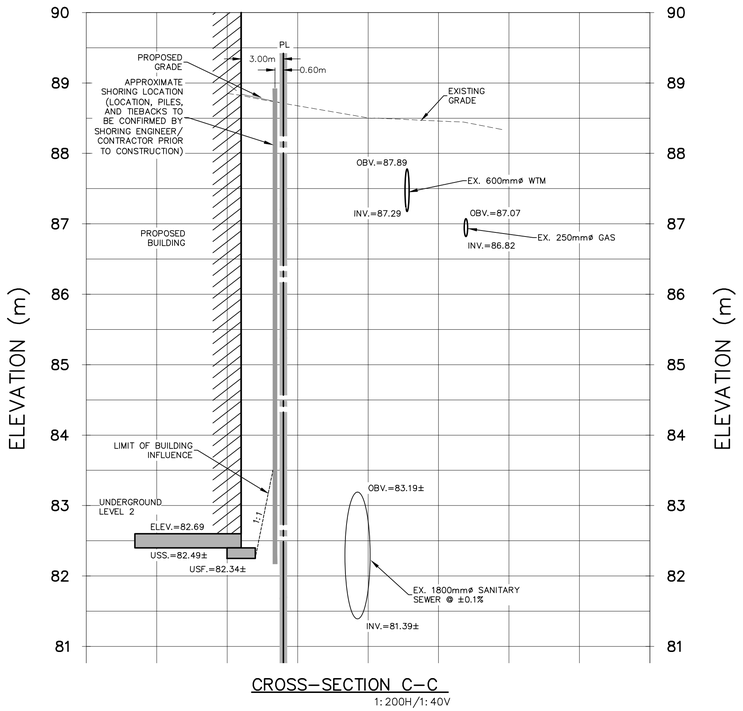
CROSS-SECTION A-A

1: 200H/1: 40V



CROSS-SECTION B-B

1: 200H/1: 40V

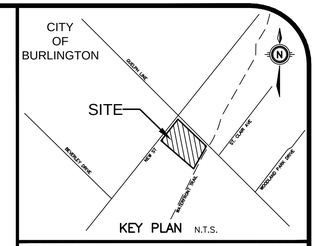


CROSS-SECTION C-C

1: 200H/1: 40V

NOTE:

1. UTILITIES AND MAINS FIELD LOCATED VIA HYDROVAC METHOD BY SUPER SUCKER AND SURVEYED BY MMP SURVEYORS LTD. ON SEPT. 26, 2019. ELEVATION INFORMATION WAS ACQUIRED FROM SUBSURFACE UTILITY AND TOPOGRAPHICAL MAPPING PLAN PREPARED BY MMP SURVEYORS LTD. DATED OCT. 10, 2019.
2. TEST PITS FOR THE 1800mmø SANITARY TRUNK MAIN EXPERIENCED CONTINUOUS COLLAPSING AND HYDROVAC OPERATION WAS STOPPED DUE TO SAFETY CONCERNS, AS SUCH THE SANITARY TRUNK MAIN WAS NOT EXPOSED. BASED ON THE ATTEMPTED TEST PITS, THE SANITARY TRUNK MAIN IS GREATER THAN 5m IN DEPTH. AS SUCH, REGIONAL AS-CONSTRUCTED DRAWING B-12495 WAS USED TO ESTIMATE THE ELEVATIONS OF THE SANITARY TRUNK MAIN.
3. LOCATION AND EXTENT OF FOUNDATION TIEBACKS TO BE CONFIRMED BY STRUCTURAL ENGINEER PRIOR TO CONSTRUCTION.
4. LOCATION AND EXTENT OF SHORING, PILES, AND TIEBACKS TO BE CONFIRMED BY SHORING ENGINEER/CONTRACTOR PRIOR TO CONSTRUCTION



GEODETIC BM **ELEV. = 80.809m**

CITY OF BURLINGTON BENCHMARK No. 273
BRASS CAP IN TOP OF CURB AT THE NORTHERLY END OF THE RAMP LOCATED AT THE SOUTHEAST CORNER OF THE INTERSECTION OF LAKESHORE ROAD AND GUELPH LINE. THE MONUMENT IS LOCATED 5.5 METRES FROM THE END OF THE CURB RETURN ON THE SOUTHEAST CORNER OF THE INTERSECTION, 2.68 METRES FROM A NAIL IN THE FACE OF A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHEAST CORNER, AND 19.2 METRES FROM A WOODEN HYDRO POLE (TRAFFIC SIGNAL POLE) ON THE SOUTHWEST CORNER OF THE INTERSECTION.

SITE BENCHMARK **ELEV. = m**

NOTE TO CONTRACTOR :

DO NOT SCALE DRAWINGS.

CONTRACTORS MUST CHECK AND VERIFY ALL DIMENSIONS AND REPORT ANY DISCREPANCIES TO THE ENGINEER BEFORE PROCEEDING WITH THE WORK.

ALL DRAWINGS REMAIN THE PROPERTY OF THE ENGINEER AND SHALL NOT BE REPRODUCED OR REUSED WITHOUT THE ENGINEER'S WRITTEN PERMISSION.

THE OWNER/ARCHITECT/CONTRACTOR IS ADVISED THAT M.T.E. CONSULTANTS INC. CANNOT CERTIFY ANY COMPONENT OF THE SITE WORKS NOT INSPECTED DURING CONSTRUCTION. IT IS THE RESPONSIBILITY OF THE GENERAL CONTRACTOR TO NOTIFY M.T.E. CONSULTANTS INC. PRIOR TO COMMENCEMENT OF CONSTRUCTION TO ARRANGE FOR INSPECTION.

No.	REVISION	BY	DATE
8.			
7.			
6.			
5.			
4.			
3.			
2.			
1.	ISSUED FOR ZBA	KRR	NOV.08/2019

MTE
Engineers | Scientists | Surveyors
(905) 639-2552 www.mte85.com

LICENSED PROFESSIONAL ENGINEER
K.R.RAMSEWAK
100100928
NOV 8/19
PROVINCE OF ONTARIO

NOT FOR CONSTRUCTION

CLIENT
WALDEMAR LIMITED
3410 SOUTH SERVICE ROAD, SUITE G5 BURLINGTON, ON

PROJECT
418 & 422 GUELPH LINE
13 STOREY APARTMENT BUILDING
418 & 422 GUELPH LINE BURLINGTON, ON

DRAWING
PRELIMINARY CROSS SECTIONS PLAN

Project Manager K. RAMSEWAK	Project No. 45401-100
Design By RDZ	Checked By KRR
Drawn By AJT/GXS	Checked By KRR
Surveyed By OTHERS	Drawing No. C2.3
Date Feb.08/19	
Scale 1:200	Sheet 5 of 5

November 7, 2019 - 2:27 p.m. - Plotted By: jastalos