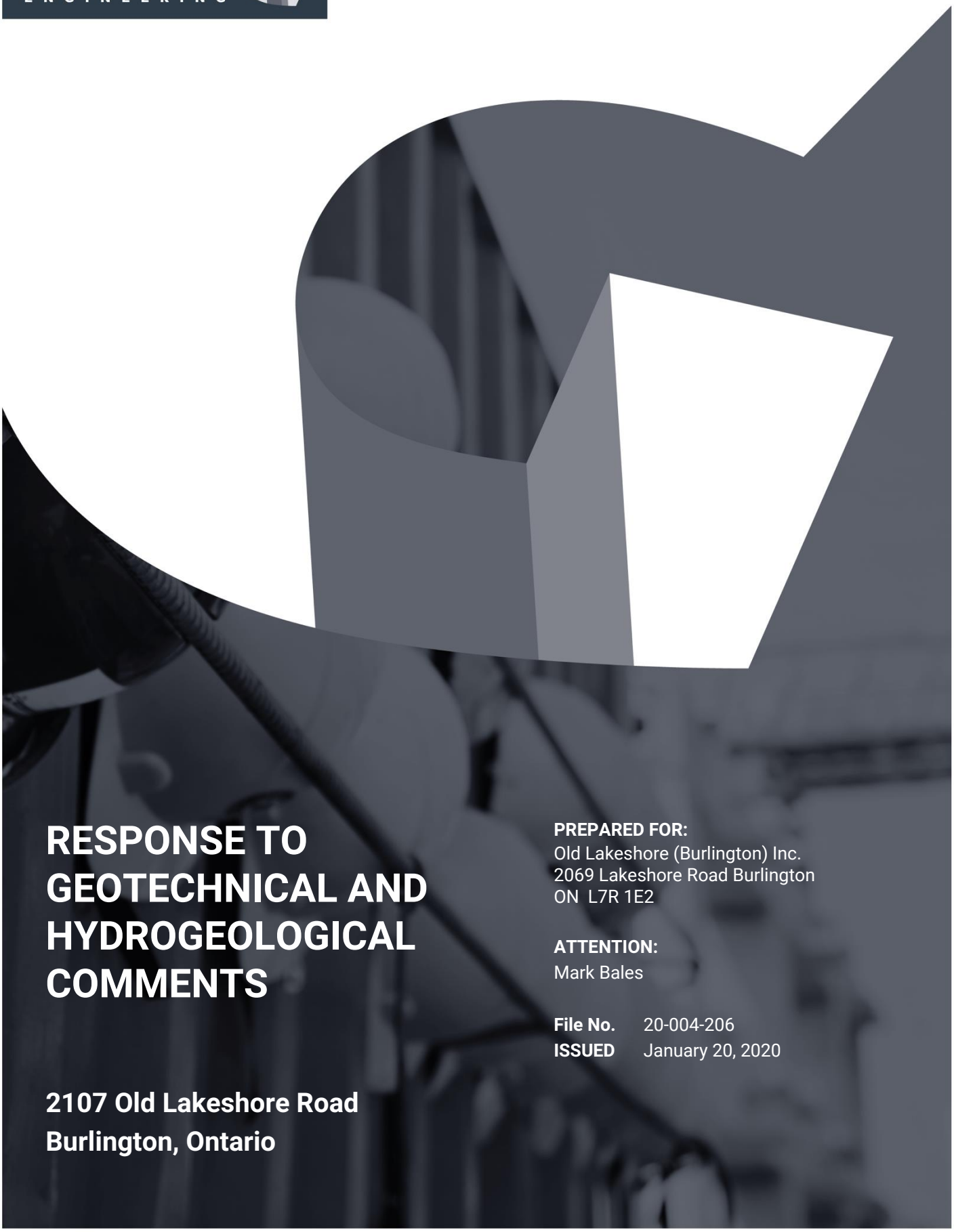
GROUNDED ENGINEERING



RESPONSE TO GEOTECHNICAL AND HYDROGEOLOGICAL COMMENTS

2107 Old Lakeshore Road
Burlington, Ontario

PREPARED FOR:
Old Lakeshore (Burlington) Inc.
2069 Lakeshore Road Burlington
ON L7R 1E2

ATTENTION:
Mark Bales

File No. 20-004-206
ISSUED January 20, 2020

Old Lakeshore (Burlington) Inc.
2069 Lakeshore Road Burlington
ON L7R 1E2

File No. 20-004-206
January 20, 2020

Attention: Mark Bales

Subject: 2107 Old Lakeshore Road, Burlington, Ontario
Response to Geotechnical and Hydrogeological Comments

Grounded Engineering Inc. ("Grounded") is pleased to provide you with this Response to Geotechnical and Hydrogeological Comments for the site known as 2107 Old Lakeshore Road, in Burlington, Ontario.

1 Introduction

Ground was retained by Old Lakeshore (Burlington) Inc. to provide a response to the geotechnical and hydrogeological comments raised by the City of Burlington in their letter dated January 9, 2020. The letter is enclosed for reference.

Carriage Gate Homes provided Grounded the following documents, which were used in the written of this letter:

- City of Burlington Comment Letter for Proposed Redevelopment 2107 Old Lakeshore & 2119 Lakeshore Road dated January 9, 2020.
- *"Geotechnical Investigation and Engineering Design, 2107 & 2119 Old Lakeshore Road, Burling Ontario"* dated December 21, 2016, by Terraprobe Inc.
- *"Hydrogeological Investigation and Engineering Design, 2107 & 2119 Old Lakeshore Road, Burling Ontario"* dated January 12, 2017, by Terraprobe Inc.
- *"Phase Two Environmental Site Assessment, 2107 & 2119 Old Lakeshore Road, Burling Ontario"* dated July 8, 2019, by Terraprobe Inc.

In addition to the above noted reports, Grounded also conducted a site inspection on January 16, 2020 to collect additional water levels and assess the condition of the monitoring wells on site.

2 Ground Water Elevations

The following ground water elevations have been collected from the property.

Borehole	Ground Level Elev. (masl)	08-Dec-16 Elev. (masl)	19-Dec-16 Elev. (masl)	15-Mar-19 Elev. (masl)	06-Apr-19 Elev. (masl)	16-Apr-19 Elev. (masl)	16-Jan-20 Elev. (masl)	Average Elev. (masl)	Fluctuation (m)
BH1	81.5	77.2	-	-	75.5	75.5	75.6	**75.9**	± 0.4
BH2	79.6	77.4	77.5	77.9	78.0	78.0	77.7	**77.8**	±0.4
BH101	81.5	-	-	-	79.4	79.3	79.0	**79.2**	±0.2
BH102	79.6	-	-	-	76.0	76.6	76.7	**76.4**	±0.4
BH103s	79.9	-	-	-	78.8	78.8	78.8	**78.8**	±0.0
BH103D	79.9	-	-	-	76.9	76.8	77.0	**76.9**	±0.1
BH104S	79.9	-	-	-	78.6	78.6	78.7	**78.6**	±0.1
BH104D	81.0	-	-	-	76.5	76.5	76.3	**76.4**	±0.1
BH105		-	-	-	79.5	79.1	79.0	**79.1**	±0.3

There exists two (2) groundwater elevations at the site. The first is in the overburden with an average groundwater elevation of 78.7 masl and the second is in the bedrock with an average ground water elevation of 76.4 masl.

3 Response to Comments

The City of Burlington provided the following geotechnical and hydrogeological comments and Grounded has provided response to each of the comments below.

> ***4a – The report refers to 4 levels of underground parking where 5 levels are proposed. Please confirm that the overall depth of the borehole analysis conducted on November 25, 2016 archives the limits to conform to a 5 level underground structure.***

Bedrock of the Queenston formation begins at approximately 2.3 m below the ground surface. As such, the excavation will be within the bedrock formation even at the P1 level. The P2, P3, P4 and P5 levels will be completely within the bedrock. The approximate finished floor elevation of a P5 level will be approximately 16 m below ground surface. The geotechnical investigation included rock coring to 16.9 m below ground surface. As such, because the P2 through P5 levels will be within the bedrock and the geotechnical

investigation extended below the P5 elevation, we confirm that the current geotechnical investigation will stratify the requirements for the current proposed P5 level.

> ***4b – Seasonal fluctuations may cause significant changes to the depth of the groundwater table over time. Please provide further analysis during the months of April/May when precipitation rates may be higher.***

A total of six (6) groundwater levels have been collected from the site, included two (2) groundwater levels from April. As such, the seasonally high groundwater elevations have been determined.

In addition, there is less than 2.5 m of overburden present at the property. The overburden does have a perched groundwater table over the lower bedrock aquifer. Well it is acknowledged that the rainfall events may affect the groundwater elevation in the overburden, the majority of the excavation at this site will be within the bedrock, which does not experience fluctuations due to rainfall events.

Given the above, we feel that the groundwater levels at the site have been sufficiently evaluated to determine the seasonal fluctuations in the overburden and in the bedrock.

> ***4c – The report referred to a Hydrogeological Investigation prepared by Terraprobe (File 1-16-0680-46). Please provide a copy of this report for review.***

A copy of the Hydrogeological Investigation is enclosed as part of this letter.

4 Conclusions

The following conclusions are presented based upon a review of the provided information and the site inspection conducted by Grounded:

- The overburden at the site consist of clayey silt over bedrock of the Queenston Formation.
- The hydraulic conductivities of both the overburden and the bedrock respectively, are very low (10^{-7} to 10^{-8} m/s)
- The thickness of the overburden at the site is only 2.3 m thick
- The depth of the investigation extended to 16.9 m below the ground surface, which is sufficient for a P5 level.
- The hydrogeological investigation assumed a P4 level, extending approximately to 13 m below that ground surface. The addition of a parking level to P5, increasing the depth to approximately 16 m below ground surface, will slightly increase the ground water seepage from the bedrock.
- The current hydrogeological investigation estimates a ground water seepage rate of 2,100 L/day for a P4 scenario in the long-term condition. For a P5 scenario, we recommend increasing the ground water seepage to 3,000 L/day.

5 Closure

We trust that the information contained in this letter is sufficient for your present requirements. If we can be of further assistance, please do not hesitate to contact us.

GROUNDED ENGINEERING



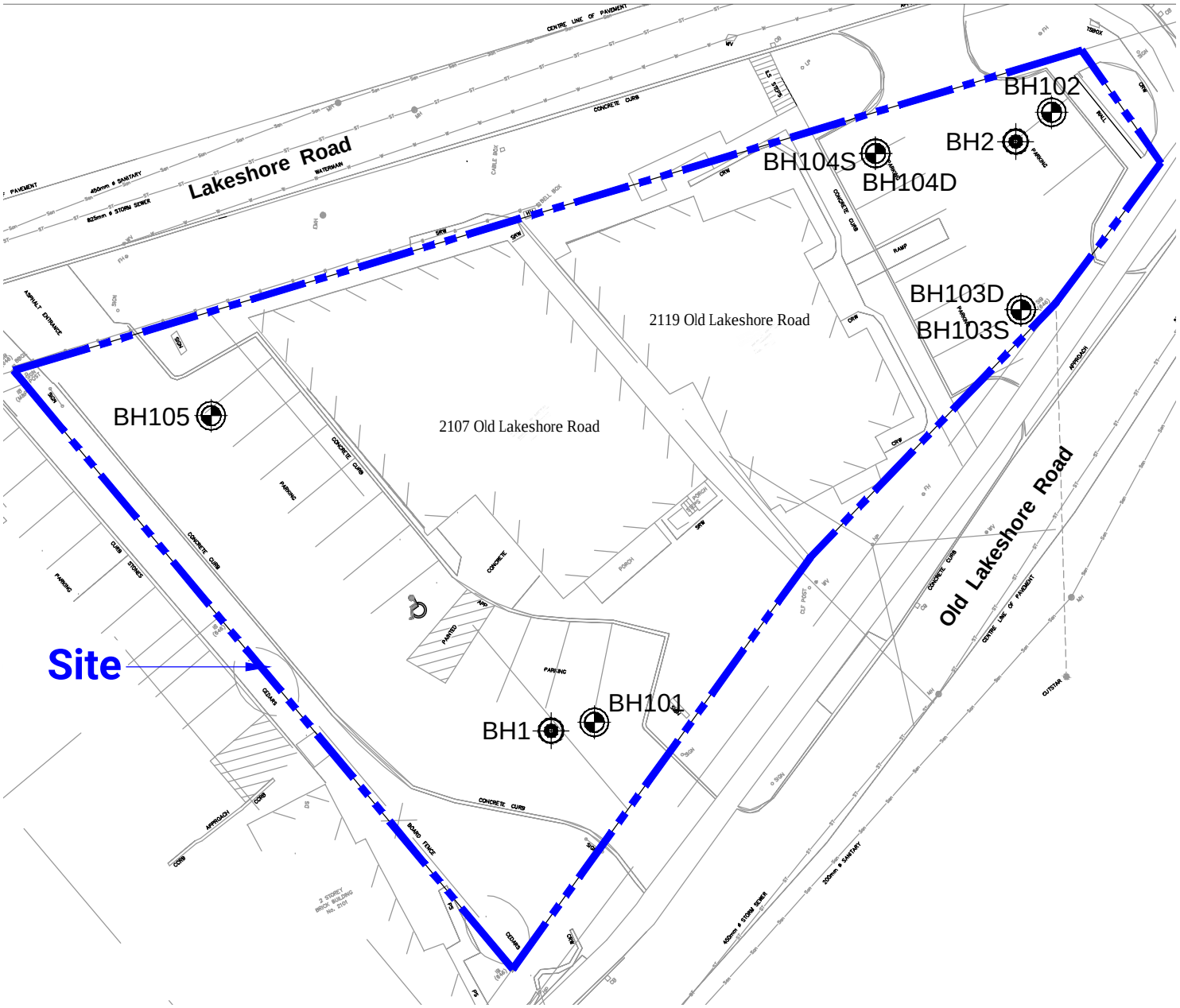
Matthew Bielaski, P.Eng., QP_{RA}
Principal

Enclosed:

Figure 1 – Borehole Location Plan

Appendix A – Borehole Logs
Appendix B – City of Burlington Comments
Appendix C – Terraprobe Hydrogeological Investigation

FIGURES



GROUNDED ENGINEERING

Borehole Location Plan

Project No. 20-004-206

Date January 20, 2020

Figure No. 1

Appendix A



LOG OF BOREHOLE 101

Terraprobe

Project No. : 7-19-0023-42	Client : Old Lakeshore Burlington Inc.	Originated by : KG
Date started : March 26, 2019	Project : 2107 & 2119 Old Lakeshore Road	Compiled by : AB
Sheet No. : 1 of 1	Location : Burlington, Ontario	Checked by : BW

Position : E: 597993, N: 4797787 (UTM 17T) Elevation Datum : Geodetic

Rig type : Truck-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)	Penetration Test Values (Blows / 0.3m) / Undrained Shear Strength (kPa)	Moisture / Plasticity	Headspace Vapour (ppm)	Instrument Details	Unstabilized Water Level	Lab Data and Comments
	81.5	**GROUND SURFACE**						Dynamic Cone 10 20 30 40; Unconfined, Pocket Penetrometer, Field Vane, Lab Vane 40 80 120 160	Plastic Limit, Natural Water Content, Liquid Limit PL MC LL 10 20 30				GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL
0	81.3	50mm **ASPHALTIC CONCRETE**											
	0.2	**FILL**, granular base											
		CLAYEY SILT, trace to some sand, trace to some gravel, stiff to hard, grey and brown (GLACIAL TILL)		1	SS	15	81			PID: 20			
1				2	SS	80				PID: 35			SS2 Analysis: M&I, PAH
				3	SS	47	80			PID: 25			
2				4	SS	83 / 250mm	79			PID: 25			0 24 57 19
	78.6												
3	78.4	**WEATHERED SHALE**, very dense, reddish brown		5	SS	50 / 25mm				PID: 20			
	3.1												

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Apr 6, 2019	2.1	79.4
Apr 16, 2019	2.2	79.3

file: 7-19-0023-42 2107 old lakeshore road.gpj

LOG OF BOREHOLE 102

Terraprobe

Project No. : 7-19-0023-42	Client : Old Lakeshore Burlington Inc.	Originated by : KG
Date started : March 26, 2019	Project : 2107 & 2119 Old Lakeshore Road	Compiled by : AB
Sheet No. : 1 of 1	Location : Burlington, Ontario	Checked by : BW

Position : E: 598010, N: 4797828 (UTM 17T) Elevation Datum : Geodetic

Rig type : Truck-mounted Drilling Method : Solid stem augers

Depth (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
0	79.6	**GROUND SURFACE**				
	79.4	100mm **ASPHALTIC CONCRETE**				
	0.2	**FILL**, sand and gravel, trace brick fragments, brown		1	SS	20
1		**FILL**, clayey silt, some sand, some gravel, trace brick fragments, trace staining, strong petroleum hydrocarbon odour, firm, brown		2	SS	8
				3	SS	8
2	77.6					
	2.0	**CLAYEY SILT**, some sand, trace gravel, petroleum odour, hard, reddish brown				
	77.3					
	2.3	**WEATHERED SHALE**, petroleum hydrocarbon odour to 6.7m depth, hard, reddish brown		4	SS	98 / 275mm
3				5	SS	50 / 100mm
				6	SS	50 / 75mm
4				7	SS	50 / 75mm
				8	SS	50 / 50mm
5						
6						
	71.9			9	SS	50 / 50mm
7	7.7					

END OF BOREHOLE

Borehole was dry and caved to 7.3 m below ground surface upon completion of drilling.

50 mm dia. monitoring well installed.

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

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

Elevation Scale (m): 79, 78, 77, 76, 75, 74, 73, 72

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

Headspace Vapour (ppm): PID: 0; PID: 1650; PID: 1650; PID: 870; PID: 410; PID: 250; PID: 200; PID: 55; PID: 80

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) — GR SA SI CL

SS1 Analysis: M&I, PAH

SS3 Analysis: Metals, VOC, PHC, EC/SAR

SS4 Analysis: VOC, PHC

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Apr 6, 2019	3.6	76.0
Apr 16, 2019	3.0	76.6

file: 7-19-0023-42 2107 old lakeshore road.gpj

LOG OF BOREHOLE 103

Terraprobe

Project No. : 7-19-0023-42	Client : Old Lakeshore Burlington Inc.	Originated by : KG
Date started : March 26, 2019	Project : 2107 & 2119 Old Lakeshore Road	Compiled by : AB
Sheet No. : 1 of 1	Location : Burlington, Ontario	Checked by : BW

Position : E: 598020, N: 4797809 (UTM 17T) Elevation Datum : Geodetic

Rig type : Truck-mounted Drilling Method : Solid stem augers

Depth (m)	Elev Depth (m)	Description	Number	Type	SPT 'N' Value
	79.9	**GROUND SURFACE**			
0	79.7	150mm **ASPHALTIC CONCRETE**			
	0.2				
	79.7	**FILL**, granular base	1	SS	9
	0.2	**FILL**, clayey silt, some sand, some gravel, black staining (0.76 to 1.37m), petroleum odour, firm, brown	2	SS	5
1	78.4				
	1.5	**SHALEY TILL**, with grey shale fragments, dense, reddish brown	3	SS	70
2	77.6				
	2.3	**WEATHERED SHALE**, very dense, reddish brown	4	SS	50 / 75mm
			5	SS	50 / 125mm
3			6	SS	50 / 75mm
4			7	SS	50 / 50mm
5					
6			8	SS	50 / 50mm
7	72.3		9	SS	50 / 25mm
	7.6	**END OF BOREHOLE**			

Elevation Scale (m): 79, 78, 77, 76, 75, 74, 73

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

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

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

Headspace Vapour (ppm)
PID: 10
PID: 10
PID: 15
PID: 190
PID: 120
PID: 20
PID: 10
PID: 10

Instrument Details: W1 W2

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

SS1 Analysis: PAH

SS2 Analysis: M&I, VOC, PHC

SS3 Analysis: M&I, PAH, VOC, PHC

Unstabilized water level measured at 4.9 m below ground surface; borehole was open upon completion of drilling.

W1: 50 mm dia. monitoring well installed.
W2: 50 mm dia. monitoring well installed.

W1 WATER LEVELS

Date	Water Depth (m)	Elevation (m)
Apr 6, 2019	1.1	78.8
Apr 16, 2019	1.1	78.8

W2 WATER LEVELS

Date	Water Depth (m)	Elevation (m)
Apr 6, 2019	3.0	76.9
Apr 16, 2019	3.1	76.8

file: 7-19-0023-42 2107 old lakeshore road.gpj

LOG OF BOREHOLE 104

Terraprobe

Project No. : 7-19-0023-42	Client : Old Lakeshore Burlington Inc.	Originated by : KG
Date started : March 26, 2019	Project : 2107 & 2119 Old Lakeshore Road	Compiled by : AB
Sheet No. : 1 of 1	Location : Burlington, Ontario	Checked by : BW

Position : E: 598011, N: 4797821 (UTM 17T) Elevation Datum : Geodetic

Rig type : Truck-mounted Drilling Method : Solid stem augers

Depth (m)	Elev Depth (m)	Description	Number	Type	SPT 'N' Value
0	79.9	**GROUND SURFACE**			
	79.7	50mm **ASPHALTIC CONCRETE**			
	0.2	**FILL**, granular base	1	SS	12
		CLAYEY SILT, some sand, some gravel, petroleum odour below 0.76m, firm, brown	2	SS	4
2			3	SS	10
	77.6				
	2.3	**SILT to SHALEY TILL**, with shale fragments, black staining (2.5 to 3.35m) depth, petroleum odour, dense, reddish brown	4	SS	45
3	76.5		5	SS	83 / 250mm
	3.4	**WEATHERED SHALE**, petroleum odour, reddish brown	6	SS	50 / 100mm
4			7	SS	50 / 100mm
5					
6			8	SS	50 / 100mm
7	72.2		9	SS	50 / 125mm
	7.7	**END OF BOREHOLE**			

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

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

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

Headspace Vapour (ppm): PID: 5; PID: 10; PID: 350; PID: 500; PID: 150; PID: 170; PID: 95; PID: 70; PID: 30

Instrument Details: W1, W2

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

- SS2 Analysis: PAH
- SS3 Analysis: M&I, VOC, PHC
- SS4 Analysis: Metals, VOC, PHC, EC/SAR
- SS5 Analysis: VOC, PHC

Borehole was dry and open upon completion of drilling.

W1: 50 mm dia. monitoring well installed.
W2: 50 mm dia. monitoring well installed.

W1 WATER LEVELS

Date	Water Depth (m)	Elevation (m)
Apr 6, 2019	1.3	78.6
Apr 16, 2019	1.3	78.6

W2 WATER LEVELS

Date	Water Depth (m)	Elevation (m)
Apr 6, 2019	3.4	76.5
Apr 16, 2019	3.4	76.5

file: 7-19-0023-42 2107 old lakeshore road.gpj

LOG OF BOREHOLE 105

Terraprobe

Project No. : 7-19-0023-42	Client : Old Lakeshore Burlington Inc.	Originated by : KG
Date started : March 26, 2019	Project : 2107 & 2119 Old Lakeshore Road	Compiled by : AB
Sheet No. : 1 of 1	Location : Burlington, Ontario	Checked by : BW

Position :
Elevation Datum : Geodetic
Rig type : Truck-mounted
Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
	81.0	**GROUND SURFACE**				
0	80.8	50mm **ASPHALTIC CONCRETE**				
	0.2	**FILL**, granular base		1	SS	17
		SAND, some silt, compact, brown				
1				2	SS	18
	79.5					
	1.5	**CLAYEY SILT to SHALEY TILL**, hard, brown to reddish brown		3	SS	43
2				4	SS	80 / 250mm
	78.1					
3	2.9	**WEATHERED SHALE**, very dense, reddish brown		5	SS	50 / 75mm
	77.9					
	3.1					

Elevation Scale (m): 81, 80, 79, 78

Penetration Test Values (Blows / 0.3m)
Dynamic Cone: 10, 20, 30, 40
Undrained Shear Strength (kPa)
Unconfined, Pocket Penetrometer, Field Vane, Lab Vane
40, 80, 120, 160

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

Headspace Vapour (ppm): PID: 0, PID: 25, PID: 25, PID: 20, PID: 25

Instrument Details

Unstabilized Water Level

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

SS2 Analysis: M&I, PAH

SS3 Analysis: Metals, VOC, PHC, EC/SAR

END OF BOREHOLE

Borehole was dry and caved to 7.2 m below ground surface upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Apr 6, 2019	1.5	79.5
Apr 16, 2019	1.9	79.1

file: 7-19-0023-42 2107 old lakeshore road.gpj

LOG OF BOREHOLE 1

Terraprobe

Project No. : 1-16-0680-01	Client : Carriage Gate Homes	Originated by : TG
Date started : November 25, 2016	Project : SW of Old Lakeshore & Lakeshore Rd	Compiled by : NN
Sheet No. : 1 of 2	Location : Burlington, Ontario	Checked by : JC

Position : E: 597988, N: 4797784 (UTM 17T) | Elevation Datum : Geodetic (NAD83) | Core Diameter : **HQ**, OD=96mm, ID=64mm

Rig type : Truck-mounted | Drilling Method : Solid stem augers, HQ rock coring

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
0	81.5	**GROUND SURFACE**				
	81.3	50mm **ASPHALTIC CONCRETE**				
	0.2	150mm **AGGREGATE**				
		CLAYEY SILT, trace to some sand, trace to some gravel, very stiff to hard, mottled greyish brown (GLACIAL TILL)		1	SS	20
1		...at 0.8 m, reddish brown		2	SS	88
				3	SS	63
2	79.2					
	2.3	**INFERRED BEDROCK**, shale, red, weathered		4	SS	50 / 125mm
	78.9					
	2.6	**QUEENSTON FORMATION** (See rock core log for details)		1	RUN	
3				2	RUN	
4						
5				3	RUN	
6						
7				4	RUN	
8						
9				5	RUN	
10				6	RUN	

Elevation Scale (m): 81, 80, 79, 78, 77, 76, 75, 74, 73, 72

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

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

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

Headspace Vapour (ppm)

Instrument Details — Unstabilized Water Level

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

...at 1.5m, augers grinding

(continued next page)

LOG OF BOREHOLE 1

Terraprobe

Project No. : 1-16-0680-01	Client : Carriage Gate Homes	Originated by : TG
Date started : November 25, 2016	Project : SW of Old Lakeshore & Lakeshore Rd	Compiled by : NN
Sheet No. : 2 of 2	Location : Burlington, Ontario	Checked by : JC

Position : E: 597988, N: 4797784 (UTM 17T) | Elevation Datum : Geodetic (NAD83) | Core Diameter : **HQ**, OD=96mm, ID=64mm

Rig type : Truck-mounted | Drilling Method : Solid stem augers, HQ rock coring

Depth Scale (m)	Elev / Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value	Elevation Scale (m)
		(continued)					
11		**QUEENSTON FORMATION** (See rock core log for details) *(continued)*		6	RUN		71
12				7	RUN		70
13				8	RUN		69
14				9	RUN		68
15							67
16	64.6 / 16.9			10	RUN		66
							65

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

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

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

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT): GR SA SI CL

END OF BOREHOLE

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Dec 8, 2016	4.3	77.2
Mar 15, 2019	6.0	75.5
Apr 6, 2019	6.0	75.5
Apr 16, 2019	6.0	75.5

file: 1-16-0680-01 bh logs.gpj

LOG OF BOREHOLE 2

Terraprobe

Project No. : 1-16-0680-01	Client : Carriage Gate Homes	Originated by : TG
Date started : November 23, 2016	Project : SW of Old Lakeshore & Lakeshore Rd	Compiled by : NN
Sheet No. : 1 of 1	Location : Burlington, Ontario	Checked by : JC

Position : E: 598019, N: 4797817 (UTM 17T) Elevation Datum : Geodetic (NAD83)

Rig type : Truck-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
	79.6	**GROUND SURFACE**				
0	79.4	50mm **ASPHALTIC CONCRETE**				
	0.2	100mm **AGGREGATE**				
		FILL, sand, some silt to silty, trace gravel, trace clay, compact, reddish brown, moist		1	SS	16
1				2	SS	15
	78.1					
	1.5	**CLAYEY SILT**, some sand, trace gravel, hydrocarbon odour, firm, reddish brown, moist (GLACIAL TILL)		3	SS	6
2	77.3					
	2.3	**INFERRED BEDROCK**, shale, red, weathered (QUEENSTON FORMATION)		4	SS	97 / 275mm
3				5	SS	50 / 75mm
4				6	SS	50 / 25mm
5						
6	73.5			7	SS	50 / 25mm
	6.1	**END OF BOREHOLE**				

Elevation Scale (m): 79, 78, 77, 76, 75, 74

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

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

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

Headspace Vapour (ppm):
- PID: <5
- PID: <5
- PID: 3250
- PID: 2950
- PID: 270
- PID: 45

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) GR SA SI CL

2 10 59 29

...at 4.0m, heavy grinding to 4.3m

Unstabilized water level measured at 4.9 m below ground surface; borehole was open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Dec 8, 2016	2.2	77.4
Dec 19, 2016	2.1	77.5
Dec 17, 2018	1.7	77.9
Mar 15, 2019	1.6	78.0
Apr 6, 2019	1.6	78.0
Apr 16, 2019	1.6	78.0

file: 1-16-0680-01 bh logs.gpj

Appendix B



CITY OF Burlington

905 335-7600 Ext. 7809
905 335-7880
Rosalind.minaji@burlington.ca

January 9, 2020

Mr. Mark Bales
Carriage Gate Homes
2069 Lakeshore Road, Suite 201
Burlington, ON, L7R 1E2

Dear Mr. Bales:

Re: Proposed Redevelopment 2107 Old Lakeshore & 2119 Lakeshore Rd.

The City of Burlington Community Planning Department is returning the materials left at our counter on December 20, 2019 along with the cheques payable to the City of Burlington and Region of Halton.

These materials do not meet the requirements for a complete development application under the Planning Act, as outlined in the Burlington Official Plan Part VI, Section 1.3 and our Preconsultation By-law 40-2007.

The Preconsultation Form, notes and checklist prepared and signed on July 17, 2019 set out required materials necessary to support the proposed Official Plan Amendment and rezoning for this site. The following matters remain outstanding:

1. Please revise the plans to reflect the required 2m road widening along Lakeshore Road. No development is permitted within the road widening and setbacks must be established from the new property line.

2. Please revise the Functional Servicing Report completed by S. Llwellyn and Associates. The City will not support an uncontrolled stormwater release rate for all post-development storm events.

   Engineering staff have discussed the proposed stormwater design in greater detail and have the following requirements:
   a. Quantity Criteria: control all post development flows (2 year up to and including the 100 year) to the pre-development flows
   b. Confirm that the overland flow routes post development will not negatively impact any of the neighbouring properties up to and including the 100 year storm, especially those with reverse slope driveways along Old Lakeshore Road.

3. Please revise the Transportation Impact Study completed by Paradigm Transportation Solutions to provide current traffic counts for Lakeshore Road & Martha Street as well as Lakeshore Road & Old Lakeshore Road and amend the study conclusions according to the revised counts. Traffic counts in the existing report were completed in August 2019. Counts prepared during school holidays are not acceptable to the City of Burlington.

4. Please revise the Geotechnical Investigation completed by Terraprobe as follows:
    a. The report refers to 4 levels of underground parking where 5 levels are proposed. Please confirm that the overall depth of the borehole analysis conducted on November 25, 2016 achieves the limits to conform to a 5 level underground structure
    b. Seasonal fluxuations may cause significant changes to the depth of the groundwater table over time. Please provide further analysis during the months of April/May when precipitation rates may be higher.
    c. The report refers to a Hydrogeological Investigation prepared by Terraprobe (File 1-16-0680-46). Please provide a copy of this report for review.

5. Please update the Construction and Mobility Management Plan completed by BA Consulting Group Ltd to include the following requirements outlined in the preconsultation checklist:
    a. Clearly identify property lines, easements, flood lines & hazard lands, natural heritage buffers, existing trees and vegetation to be retained, etc.
    b. Clearly identify the limits of underground parking structures, including dimensioning distance from property lines
    c. Clearly identify limits of all elements of the underground parking structure including foundation drainage system/shoring/tiebacks, etc.
    d. 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 of closure.
    e. The drawing must clearly note that no trades parking or truck staging will be allowed on the municipal right-of-way.

Once you have updated the required materials as outlined above, please bring your submission to the Community Planning Department, along with a letter outlining the changes that have been made. Please include two electronic copies of the technical reports as the Region of Halton would also like a copy. 2020 fees will apply. Once the submission has been reviewed and deemed complete, we will send you an acknowledgement letter and a receipt for the application fees.

Yours truly,



Rosalind Minaji, RPP
Coordinator of Development Review
City of Burlington

cc Jamie Tellier, Director of Community Planning
Brynn Nheiley, Manager of Development Planning

Appendix C



Terraprobe

Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

HYDROGEOLOGICAL INVESTIGATION
2107 & 2119 OLD LAKESHORE ROAD
BURLINGTON, ONTARIO

Prepared for: **Carriage Gate Homes**
421 Brant Street, Suite 200
Burlington, Ontario
L7R 2G3

Attention: Mr. Mark Bales

File No 1-16-0680-46
Issued: January 12, 2017

©Terraprobe Inc.

Terraprobe Inc.

Greater Toronto
11 Indell Lane
Brampton, Ontario L6T 3Y3
(905) 796-2650 Fax: 796-2250

Hamilton – Niagara
903 Barton Street, Unit 22
Stoney Creek, Ontario L8E 5P5
(905) 643-7560 Fax: 643-7559

Central Ontario
220 Bayview Drive, Unit 25
Barrie, Ontario L4N 4Y8
(705) 739-8355 Fax: 739-8369

Northern Ontario
1012 Kelly Lake Rd., Unit 1
Sudbury, Ontario P3E 5P4
(705) 670-0460 Fax: 670-0558

www.terraprobe.ca

EXECUTIVE SUMMARY

Terraprobe Inc. (Terraprobe) was retained by Carriage Gate Homes Inc. to conduct a hydrogeological investigation for the site located at the southwest corner of Lakeshore Road and Old Lakeshore Road at 2107 & 2119 Old Lakeshore Road in Burlington, Ontario (the "Site"). The purpose of the investigation is to assess the ground water conditions and dewatering requirements for the proposed construction activities at the Site. A site location plan is provided as Figure 1.

The conclusions of the investigation are as follows:

- The subsurface investigation indicates that the Site is covered by a pavement structure underlain by earth fill, over a clayey silt till, overlying Queenston Formation bedrock which the proposed underground parking garage will extend into.
- The highest ground water elevation at the Site is approximately Elev. 77.5 masl, located within the glacial till. The base of the proposed excavation is 65.5 masl.
- Treatment of the ground water will be required prior to discharge into the storm or sanitary sewers due to total suspended solids.
- Discharge agreements will be required by the City of Burlington or Halton Region if any water is to be discharged to the sewer systems.

Short Term (During Construction)

- The estimated water taking volume of the excavation during construction will be approximately 2,100 L/day of water seepage when a factor of safety of 1.5 is applied.
- The collection system should account for storm water management from rainfall events. A typical 2-year rainfall event will generate approximately 83,000 L from the Site, which will result in a total of 85,100 L including ground water. According to O. Reg. 63/16, a plan for discharge must consider the conveyance of storm water from a 100-year storm event which translates to approximately 260,000 L.
- An application will need to be submitted to the Water Taking Environmental Activity and Sector Registry to the Ministry of the Environment and Climate Change (MOECC) due to the combined ground water seepage and potential storm water at the Site exceeding 50,000 L/day.
- No PTTW will be required for the short-term water taking.

Long Term (Post-Construction)

- The estimated water taking volume of the drained foundations of the buildings post-construction will be approximately 2,100 L/day of ground water seepage when a factor of safety of 1.5 is applied.
- No PTTW will be required for the long-term water taking.

TABLE OF CONTENTS

SECTION PAGE

1.0 INTRODUCTION 1

2.0 SCOPE OF WORK 2

3.0 DESCRIPTION OF SITE CONDITIONS 3
3.1 Site Location and Description 3
3.2 Site Topography and Drainage 3
3.3 Site Geology and Hydrogeology 3
3.3.1 Soil 4
3.3.2 Ground Water Elevations 5
3.3.3 Ground Water Quality 6
3.3.4 Aquifer Performance Tests 6

4.0 DISCUSSION AND ANALYSIS 8
4.1 Summary of Hydrogeological Conditions 8
4.2 Proposed Development Plan 8
4.3 Short-Term Ground Water Control Requirements (Construction Dewatering) 9
4.4 Long-Term Ground Water Control Requirements (Post Construction) 9
4.5 Assessment of Potential Impacts 10
4.5.1 Short Term Discharge of Pumped Ground Water (Construction Dewatering) 10
4.5.2 Long Term Discharge of Pumped Ground Water (Post Construction) 10
4.5.3 Zone of Influence (ZOI) 10
4.5.4 Geotechnical Considerations 11
4.5.5 Surface Water, Wetlands and Areas of Natural Significance 11
4.5.6 Local Wells and Zone of Influence 11
4.5.7 Contamination Sources 12

5.0 CONCLUSIONS AND RECOMMENDATIONS 13

FIGURES:
Figure 1 Site Location Plan
Figure 2 Borehole Location Plan

APPENDICES:
Appendix A Borehole Logs and Rock Core Logs
Appendix B Grain Size Analyses
Appendix C Laboratory Certificates of Analysis
Appendix D Aquifer Response Tests
Appendix E Modelling Results for Dewatering Requirements

1.0 INTRODUCTION

Terraprobe Inc. (Terraprobe) was retained by Carriage Gate Homes Inc. to conduct a hydrogeological investigation for the site located at the southwest corner of Lakeshore Road and Old Lakeshore Road at 2107 & 2119 Old Lakeshore Road in Burlington, Ontario (the "Site"). The purpose of the investigation is to assess the ground water conditions and dewatering requirements for the proposed construction activities at the Site. A site location plan is provided as Figure 1.

The Site is bounded by Lakeshore Road then residential properties to the north, Old Lakeshore Road then residential properties to the east, Old Lakeshore Road then mixed commercial and residential properties to the south, and commercial properties to the west. The development at the Site is approximately 0.3 hectares in size (16 to 61 metres [width] by 79 metres [length]) and is currently developed with two (2) low-rise buildings and paved parking areas. It is understood that the Site will be redeveloped into high rise towers over a mixed use podium resting on a four (4) level underground parking structure. It is expected that the proposed lowest parking level four (P4) finished floor elevation (FFE) will be set at Elev. 67 ± m within bedrock, and foundations will extend nominally 1 m deeper. For discussion purposes, it is assumed that Old Lakeshore Road is oriented in an east-west direction.

2.0 SCOPE OF WORK

The scope of work for the hydrogeologic investigation consisted of the following:

- Completion of rising head permeability tests. Ground water measurements were completed at all monitoring wells installed in this subsurface investigation. Rising head tests were completed at the monitoring well locations. The results of these tests were used to assess the ground water control requirements for the project.

- Assessment of ground water control requirements. An assessment of the ground water inflow rates and volumes for the currently proposed design was completed. The information obtained from the rising head tests and soil grain size information was utilized in order to provide an assessment of the potential ground water control requirements during construction and for the completed structures following construction.

- Completion of ground water sampling and analysis. Ground water sampling was completed in order to identity the ground water quality. The results of the analysis were used in order to determine the presence of ground water contamination and to assess options for disposal of the pumped ground water.

- Report preparation. A hydrogeological report has been prepared for the project. A summary of the local ground water conditions in the area has been completed. An evaluation of the proposed construction methods and an assessment of the possible requirements for dewatering or depressurization were completed. Recommendations regarding the estimates of the ground water control volumes and rates are provided. Regulatory requirements for the ground water takings will be discussed.

3.0 DESCRIPTION OF SITE CONDITIONS

3.1 Site Location and Description

The Site is bounded by Lakeshore Road then residential properties to the north, Old Lakeshore Road then residential properties to the east, Old Lakeshore Road then mixed commercial and residential properties to the south, and commercial properties to the west. The development at the Site is approximately 0.3 hectares in size (16 to 61 metres [width] by 79 metres [length]) and is currently developed with two (2) low-rise buildings and paved parking areas. It is understood that the Site will be redeveloped into high rise towers over a mixed use podium resting on a four (4) level underground parking structure. It is expected that the proposed lowest parking level four (P4) finished floor elevation (FFE) will be set at Elev. 67 ± m within bedrock, and foundations will extend nominally 1 m deeper. For discussion purposes, it is assumed that Old Lakeshore Road is oriented in an east-west direction. A site location plan is provided as Figure 1.

3.2 Site Topography and Drainage

The Site is currently developed with two (2) low-rise buildings and paved parking areas and is located within a mixed residential and commercial area in Burlington. The Site has an approximate ground surface elevation of Elev. 80 ± masl and is relatively flat.

There are no surface water bodies or features located on the Site. The nearest water body is Lake Ontario, which is located approximately 40 m south of the Site. The approximate depth to ground water, based on Water Well Records in the local area, is expected to be 2.4 m to 6.1 m from the ground surface within the till. Locally and regionally, ground water is expected to flow south towards Lake Ontario. Storm water is expected to drain towards the catch basins located on the municipal roads adjacent to the Site and towards the catch basins located on the parking lot at the Site.

3.3 Site Geology and Hydrogeology

The site stratigraphy is based on the borehole findings, as well as the geotechnical laboratory testing conducted on selected representative soil samples.

The summary elevations below are provided for general guidance only. Detailed depths are given in the following subsections. In general, the following strata were encountered at the site:

1. Earth fill, comprising sand at Elev. 81.5 ± masl to 79.0 ± masl, overlying
2. Clayey Silt Till at Elev. 79.0± masl to 77.3± masl, overlying
3. Queenston Formation, at about Elev. 77.3± masl

Based upon historic borehole information from the Ministry of Natural Resources and Forestry (MNRF) and Water Well Records from the MOECC in the vicinity of the Site, bedrock was encountered below approximately 3.4 to 6.1 m below ground surface within the vicinity of the Site.

The drilling field work was carried out on November 23rd and 25th, 2016. The borehole and rock coring results are recorded on the borehole and rock core logs provided in Appendix A, and a summary of the geotechnical laboratory tests results are provided in Appendix B. The borehole locations were surveyed by Terraprobe for horizontal coordinates and geodetic elevations with a Trimble R10 Receiver connected to the Global Navigation Satellite System and the Can-Net Virtual Reference Station Network. These elevations are provided for the purpose of relating borehole stratigraphy and should not be used or relied on for other purposes. Borehole locations are shown on Figure 2.

Ground water was found within the monitoring wells screened within the glacial till and within the bedrock. In-situ permeability tests were conducted at all monitoring wells where ground water was present and ground water was also collected for chemical analyses at the lowest level of the proposed development.

3.3.1 Soil

The following stratigraphy is based on the Terraprobe borehole findings as well as on the geotechnical laboratory testing conducted on selected representative soil samples. It should be noted that the subsurface conditions are confirmed at the borehole locations only and may vary at other locations. In summary, the subsurface soil conditions encountered in the boreholes advanced across the Site were fairly consistent. The stratigraphy described in the subsequent sections is based on the boreholes advanced by Terraprobe in November 2016.

Surficial Materials

The boreholes encountered a pavement structure at the ground surface comprising 50 mm of asphaltic concrete underlain by 100 to 150 mm of aggregate.

Earth Fill

Underlying the pavement structure, Borehole 2 encountered a zone of earth fill that extends to a depth of 1.5 m below grade (Elev. 78.1 ± masl). The fill consists of reddish brown and moist sand, with some silt to being silty, and trace amounts of clay and gravel. The earth fill indicated a compact relative density.

Glacial Till

Underlying the pavement structure in Borehole 1 and the earth fill in Borehole 2, a glacial till deposit with a cohesive matrix comprising clayey silt, with some sand and trace gravel was encountered. A hydrocarbon odour was detected in the recovered glacial till sample in Borehole 2. The till was found at a depth of 0.2 to 1.5 m below grade (Elev. 81.3 to 78.1 ± masl) and extend to the inferred bedrock surface

at a depth of 2.3 m below grade (Elev. 79.2 to 77.3 ± masl). The till is greyish brown to reddish brown and moist. The clayey silt till indicated a stiff to hard consistency.

Bedrock

Bedrock of the Queenston Formation was inferred and identified in Borehole 1 and inferred in Borehole 2, underlying the cohesive glacial till. The bedrock surface is inferred to be at a depth of 2.3 m below grade (Elev. 79.2 to 77.3 ± masl). A total of 14.3 m of rock core was recovered from Borehole 1. Detailed rock core logs are included in Appendix A.

The bedrock of the Queenston Formation is a deposit predominantly consisting of thickly bedded to massive red shale of Ordovician age. The formation contains interbeds of light grey / green calcareous shale, siltstone, sandstone, and limestone/dolostone which are discontinuous and nominally 50 to 300 mm thick. The shale is a weak strength rock, whereas the harder calcareous and limestone/dolostone beds are considered medium strength rock and are considered to be hard layers.

The borehole logs and rock core logs are attached in Appendix A.

Full details of the bedrock are described in the Geotechnical Report entitled "G*eotechnical Investigation and Engineering Design 2107 & 2119 Old Lakeshore Road Burlington, Ontario*" dated December 21, 2016, File No. 1-16-0680-01, under a separate cover.

3.3.2 Ground Water Elevations

The monitoring wells installed at BH1 and BH2 were constructed of PVC pipe with an interior diameter of 50 mm. The monitoring well at BH1 has a screen length of 3.1 m. BH1 has a finished depth of 16.9 mbgs (Elev. 64.6 masl). BH2 had a finished depth of 6.1 mbgs (Elev. 73.5 masl). The monitoring well at BH2 has a screen length of 1.5 m.

The ground water levels were measured on December 8 and 19, 2016 for Boreholes BH1 and BH2. It was noted that the lid for BH1 was frozen and could not be accessed on December 19. The ground water levels and corresponding ground water elevations are presented below:

Well ID	Ground Elev. (masl)	Stick up (m)	Well Depth (mbgs)	08-Dec-2016		19-Dec-2016	
				WL (mbgs)	Elev. (masl)	WL (mbgs)	Elev. (masl)
BH1	81.5	0.0	12.2	4.3	77.2	Frozen	Frozen
BH2	83.6	0.0	3.2	2.2	77.4	2.1	77.5

Notes: WL = Water Level; mbgs = metres below ground surface; masl = metres above sea level

Based on this information, the ground water flow direction could not be determined as additional monitoring wells are required.

The earth fill that is present overlying the till on Site is likely to allow the free flow of water when wet as the composition of the fill is a sand. The till found beneath the earth fill and sand contains a relatively high percentage of fine materials and as such, is considered to be of low permeability and will allow minimal volumes of water to flow into the hydrogeological strata. The ground water within the Queenston Formation bedrock is considered to be of low permeability due to the general lack of voids within sound bedrock and is considered to be a separate hydrogeological layer in comparison to the overlying overburden material.

3.3.3 Ground Water Quality

Samples of the ground water were collected by Terraprobe and analysed for the Regional Municipality of Halton sewer use by-law parameters and the Ontario Regulation 153/04 parameters as requested by the City of Burlington. One (1) ground water sample was collected from the monitoring well screened at the depth of the proposed development for analysis for the Regional Municipality of Halton sewer use by-law parameters. One (1) ground water samples were collected from the monitoring wells for the Ontario Regulation 153/04 parameters. The samples were compared to the following:

- The Regional Municipality of Halton By-Law No. 2-03 Section 4 Table 1 – Limits for Sanitary Sewers and Combined Sewers Discharge
- Ontario Regulation 153/04 Table 2 of the April 15, 2011 Ontario Ministry of Environment and Climate Change (MOECC) "*Soil, Ground Water and Sediment Standards for use under part XV.1 of the Environmental Protection Act*" for Residential, Parkland, Institutional Land Use in a potable ground water condition for coarse textured soil (MOECC Table 2 RPI Standards).

No samples exceeded the Limits for the MOECC Table 2 RPI Standards.

The sample meets the Regional Municipality of Halton Limits for Sanitary Sewers and Combined Sewers Discharge for all parameters with the exception of the following parameter:

- Total Suspended Solids (Result: 1,900 mg/L, Standard: 350 mg/L)

The full Certificates of Analysis are presented in Appendix B.

3.3.4 Aquifer Performance Tests

The hydraulic conductivity from each well was determined based on a single well response test, as per the field investigations completed in December 2016. This test involves the rapid removal of water from a single well and monitoring the water level recovery. These tests were conducted in all monitoring wells completed by Terraprobe in December 2016 (BH1 and BH2). The data from the tests were analysed using the Bouwer and Rice method (1976). The results of the analysis are presented in Appendix C. The hydraulic conductivities of the strata are as follows:

Monitoring Well	Well Screen Elevation (masl)	Strata Screened Within	Hydraulic Conductivity (rising head test, m/s)
BH1	69.3-72.4	Queenston Formation	3×10^{-7}
BH2	76.1-77.6	Glacial Till	3×10^{-8}

Based on the soil collected from the boreholes advanced at the Site, grain size analyses were completed across the strata and the hydraulic conductivities were calculated using the Hazen method. The hydraulic conductivities of the strata are as follows:

Sample ID	Soil Elevation (masl)	Strata	Hydraulic Conductivity (Hazen, m/s)
BH2 SS3	77.8	Glacial Till	2×10^{-9}

According to Freeze and Cherry (1979), the typical hydraulic conductivity of the strata investigated at the Property are:

- Earth Fill (Silty Sand Earth Fill) 10^{-5} m/s to 10^{-6} m/s
- Native Soil (Clayey to Sandy Silt Glacial Till) 10^{-7} m/s to 10^{-9} m/s
- Native Soil (Queenston Formation) 10^{-7} m/s to 10^{-8} m/s

Based on the typical TRCA values of the Queenston Formation within the vicinity of the Site, the hydraulic conductivity is approximately 1.2×10^{-7} m/s. Based on the analyses, the hydraulic conductivity calculated from the rising head test is relatively consistent with the published values associated with the geological material tested. As such, the conservative value provided from the TRCA database of 1.2×10^{-7} m/s was used for the Queenston Formation pertaining to the water taking calculations.

4.0 DISCUSSION AND ANALYSIS

4.1 Summary of Hydrogeological Conditions

The results of the investigation completed by Terraprobe indicate the following hydrogeologic features for the site:

- The highest stabilized ground water level at the Site is approximately Elev. 77.5± masl.
- The earth fill that is present overlying the till on Site is likely to allow the free flow of water when wet as the composition of the fill is a sand. The till found beneath the earth fill and sand contains a relatively high percentage of fine materials and as such, is considered to be of low permeability and will allow minimal volumes of water to flow into the hydrogeological strata. The ground water within the Queenston Formation bedrock is considered to be of low permeability due to the general lack of voids within sound bedrock and is considered to be a separate hydrogeological layer in comparison to the overlying overburden material.
- Based on a review of the in-situ test and published values, the hydraulic conductivity applicable to the Site is approximately 1 x 10^{-5} m/s for the earth fill, approximately 3 x 10^{-8} m/s for the glacial till, and approximately 1.2 x 10^{-7} m/s for the Queenston Formation bedrock where ground water was found.

4.2 Proposed Development Plan

Prevailing Site grade is taken as Elev. 80± masl. The proposed structure will rest on a 4-level underground parking structure across the Site. The P4 finished floor elevation (FFE) is anticipated to be set approximately 13.0 m below existing grade (Elev. 67.0 masl) and the bottom of the slab is assumed to be approximately 0.5 m below the FFE (Elev. 66.5 masl) The elevator core and other lower protrusions may be 2 m lower than the FFE. Spread footing foundations for the proposed development will be approximately 1.0 m below the top of the footing at approximately Elev. 65.5 masl. It is assumed that the drainage layer for the foundations will be 0.3 m, but will be adjacent to the footing.

It is the understanding of Terraprobe that the relevant construction elevations for the proposed underground parking garages at the Site for the proposed development are approximately:

Bottom of P4 foundation.....66.5 masl
Base of excavation .....65.5 masl

It is assumed that a permeable shoring system (i.e. lagging wall), will be used during construction. The estimated length and width potentially requiring dewatering is:

Excavation Area (note that dimensions have been revised to match area) ..... 35 m x 79 m

4.3 Short-Term Ground Water Control Requirements (Construction Dewatering)

Excavations for the spread footings will extend approximately 1.0 m below the FFE as aforementioned. As the development will be found on bedrock, dewatering below the base of the excavation will not be required to preserve the in situ integrity of the founding elevation. Excavation for the foundation will extend to Elev. 65.5 masl, with the dewatering requirement of Elev. 65.5± masl.

A numerical analysis was conducted utilizing computer software (Slide 7.014, released March 30, 2016, developed by Rocscience Inc.), utilizing the finite element modelling method. The finite element model (FEM) for ground water seepage indicates the short-term (construction) dewatering requirements as provided below. The finite element model results are presented in Appendix E.

The short-term (construction) dewatering estimates for the Site are as follows:

- 2,100± L/day of water seepage into excavation when a factor of safety of 1.5 is applied

The above estimate does not take into account storm water management from rainfall events. The collection system should also account for a typical 2-year design storm event which will generate approximately 83,000 L from the Site, which will result in a total of 85,100 L. The dewatering system should be designed to take into account removal of rainfall from the excavation. According to O. Reg. 63/16, a plan for discharge must consider the conveyance of storm water from a 100-year storm event which translates to approximately 260,000 L.

Based on the potential ground water seepage expected at the Site, a Permit to Take Water is not required in the short term based on this discharge rate. However, a posting on the EASR will be required as the dewatering combined with the potential storm water exceeds 50,000 L/day.

As ground water will need to be discharged to the sewer, a Discharge Agreement will need to be entered with Halton Region or the City of Burlington based on the proposed discharge location.

4.4 Long-Term Ground Water Control Requirements (Post Construction)

The building is proposed to be a drained structure. The FEM for ground water seepage indicates the long-term (post construction) drainage requirements as provided below. The finite element model results are presented in Appendix E.

The long-term (post construction) drainage estimates for the Site are as follows:

- 2,100± L/day of water seepage into excavation when a factor of safety of 1.5 is applied

To account for variability a safety factor of 1.5 was applied. Rainfall was not added as the runoff is expected to be directed away from the structure. Based on the potential ground water seepage expected at the Site, a Permit to Take Water is not required in the long term based on this discharge rate.

As ground water will need to be discharged to the sewer, a Discharge Agreement will need to be entered with Halton Region or the City of Burlington based on the proposed discharge location.

4.5 Assessment of Potential Impacts

4.5.1 Short Term Discharge of Pumped Ground Water (Construction Dewatering)

The water control system should consist of sumps lined with filter material within the excavation. The flow from the sumps will be directed towards the local sewer. The dewatering system must be appropriately filtered in order to prevent the pumping of fines and loss of ground during the dewatering activities from the precipitation and should be designed by the Dewatering Contractor. As per the results from the ground water quality sampling, treatment will be required prior to discharge into the sewers. It is recommended that samples of the discharge water be collected on a regular frequency during dewatering to ensure the water quality meets the sewer by-law Standards.

Visual monitoring of the dewatering discharge should be conducted daily when active. Adjustments to the dewatering system should be made if an increase in turbidity or sediment is noted.

4.5.2 Long Term Discharge of Pumped Ground Water (Post Construction)

If the buildings are designed as drained structures, a permanent subfloor drainage system is required. Ground water takings of approximately 2,100 L/day (0.024 L/s) are possible. To reduce potential flows into the local sewer system, consideration should be given to reuse of the ground water on the Site. Any discharge to the sewer system must comply with the City of Burlington's Sewer Use by-law or Halton Region's Sewer Use by-law, depending on the final discharge location. However, as per the limited discharge, a PTTW will not be required for the long term discharge. At such volumes, no potential impacts are expected to affect the surrounding properties.

4.5.3 Zone of Influence (ZOI)

The Zone of Influence (ZOI) was calculated based on the estimated ground water taking rate and the average hydraulic conductivity recorded at the site. The stratigraphy with water at the Site consists of Queenston Formation bedrock. The Zone of Influence (also known as Radius of Influence or R_0 Calculation) calculation is as follows:

Equation: $R_0 = 3000*dH*K^{0.5}$ Where dH is the dewatering thickness (m)
K is the hydraulic conductivity (m/s)

However, as the Site is being found within bedrock, and ground water is only being extracted from the bedrock, the zone of influence calculation is not applicable. No zone of influence is anticipated within bedrock.

4.5.4 Geotechnical Considerations

The Site is bounded by Lakeshore Road then residential properties to the north, Old Lakeshore Road then residential properties to the east, Old Lakeshore Road then mixed commercial and residential properties to the south, and commercial properties to the west.

As the ZOI is very limited and the dewatering operations will mainly occur within the bedrock, no off-Site impacts are anticipated. The buildings adjacent to the proposed development are unlikely to be affected significantly due to the effective radius of the settlement. The dewatering at the development will not cause consolidation within bedrock and therefore settlement due to the increase in effective stress.

The temporary construction dewatering system must be properly installed and screened to ensure the sediment and fine soils will not be removed during the dewatering when precipitation occurs.

4.5.5 Surface Water, Wetlands and Areas of Natural Significance

There are no surface water bodies, wetlands or other sensitive features located on the Site. The nearest water body is Lake Ontario, which is located approximately 40 m south of the Site. Ground water is expected to flow south towards Lake Ontario. Surface water and storm water is expected to drain towards the catch basins located on the municipal roads adjacent to the Site and towards the catch basins located on the parking lot at the Site.

Lake Ontario is located outside the ZOI and is unlikely to be affected by the dewatering activities. Further, the hydrogeological stratum for the creek is unlikely to be connected to the underlying water bearing unit within the bedrock. As such, no impacts are anticipated at Lake Ontario due to the dewatering activities at the proposed development.

4.5.6 Local Wells and Zone of Influence

The Site is located in a serviced area of Burlington. The Site and surrounding area are provided with municipal piped water and sewer supply. The MOECC well records database was searched through the online Water Well Database for records located on the Property and within a 500 m radius. According to the Water Well record search, 25 wells are listed within 500 m of the Site. A total of eighteen (18) wells were indicated to be in use as monitoring wells, test holes, or both. No other wells were identified with a use. No domestic water wells are located within a 500 m radius of the Site and no impacts are anticipated based on the zone of influence from the proposed dewatering at the Site.

4.5.7 Contamination Sources

The Site and immediately surrounding area currently consists of mixed residential and commercial areas. No Records of Site Conditions (RSCs) have been filed for the Site. It is noted that a Phase One Environmental Site Assessment has been completed for this Site. Potential contamination sources from on-Site and off-Site historical impacts may affect the Site. Based on the ground water results, there are no contamination sources at the Site when compared with the 2011 MOECC O.Reg. 153/04 Table 2 RPI Standards for metals and inorganics, PAHs, PHCs, BTEX, and VOCs.

5.0 CONCLUSIONS AND RECOMMENDATIONS

The conclusions of the investigation are as follows:

- The subsurface investigation indicates that the Site is covered by a pavement structure underlain by earth fill, over a clayey silt till, overlying Queenston Formation bedrock which the proposed underground parking garage will extend into.
- The highest ground water elevation at the Site is approximately Elev. 77.5 masl, located within the glacial till. The base of the proposed excavation is 65.5 masl.
- Treatment of the ground water will be required prior to discharge into the storm or sanitary sewers due to total suspended solids.
- Discharge agreements will be required by the City of Burlington or Halton Region if any water is to be discharged to the sewer systems.

Short Term (During Construction)

- The estimated water taking volume of the excavation during construction will be approximately 2,100 L/day of water seepage when a factor of safety of 1.5 is applied.
- The collection system should account for storm water management from rainfall events. A typical 2-year rainfall event will generate approximately 83,000 L from the Site, which will result in a total of 85,100 L including ground water. According to O. Reg. 63/16, a plan for discharge must consider the conveyance of storm water from a 100-year storm event which translates to approximately 260,000 L.
- An application will need to be submitted to the Water Taking Environmental Activity and Sector Registry to the Ministry of the Environment and Climate Change (MOECC) due to the combined ground water seepage and potential storm water at the Site exceeding 50,000 L/day.
- No PTTW will be required for the short-term water taking.

Long Term (Post-Construction)

- The estimated water taking volume of the drained foundations of the buildings post-construction will be approximately 2,100 L/day of ground water seepage when a factor of safety of 1.5 is applied.
- No PTTW will be required for the long-term water taking.

We trust this report meets with your requirements. Should you have any questions regarding the information presented, please do not hesitate to contact our office.

Yours truly,

Terraprobe Inc.

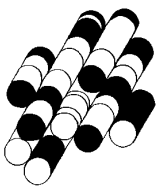


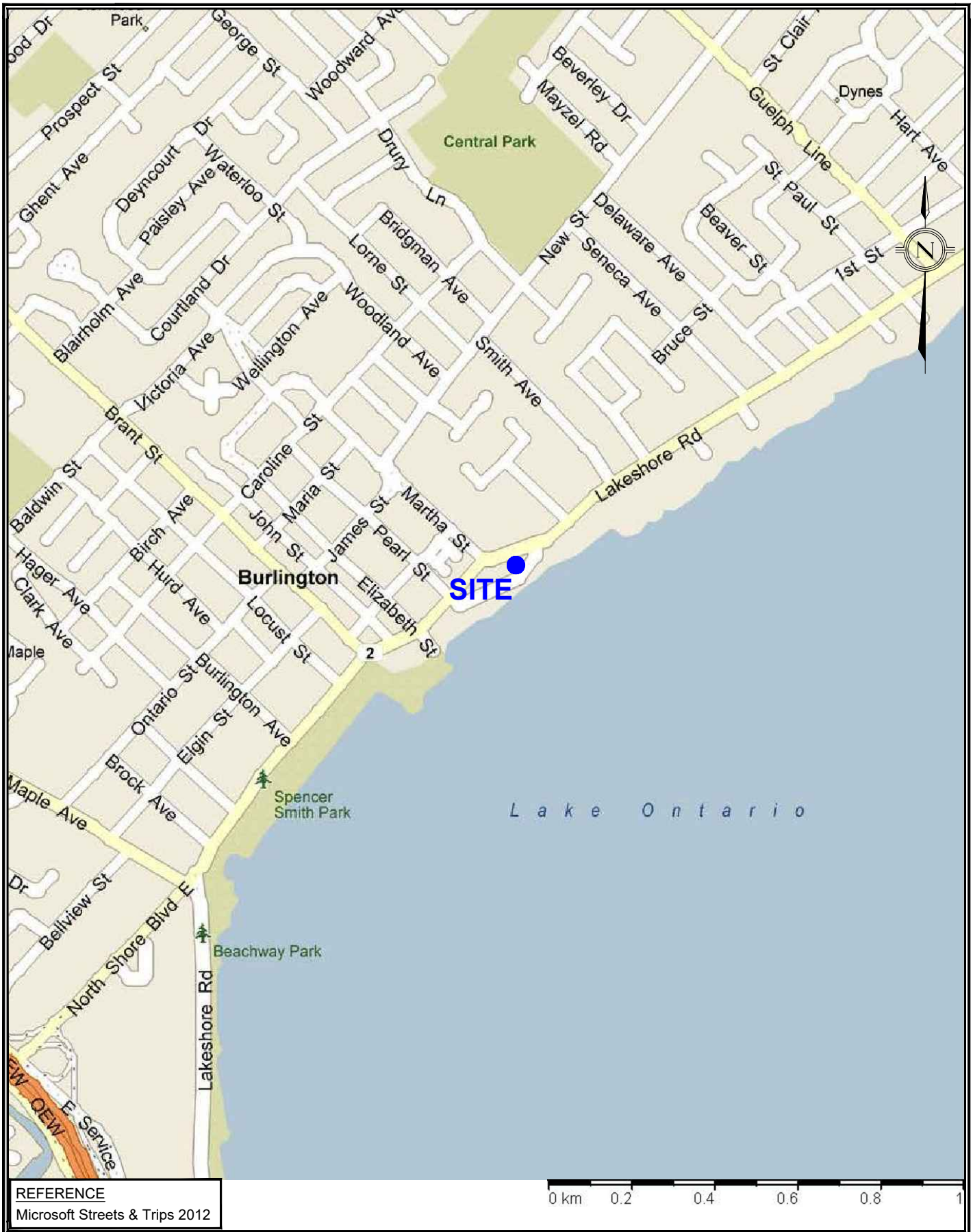
Suvish Melanta, M.Sc., EIT
Project Manager

Matthew J. Bielaski, P.Eng., QP_{RA}
Associate

FIGURES

TERRAPROBE INC.





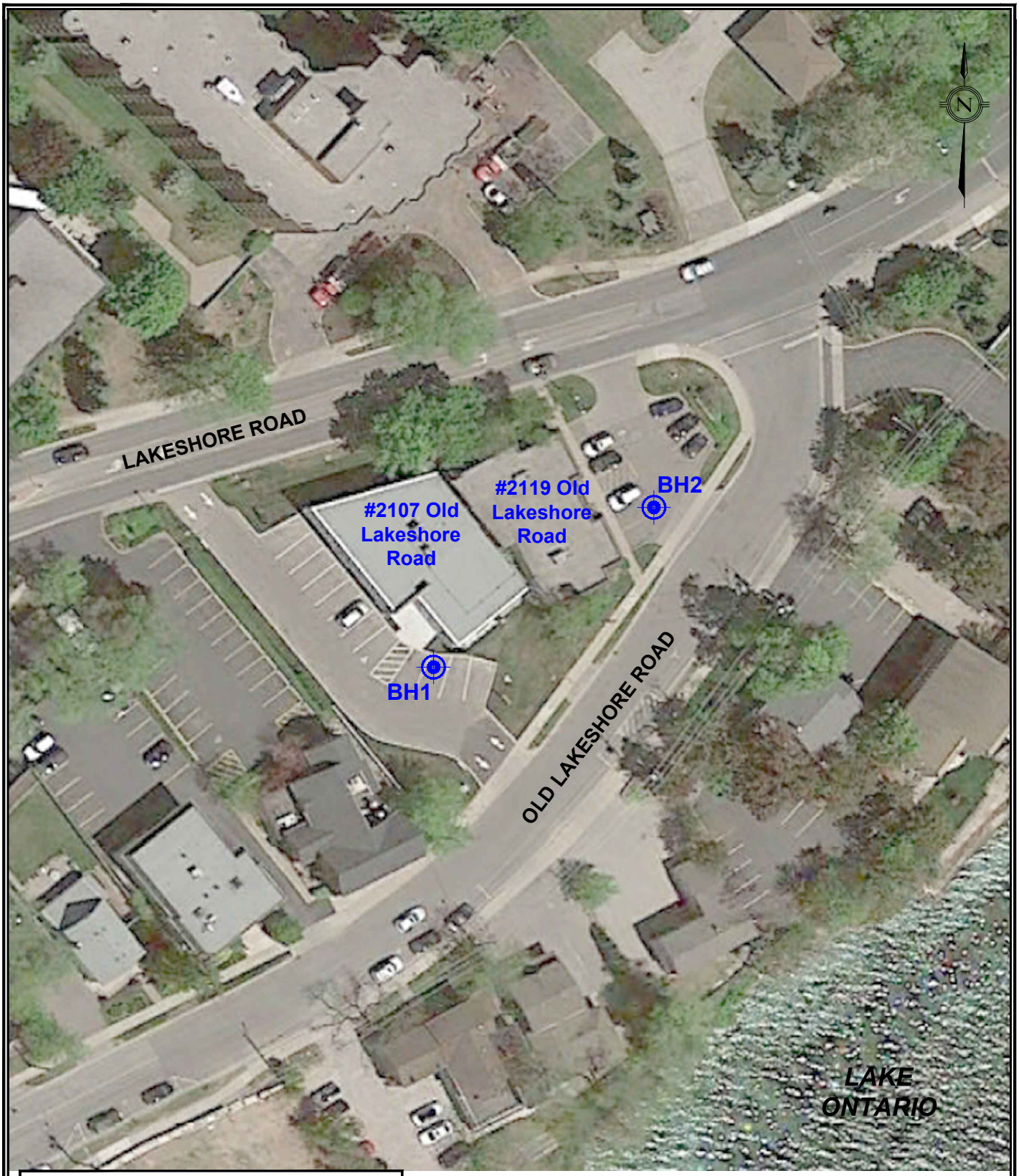
REFERENCE
Microsoft Streets & Trips 2012

Terraprobe
11 Indell Lane, Brampton, Ontario, L6T 3Y3
Tel: (905) 796-2650 Fax: (905) 796-2250

Title: SITE LOCATION PLAN

File No. 1-16-0680-46

FIGURE : 1



LEGEND

Approximate Monitoring Well Location

SCALE 1:750

10 8 6 4 2 0 10m

REFERENCE
Google Earth 2015

Terraprobe

11 Indell Lane, Brampton, Ontario, L6T 3Y3
Tel: (905) 796-2650 Fax: (905) 796-2250

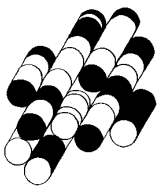
Title: BOREHOLE LOCATION PLAN

File No. 1-16-0680-46

FIGURE : 2

APPENDIX A

TERRAPROBE INC.



Terraprobe

LOG OF BOREHOLE 1

Project No. : 1-16-0680-01 | Client : Carriage Gate Homes | Originated by : TG

Date started : November 25, 2016 | Project : SW of Old Lakeshore & Lakeshore Rd | Compiled by : NN

Sheet No. : 1 of 2 | Location : Burlington, Ontario | Checked by : JC

Position : E: 597988, N: 4797784 (UTM 17T) | Elevation Datum : Geodetic (NAD83) | Core Diameter : **HQ**, OD=96mm, ID=64mm

Rig type : Truck-mounted | Drilling Method : Solid stem augers, HQ rock coring

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Sample Number	Sample Type	SPT 'N' Value
0	81.5	**GROUND SURFACE**				
	81.3	50mm **ASPHALTIC CONCRETE**				
	0.2	150mm **AGGREGATE**				
		CLAYEY SILT, trace to some sand, trace to some gravel, very stiff to hard, mottled greyish brown (GLACIAL TILL)		1	SS	20
1		...at 0.8 m, reddish brown		2	SS	88
				3	SS	63
2	79.2					
	2.3	**INFERRED BEDROCK**, shale, red, weathered		4	SS	50 / 125mm
	78.9					
	2.6	**QUEENSTON FORMATION** (See rock core log for details)		1	RUN	
3				2	RUN	
4						
5				3	RUN	
6						
7				4	RUN	
8						
9				5	RUN	
10				6	RUN	

Elevation Scale (m): 81, 80, 79, 78, 77, 76, 75, 74, 73, 72

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

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

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

Headspace Vapour (ppm)

Instrument Details — Unstabilized Water Level

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

...at 1.5m, augers grinding

(continued next page)

LOG OF BOREHOLE 1

Terraprobe

Project No. : 1-16-0680-01	Client : Carriage Gate Homes	Originated by : TG
Date started : November 25, 2016	Project : SW of Old Lakeshore & Lakeshore Rd	Compiled by : NN
Sheet No. : 2 of 2	Location : Burlington, Ontario	Checked by : JC

Position : E: 597988, N: 4797784 (UTM 17T) | Elevation Datum : Geodetic (NAD83) | Core Diameter : **HQ**, OD=96mm, ID=64mm

Rig type : Truck-mounted | Drilling Method : Solid stem augers, HQ rock coring

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value	Elevation Scale (m)
		(continued)					
11		**QUEENSTON FORMATION** (See rock core log for details) *(continued)*		6	RUN		71
12				7	RUN		70
13				8	RUN		69
14				9	RUN		68
15							67
16				10	RUN		66
	64.6						65
	16.9	**END OF BOREHOLE**					

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

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

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

Headspace Vapour (ppm)

Instrument Details

Unstabilized Water Level

Lab Data and Comments

GRAIN SIZE DISTRIBUTION (%) (MIT) — GR SA SI CL

Borehole was dry and open upon completion of drilling.

50 mm dia. monitoring well installed.

WATER LEVEL READINGS

Date	Water Depth (m)	Elevation (m)
Dec 8, 2016	4.3	77.2

file: 1-16-0680-01 bh logs.gpj

Terraprobe

ROCK CORE LOG 1

Project No. : 1-16-0680-01 | Client : Carriage Gate Homes | Originated by : TG

Date started : November 25, 2016 | Project : SW of Old Lakeshore & Lakeshore Rd | Compiled by : NN

Sheet No. : 1 of 2 | Location : Burlington, Ontario | Checked by : JC

Position : E: 597988, N: 4797784 (UTM 17T) | Elevation Datum : Geodetic (NAD83) | Core Diameter : **HQ**, OD=96mm, ID=64mm

Rig type : Truck-mounted | Drilling Method : Solid stem augers, HQ rock coring

GENERAL DESCRIPTION

Rock coring started at 2.6m below grade

QUEENSTON FORMATION

Shale, red, laminated, weak; joints are horizontal, gapped to closed, unaltered;

interbedded with **limestone**, light grey, laminated to thinly bedded, medium strong

Run 1 : 0% limestone 100% shale

Run 2 : 30% limestone 70% shale

Run 3 : 13% limestone 87% shale

Run 4 : 28% limestone 72% shale

Run 5 : 23% limestone 77% shale

Run 6 : 8% limestone 92% shale

Run 7 : 24% limestone 76% shale

Run	Elev Depth (m)	Recovery	Elevation (m)
	78.9		
	2.6		
R1		TCR = **97%** SCR = **77%** RQD = **47%**	
	78.1		
	3.4		78
R2		TCR = **100%** SCR = **100%** RQD = **76%**	
	76.6		77
	4.9		
R3		TCR = **89%** SCR = **86%** RQD = **51%**	76
	75.0		
	6.5		75
R4		TCR = **100%** SCR = **100%** RQD = **99%**	
	73.5		74
	8.0		
R5		TCR = **100%** SCR = **100%** RQD = **99%**	73
	72.0		
	9.5		72
R6		TCR = **100%** SCR = **97%** RQD = **56%**	
	70.5		71
	11.0		
R7		TCR = **97%** SCR = **93%** RQD = **74%**	70
	68.9		
	12.6		69

Shale Weathering Zones: Z1 Z2 Z3 Z4

UCS (MPa) 5 25 50 100 250 — Estimated Strength: R1 R2 R3 R4 R5 R6

Natural Fractures — Frequency / Spacing

Frequency
>10
10
2
3
5
1
1
0
5
>10
1
>10
5
0
0
0
2
0
1
0
1
2
0
2
0
0
0
10
5
3
10
1
1
2
0
0
1

Laboratory Testing

Comments

2.6-2.8m: *angular blocks*
2.8m: *transition to sound rock*

3.1m: *vertical fracture, clean, gapped, planar, smooth*
3.2-3.2m: *rubblized*

5.1m: *vertical fracture, clean, gapped, planar, rough*

5.4m: *rubblized*
5.5m: *dipping fracture, clean, gapped, planar, smooth*

5.9-6.1m: *core loss*

6.4m: *vertical fracture, clean, gapped, planar, rough*

9.8m: *rubblized*

11.2-11.3m: *rubblized*

(continued next page)

ROCK CORE LOG 1

Terraprobe

Project No. : 1-16-0680-01	Client : Carriage Gate Homes	Originated by : TG
Date started : November 25, 2016	Project : SW of Old Lakeshore & Lakeshore Rd	Compiled by : NN
Sheet No. : 2 of 2	Location : Burlington, Ontario	Checked by : JC

Position : E: 597988, N: 4797784 (UTM 17T) | Elevation Datum : Geodetic (NAD83) | Core Diameter : **HQ**, OD=96mm, ID=64mm

Rig type : Truck-mounted | Drilling Method : Solid stem augers, HQ rock coring

Depth (m)	GENERAL DESCRIPTION	Run / Elev Depth (m)	Recovery	Elevation (m)	Shale Weathering Zones (Z1 Z2 Z3 Z4)	UCS (MPa) 5 25 50 100 250 / Estimated Strength (R1 R2 R3 R4 R5 R6)	Natural Fractures: Frequency	Natural Fractures: Spacing	Laboratory Testing	Comments	Elevation (m)
	78.9										
13	**QUEENSTON FORMATION** **Shale**, red, laminated, weak; joints are horizontal, gapped to closed, unaltered;						1				
	interbedded with **limestone**, light grey, laminated to thinly bedded, medium strong	R8	TCR = **98**% SCR = **95**% RQD = **80**%	68			0 4 1				68
14	*Run 8 : 7% limestone* *93% shale*	67.4 14.1					5 4				
		R9	TCR = **100**% SCR = **91**% RQD = **53**%	67			>10 >10			**14.7-14.8m:** *rubblized* **15.0-15.0m:** *rubblized*	67
15	*Run 9 : 16% limestone* *84% shale*	65.9 15.6		66			>10 4 1			**15.6-15.7m:** *vertical fracture and horizontal fracture*	66
16		R10	TCR = **98**% SCR = **89**% RQD = **66**%	65			>10 5 3				65
	Run 10 : 9% limestone *91% shale*	64.6					0				
		16.9m									
	END OF COREHOLE										

file: 1-16-0680-01 bh logs.gpj

LOG OF BOREHOLE 2

Terraprobe

Project No. : 1-16-0680-01	Client : Carriage Gate Homes	Originated by : TG
Date started : November 23, 2016	Project : SW of Old Lakeshore & Lakeshore Rd	Compiled by : NN
Sheet No. : 1 of 1	Location : Burlington, Ontario	Checked by : JC

Position : E: 598019, N: 4797817 (UTM 17T) Elevation Datum : Geodetic (NAD83)

Rig type : Truck-mounted Drilling Method : Solid stem augers

Depth Scale (m)	Elev Depth (m)	Description	Graphic Log	Number	Type	SPT 'N' Value
	79.6	**GROUND SURFACE**				
0	79.4	50mm **ASPHALTIC CONCRETE**				
	0.2	100mm **AGGREGATE**				
		FILL, sand, some silt to silty, trace gravel, trace clay, compact, reddish brown, moist		1	SS	16
1				2	SS	15
	78.1					
	1.5	**CLAYEY SILT**, some sand, trace gravel, hydrocarbon odour, firm, reddish brown, moist (GLACIAL TILL)		3	SS	6
2	77.3					
	2.3	**INFERRED BEDROCK**, shale, red, weathered (QUEENSTON FORMATION)		4	SS	97 / 275mm
3				5	SS	50 / 75mm
4				6	SS	50 / 25mm
5						
6	73.5			7	SS	50 / 25mm
	6.1	**END OF BOREHOLE**				

Elevation Scale (m): 79, 78, 77, 76, 75, 74

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

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

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

Headspace Vapour (ppm): PID: <5; PID: <5; PID: 3250; PID: 2950; PID: 270; PID: 45

Instrument Details

Unstabilized Water Level

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

2 10 59 29

...at 4.0m, heavy grinding to 4.3m

Unstabilized water level measured at 4.9 m below ground surface; borehole was open upon completion of drilling.

50 mm dia. monitoring well installed.

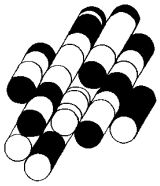
WATER LEVEL READINGS

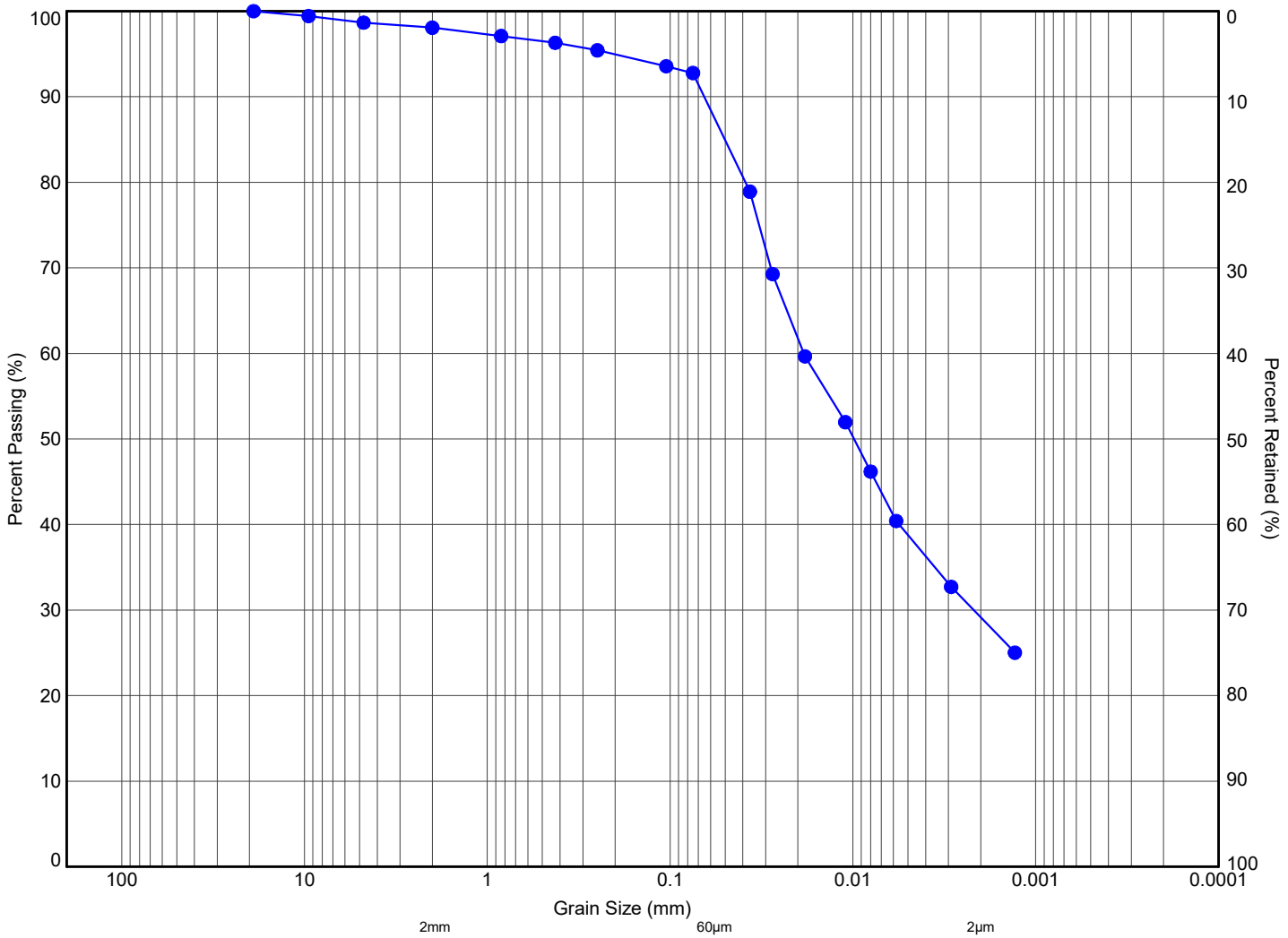
Date	Water Depth (m)	Elevation (m)
Dec 8, 2016	2.2	77.4
Dec 19, 2016	2.1	77.5

file: 1-16-0680-01 bh logs.gpj

APPENDIX B

TERRAPROBE INC.





MIT SYSTEM	COBBLES	GRAVEL			SAND			SILT	CLAY
		COARSE	MEDIUM	FINE	COARSE	MEDIUM	FINE		

MIT SYSTEM

	Hole ID	Sample	Depth (m)	Elev. (m)	Gravel (%)	Sand (%)	Silt (%)	Clay (%)	*(Fines, %)*
●	**2**	SS3	1.8		2	10	59	29	

Terraprobe
11 Indell Lane, Brampton Ontario L6T 3Y3
(905) 796-2650

Title:

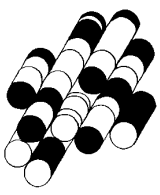
GRAIN SIZE DISTRIBUTION

CLAYEY SILT, SOME SAND, TRACE GRAVEL (GLACIAL TILL)

File No.: **1-16-0680-01**

APPENDIX C

TERRAPROBE INC.



Maxxam
A Bureau Veritas Group Company

Your Project #: 1-16-0680-46
Site#: 1-16-0680-46
Your C.O.C. #: 590410-01-01

Attention:Suvish Melanta

Terraprobe
11 Indell Lane
Brampton, ON
L6T 3Y3

Report Date: 2016/12/15
Report #: R4288665
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6Q8047
Received: 2016/12/08, 17:18

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Methylnaphthalene Sum	1	N/A	2016/12/14	CAM SOP-00301	EPA 8270D m
Carbonaceous BOD	1	2016/12/09	2016/12/14	CAM SOP-00427	SM 22 5210B m
1,3-Dichloropropene Sum	1	N/A	2016/12/13		EPA 8260C m
Chloride by Automated Colourimetry	1	N/A	2016/12/14	CAM SOP-00463	EPA 325.2 m
Chromium (VI) in Water	1	N/A	2016/12/13	CAM SOP-00436	EPA 7199 m
Free (WAD) Cyanide	1	N/A	2016/12/13	CAM SOP-00457	OMOE E3015 m
Total Cyanide	1	2016/12/10	2016/12/12	CAM SOP-00457	OMOE E3015 5 m
Petroleum Hydrocarbons F2-F4 in Water (1)	1	2016/12/13	2016/12/14	CAM SOP-00316	CCME PHC-CWS m
Fluoride	1	2016/12/10	2016/12/12	CAM SOP-00449	SM 22 4500-F C m
Mercury in Water by CVAA	1	2016/12/10	2016/12/13	CAM SOP-00453	EPA 7470A m
Mercury	1	2016/12/10	2016/12/14	CAM SOP-00453	EPA 7470A m
Total Metals Analysis by Axial ICP	1	2016/12/12	2016/12/12	CAM SOP-00408	EPA 6010C m
Lab Filtered Metals by ICPMS	1	2016/12/12	2016/12/13	CAM SOP-00447	EPA 6020B m
E.coli, (CFU/100mL)	1	N/A	2016/12/08	CAM SOP-00552	MOE LSB E3371
Animal and Vegetable Oil & Grease	1	N/A	2016/12/13	CAM SOP-00326	EPA1664B m,SM5520B m
Total Oil and Grease	1	2016/12/12	2016/12/13	CAM SOP-00326	EPA1664B m,SM5520A m
PAH Compounds in Water by GC/MS (SIM)	2	2016/12/13	2016/12/13	CAM SOP-00318	EPA 8270D m
pH	1	N/A	2016/12/12	CAM SOP-00413	SM 4500H+ B m
Phenols (4AAP)	1	N/A	2016/12/13	CAM SOP-00444	OMOE E3179 m
Sulphate by Automated Colourimetry	1	N/A	2016/12/13	CAM SOP-00464	EPA 375.4 m
Total Kjeldahl Nitrogen in Water	1	2016/12/14	2016/12/15	CAM SOP-00938	OMOE E3516 m
TPH (Heavy Oil) (2)	1	2016/12/12	2016/12/13	CAM SOP-00326	EPA1664B m,SM5520F m
Total Suspended Solids	1	2016/12/10	2016/12/12	CAM SOP-00428	SM 22 2540D m
Volatile Organic Compounds and F1 PHCs	1	N/A	2016/12/12	CAM SOP-00230	EPA 8260C m
Volatile Organic Compounds in Water	1	N/A	2016/12/14	CAM SOP-00226	EPA 8260C m

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 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

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 Project #: 1-16-0680-46
Site#: 1-16-0680-46
Your C.O.C. #: 590410-01-01

Attention:Suvish Melanta

Terraprobe
11 Indell Lane
Brampton, ON
L6T 3Y3

Report Date: 2016/12/15
Report #: R4288665
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B6Q8047
Received: 2016/12/08, 17:18

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.

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.

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.

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.
(2) Note: TPH (Heavy Oil) is equivalent to Mineral / Synthetic Oil & Grease

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Ashton Gibson, Project Manager
Email: AGibson@maxxam.ca
Phone# (905) 817-5700

==========

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.

HALTON SANITARY & COMBINED SEWER (2-03)

Maxxam ID				DPE292	DPE292		
Sampling Date							
COC Number				590410-01-01	590410-01-01		
	UNITS	Criteria	Criteria-2	SUB-UF	SUB-UF Lab-Dup	RDL	QC Batch
Calculated Parameters							
Total Animal/Vegetable Oil and Grease	mg/L	-	150	<0.50		0.50	4784165
Inorganics							
Total Carbonaceous BOD	mg/L	-	300	<2		2	4785915
Fluoride (F-)	mg/L	-	10	0.32		0.10	4787902
Total Kjeldahl Nitrogen (TKN)	mg/L	-	100	2.4		0.10	4792532
pH	pH	-	6.0:10.0	7.66			4787903
Phenols-4AAP	mg/L	-	1	<0.0010		0.0010	4790200
Total Suspended Solids	mg/L	-	350	1900		50	4787452
Dissolved Sulphate (SO4)	mg/L	-	1500	140		1.0	4788497
Total Cyanide (CN)	mg/L	-	2	<0.0050		0.0050	4787803
Petroleum Hydrocarbons							
Total Oil & Grease	mg/L	-	-	<0.50		0.50	4788872
Total Oil & Grease Mineral/Synthetic	mg/L	-	-	<0.50		0.50	4788902
Metals							
Total Aluminum (Al)	mg/L	-	50	14		0.1	4788468
Total Antimony (Sb)	mg/L	0.006	5	**<0.02 (1)**		0.02	4788468
Total Arsenic (As)	mg/L	0.025	1	0.02		0.01	4788468
Total Beryllium (Be)	mg/L	0.004	5	0.0006		0.0005	4788468
Total Cadmium (Cd)	mg/L	0.0027	1	<0.002		0.002	4788468
Total Chromium (Cr)	mg/L	0.05	3	0.03		0.01	4788468
Total Cobalt (Co)	mg/L	0.0038	5	0.013		0.002	4788468
Total Copper (Cu)	mg/L	0.087	3	0.01		0.01	4788468
Total Iron (Fe)	mg/L	-	50	21		0.02	4788468
Total Lead (Pb)	mg/L	0.01	3	0.01		0.01	4788468
Total Manganese (Mn)	mg/L	-	5	0.82		0.001	4788468
Mercury (Hg)	mg/L	0.00029	0.05	<0.0001		0.0001	4787545
Total Molybdenum (Mo)	mg/L	0.07	5	0.014		0.005	4788468
Total Nickel (Ni)	mg/L	0.1	3	0.031		0.005	4788468
Total Phosphorus (P)	mg/L	-	10	0.70		0.05	4788468
Total Selenium (Se)	mg/L	0.01	5	**<0.02 (1)**		0.02	4788468
Total Silver (Ag)	mg/L	0.0015	5	**<0.01 (1)**		0.01	4788468

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Texture Soil
Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)
(1) RDL exceeds criteria

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HALTON SANITARY & COMBINED SEWER (2-03)

Maxxam ID				DPE292	DPE292		
Sampling Date							
COC Number				590410-01-01	590410-01-01		
	UNITS	Criteria	Criteria-2	SUB-UF	SUB-UF Lab-Dup	RDL	QC Batch
Total Tin (Sn)	mg/L	-	5	<0.02		0.02	4788468
Total Titanium (Ti)	mg/L	-	5	0.14		0.005	4788468
Total Zinc (Zn)	mg/L	1.1	3	0.081		0.005	4788468
Polyaromatic Hydrocarbons							
Naphthalene	ug/L	11	140	<0.050		0.050	4790226
Volatile Organics							
Benzene	ug/L	5.0	10	<0.10	<0.10	0.10	4786159
Chloroform	ug/L	2.4	40	0.40	0.38	0.10	4786159
1,4-Dichlorobenzene	ug/L	1.0	80	<0.20	<0.20	0.20	4786159
Ethylbenzene	ug/L	2.4	160	<0.10	<0.10	0.10	4786159
Methylene Chloride(Dichloromethane)	ug/L	50	2000	<0.50	<0.50	0.50	4786159
Tetrachloroethylene	ug/L	1.6	1000	0.51	0.53	0.10	4786159
Toluene	ug/L	24	16	<0.20	<0.20	0.20	4786159
Trichloroethylene	ug/L	1.6	400	0.22	0.20	0.10	4786159
Surrogate Recovery (%)							
D10-Anthracene	%	-	-	102			4790226
D14-Terphenyl (FS)	%	-	-	99			4790226
D8-Acenaphthylene	%	-	-	100			4790226
4-Bromofluorobenzene	%	-	-	103	89		4786159
D4-1,2-Dichloroethane	%	-	-	107	97		4786159
D8-Toluene	%	-	-	93	98		4786159

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Texture Soil
Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)

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HALTON STORM SEWER BYLAW (2-03)

Maxxam ID		DPE292		
Sampling Date				
COC Number		590410-01-01		
	UNITS	**SUB-UF**	**RDL**	**QC Batch**
Microbiological				
Escherichia coli	CFU/100mL	<10	10	4785559

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID			DPE293		
Sampling Date					
COC Number			590410-01-01		
	UNITS	Criteria	SA #1	RDL	QC Batch
Metals					
Chromium (VI)	ug/L	25	<0.50	0.50	4790140

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Texture Soil

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O.REG 153 INORGANICS PKG (LAB FILTERED)

Maxxam ID				DPE293	DPE293		
Sampling Date							
COC Number				590410-01-01	590410-01-01		
	UNITS	Criteria	Criteria-2	SA #1	SA #1 Lab-Dup	RDL	QC Batch
Inorganics							
Free Cyanide	ug/L	66	-	<1		1	4789880
Dissolved Chloride (Cl)	mg/L	790	-	450		5.0	4790073
Metals							
Mercury (Hg)	ug/L	0.29	50	<0.1		0.1	4787552
Dissolved Antimony (Sb)	ug/L	6.0	5000	0.71	0.57	0.50	4789147
Dissolved Arsenic (As)	ug/L	25	1000	6.0	5.7	1.0	4789147
Dissolved Barium (Ba)	ug/L	1000	-	71	72	2.0	4789147
Dissolved Beryllium (Be)	ug/L	4.0	5000	<0.50	<0.50	0.50	4789147
Dissolved Boron (B)	ug/L	5000	-	1500	1500	10	4789147
Dissolved Cadmium (Cd)	ug/L	2.7	1000	<0.10	<0.10	0.10	4789147
Dissolved Chromium (Cr)	ug/L	50	3000	<5.0	<5.0	5.0	4789147
Dissolved Cobalt (Co)	ug/L	3.8	5000	<0.50	<0.50	0.50	4789147
Dissolved Copper (Cu)	ug/L	87	3000	<1.0	4.1	1.0	4789147
Dissolved Lead (Pb)	ug/L	10	3000	<0.50	<0.50	0.50	4789147
Dissolved Molybdenum (Mo)	ug/L	70	5000	11	12	0.50	4789147
Dissolved Nickel (Ni)	ug/L	100	3000	<1.0	<1.0	1.0	4789147
Dissolved Selenium (Se)	ug/L	10	5000	<2.0	<2.0	2.0	4789147
Dissolved Silver (Ag)	ug/L	1.5	5000	<0.10	<0.10	0.10	4789147
Dissolved Sodium (Na)	ug/L	490000	-	110000	110000	100	4789147
Dissolved Thallium (Tl)	ug/L	2.0	-	0.060	<0.050	0.050	4789147
Dissolved Uranium (U)	ug/L	20	-	3.1	2.9	0.10	4789147
Dissolved Vanadium (V)	ug/L	6.2	-	<0.50	<0.50	0.50	4789147
Dissolved Zinc (Zn)	ug/L	1100	3000	<5.0	<5.0	5.0	4789147

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Lab-Dup = Laboratory Initiated Duplicate

Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Texture Soil

Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)

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O.REG 153 PAHS (WATER)

Maxxam ID				DPE293		
Sampling Date						
COC Number				590410-01-01		
	UNITS	Criteria	Criteria-2	SA #1	RDL	QC Batch
Calculated Parameters						
Methylnaphthalene, 2-(1-)	ug/L	3.2	-	<0.071	0.071	4785387
Polyaromatic Hydrocarbons						
Acenaphthene	ug/L	4.1	-	<0.050	0.050	4790226
Acenaphthylene	ug/L	1	-	<0.050	0.050	4790226
Anthracene	ug/L	2.4	-	<0.050	0.050	4790226
Benzo(a)anthracene	ug/L	1.0	-	<0.050	0.050	4790226
Benzo(a)pyrene	ug/L	0.01	-	<0.010	0.010	4790226
Benzo(b/j)fluoranthene	ug/L	0.1	-	<0.050	0.050	4790226
Benzo(g,h,i)perylene	ug/L	0.2	-	<0.050	0.050	4790226
Benzo(k)fluoranthene	ug/L	0.1	-	<0.050	0.050	4790226
Chrysene	ug/L	0.1	-	<0.050	0.050	4790226
Dibenz(a,h)anthracene	ug/L	0.2	-	<0.050	0.050	4790226
Fluoranthene	ug/L	0.41	-	<0.050	0.050	4790226
Fluorene	ug/L	120	-	<0.050	0.050	4790226
Indeno(1,2,3-cd)pyrene	ug/L	0.2	-	<0.050	0.050	4790226
1-Methylnaphthalene	ug/L	3.2	-	<0.050	0.050	4790226
2-Methylnaphthalene	ug/L	3.2	-	<0.050	0.050	4790226
Naphthalene	ug/L	11	140	<0.050	0.050	4790226
Phenanthrene	ug/L	1	-	<0.030	0.030	4790226
Pyrene	ug/L	4.1	-	<0.050	0.050	4790226
Surrogate Recovery (%)						
D10-Anthracene	%	-	-	101		4790226
D14-Terphenyl (FS)	%	-	-	97		4790226
D8-Acenaphthylene	%	-	-	101		4790226

RDL = Reportable Detection Limit

QC Batch = Quality Control Batch

Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Texture Soil

Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)

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O.REG 153 VOCS & F1-F4 (WATER)

Maxxam ID				DPE293		
Sampling Date						
COC Number				590410-01-01		
	UNITS	Criteria	Criteria-2	SA #1	RDL	QC Batch
Calculated Parameters						
1,3-Dichloropropene (cis+trans)	ug/L	0.5	-	<0.50	0.50	4784043
Volatile Organics						
Acetone (2-Propanone)	ug/L	2700	-	<10	10	4787490
Benzene	ug/L	5.0	10	<0.20	0.20	4787490
Bromodichloromethane	ug/L	16.0	-	<0.50	0.50	4787490
Bromoform	ug/L	25.0	-	<1.0	1.0	4787490
Bromomethane	ug/L	0.89	-	<0.50	0.50	4787490
Carbon Tetrachloride	ug/L	0.79	-	<0.20	0.20	4787490
Chlorobenzene	ug/L	30	-	<0.20	0.20	4787490
Chloroform	ug/L	2.4	40	0.40	0.20	4787490
Dibromochloromethane	ug/L	25.0	-	<0.50	0.50	4787490
1,2-Dichlorobenzene	ug/L	3.0	-	<0.50	0.50	4787490
1,3-Dichlorobenzene	ug/L	59	-	<0.50	0.50	4787490
1,4-Dichlorobenzene	ug/L	1.0	80	<0.50	0.50	4787490
Dichlorodifluoromethane (FREON 12)	ug/L	590	-	<1.0	1.0	4787490
1,1-Dichloroethane	ug/L	5	-	0.34	0.20	4787490
1,2-Dichloroethane	ug/L	1.6	-	<0.50	0.50	4787490
1,1-Dichloroethylene	ug/L	1.6	-	<0.20	0.20	4787490
cis-1,2-Dichloroethylene	ug/L	1.6	-	<0.50	0.50	4787490
trans-1,2-Dichloroethylene	ug/L	1.6	-	<0.50	0.50	4787490
1,2-Dichloropropane	ug/L	5.0	-	<0.20	0.20	4787490
cis-1,3-Dichloropropene	ug/L	0.5	-	<0.30	0.30	4787490
trans-1,3-Dichloropropene	ug/L	0.5	-	<0.40	0.40	4787490
Ethylbenzene	ug/L	2.4	160	<0.20	0.20	4787490
Ethylene Dibromide	ug/L	0.2	-	<0.20	0.20	4787490
Hexane	ug/L	51	-	<1.0	1.0	4787490
Methylene Chloride(Dichloromethane)	ug/L	50	2000	<2.0	2.0	4787490
Methyl Ethyl Ketone (2-Butanone)	ug/L	1800	-	<10	10	4787490
Methyl Isobutyl Ketone	ug/L	640	-	<5.0	5.0	4787490
Methyl t-butyl ether (MTBE)	ug/L	15	-	<0.50	0.50	4787490
Styrene	ug/L	5.4	-	<0.50	0.50	4787490
1,1,1,2-Tetrachloroethane	ug/L	1.1	-	<0.50	0.50	4787490

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Texture Soil

Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)

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O.REG 153 VOCS & F1-F4 (WATER)

Maxxam ID				DPE293		
Sampling Date						
COC Number				590410-01-01		
	UNITS	Criteria	Criteria-2	SA #1	RDL	QC Batch
1,1,2,2-Tetrachloroethane	ug/L	1.0	-	<0.50	0.50	4787490
Tetrachloroethylene	ug/L	1.6	1000	0.40	0.20	4787490
Toluene	ug/L	24	16	<0.20	0.20	4787490
1,1,1-Trichloroethane	ug/L	200	-	<0.20	0.20	4787490
1,1,2-Trichloroethane	ug/L	4.7	-	<0.50	0.50	4787490
Trichloroethylene	ug/L	1.6	400	0.29	0.20	4787490
Trichlorofluoromethane (FREON 11)	ug/L	150	-	<0.50	0.50	4787490
Vinyl Chloride	ug/L	0.5	-	<0.20	0.20	4787490
p+m-Xylene	ug/L	-	-	<0.20	0.20	4787490
o-Xylene	ug/L	-	-	<0.20	0.20	4787490
Total Xylenes	ug/L	300	-	<0.20	0.20	4787490
F1 (C6-C10)	ug/L	750	-	<25	25	4787490
F1 (C6-C10) - BTEX	ug/L	750	-	<25	25	4787490
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/L	150	-	<100	100	4790932
F3 (C16-C34 Hydrocarbons)	ug/L	500	-	<200	200	4790932
F4 (C34-C50 Hydrocarbons)	ug/L	500	-	<200	200	4790932
Reached Baseline at C50	ug/L	-	-	Yes		4790932
Surrogate Recovery (%)						
o-Terphenyl	%	-	-	97		4790932
4-Bromofluorobenzene	%	-	-	100		4787490
D4-1,2-Dichloroethane	%	-	-	100		4787490
D8-Toluene	%	-	-	100		4787490

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 2: Full Depth Generic Site Condition Standards in a Potable Ground Water Condition
Potable Ground Water- All Types of Property Uses - Coarse Texture Soil
Criteria-2: Halton Sanitary & Combined Sewer Bylaw (2-03)

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Maxxam Job #: B6Q8047
Report Date: 2016/12/15

Terraprobe
Client Project #: 1-16-0680-46

TEST SUMMARY

Maxxam ID: DPE292
Sample ID: SUB-UF
Matrix: Water

Collected:
Shipped:
Received: 2016/12/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Carbonaceous BOD	DO	4785915	2016/12/09	2016/12/14	Prakash Piya
Total Cyanide	SKAL/CN	4787803	2016/12/10	2016/12/12	Xuanhong Qiu
Fluoride	ISE	4787902	2016/12/10	2016/12/12	Surinder Rai
Mercury in Water by CVAA	CV/AA	4787545	2016/12/10	2016/12/13	Magdalena Carlos
Total Metals Analysis by Axial ICP	ICPX	4788468	2016/12/12	2016/12/12	Archana Patel
E.coli, (CFU/100mL)	PL	4785559	N/A	2016/12/08	Jigar Shah
Animal and Vegetable Oil & Grease	BAL	4784165	N/A	2016/12/13	Automated Statchk
Total Oil and Grease	BAL	4788872	2016/12/12	2016/12/13	Amjad Mir
PAH Compounds in Water by GC/MS (SIM)	GC/MS	4790226	2016/12/13	2016/12/13	Mitesh Raj
pH	AT	4787903	N/A	2016/12/12	Surinder Rai
Phenols (4AAP)	TECH/PHEN	4790200	N/A	2016/12/13	Faye Sabet
Sulphate by Automated Colourimetry	KONE	4788497	N/A	2016/12/13	Alina Dobreanu
Total Kjeldahl Nitrogen in Water	SKAL	4792532	2016/12/14	2016/12/15	Amarinder Sawhney
TPH (Heavy Oil)	BAL	4788902	2016/12/12	2016/12/13	Amjad Mir
Total Suspended Solids	BAL	4787452	2016/12/10	2016/12/12	Arpan Shah
Volatile Organic Compounds in Water	P&T/MS	4786159	N/A	2016/12/14	Karen Huynh

Maxxam ID: DPE292 Dup
Sample ID: SUB-UF
Matrix: Water

Collected:
Shipped:
Received: 2016/12/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Volatile Organic Compounds in Water	P&T/MS	4786159	N/A	2016/12/14	Karen Huynh

Maxxam ID: DPE293
Sample ID: SA #1
Matrix: Water

Collected:
Shipped:
Received: 2016/12/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	4785387	N/A	2016/12/14	Automated Statchk
1,3-Dichloropropene Sum	CALC	4784043	N/A	2016/12/13	Automated Statchk
Chloride by Automated Colourimetry	KONE	4790073	N/A	2016/12/14	Deonarine Ramnarine
Chromium (VI) in Water	IC	4790140	N/A	2016/12/13	Lang Le
Free (WAD) Cyanide	SKAL/CN	4789880	N/A	2016/12/13	Xuanhong Qiu
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	4790932	2016/12/13	2016/12/14	Zhiyue (Frank) Zhu
Mercury	CV/AA	4787552	2016/12/10	2016/12/14	Magdalena Carlos
Lab Filtered Metals by ICPMS	ICP/MS	4789147	2016/12/12	2016/12/13	Prempal Bhatti
PAH Compounds in Water by GC/MS (SIM)	GC/MS	4790226	2016/12/13	2016/12/13	Mitesh Raj
Volatile Organic Compounds and F1 PHCs	GC/MSFD	4787490	N/A	2016/12/12	Karen Hughes

Maxxam ID: DPE293 Dup
Sample ID: SA #1
Matrix: Water

Collected:
Shipped:
Received: 2016/12/08

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Lab Filtered Metals by ICPMS	ICP/MS	4789147	2016/12/12	2016/12/13	Prempal Bhatti

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GENERAL COMMENTS

Each temperature is the average of up to three cooler temperatures taken at receipt

Package 1	7.0°C

Results relate only to the items tested.

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Maxxam Job #: B6Q8047
Report Date: 2016/12/15

Terraprobe
Client Project #: 1-16-0680-46

QUALITY ASSURANCE REPORT

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4785915	PRP	QC Standard	Total Carbonaceous BOD	2016/12/14		96	%	85 - 115
4785915	PRP	Method Blank	Total Carbonaceous BOD	2016/12/14	<2		mg/L	
4785915	PRP	RPD	Total Carbonaceous BOD	2016/12/14	NC		%	25
4786159	KH1	Matrix Spike	4-Bromofluorobenzene	2016/12/13		104	%	70 - 130
			D4-1,2-Dichloroethane	2016/12/13		98	%	70 - 130
			D8-Toluene	2016/12/13		99	%	70 - 130
			Benzene	2016/12/13		NC	%	70 - 130
			Chloroform	2016/12/13		93	%	70 - 130
			1,4-Dichlorobenzene	2016/12/13		97	%	70 - 130
			Ethylbenzene	2016/12/13		105	%	70 - 130
			Methylene Chloride(Dichloromethane)	2016/12/13		86	%	70 - 130
			Tetrachloroethylene	2016/12/13		95	%	70 - 130
			Toluene	2016/12/13		97	%	70 - 130
			Trichloroethylene	2016/12/13		95	%	70 - 130
4786159	KH1	Spiked Blank	4-Bromofluorobenzene	2016/12/13		100	%	70 - 130
			D4-1,2-Dichloroethane	2016/12/13		97	%	70 - 130
			D8-Toluene	2016/12/13		99	%	70 - 130
			Benzene	2016/12/13		94	%	70 - 130
			Chloroform	2016/12/13		92	%	70 - 130
			1,4-Dichlorobenzene	2016/12/13		95	%	70 - 130
			Ethylbenzene	2016/12/13		98	%	70 - 130
			Methylene Chloride(Dichloromethane)	2016/12/13		84	%	70 - 130
			Tetrachloroethylene	2016/12/13		95	%	70 - 130
			Toluene	2016/12/13		93	%	70 - 130
			Trichloroethylene	2016/12/13		93	%	70 - 130
4786159	KH1	Method Blank	4-Bromofluorobenzene	2016/12/13		89	%	70 - 130
			D4-1,2-Dichloroethane	2016/12/13		99	%	70 - 130
			D8-Toluene	2016/12/13		98	%	70 - 130
			Benzene	2016/12/13	<0.10		ug/L	
			Chloroform	2016/12/13	<0.10		ug/L	
			1,4-Dichlorobenzene	2016/12/13	<0.20		ug/L	
			Ethylbenzene	2016/12/13	<0.10		ug/L	
			Methylene Chloride(Dichloromethane)	2016/12/13	<0.50		ug/L	
			Tetrachloroethylene	2016/12/13	<0.10		ug/L	
			Toluene	2016/12/13	<0.20		ug/L	
			Trichloroethylene	2016/12/13	<0.10		ug/L	
4786159	KH1	RPD [DPE292-11]	Benzene	2016/12/14	NC		%	30
			Chloroform	2016/12/14	NC		%	30
			1,4-Dichlorobenzene	2016/12/14	NC		%	30
			Ethylbenzene	2016/12/14	NC		%	30
			Methylene Chloride(Dichloromethane)	2016/12/14	NC		%	30
			Tetrachloroethylene	2016/12/14	3.6		%	30
			Toluene	2016/12/14	NC		%	30
			Trichloroethylene	2016/12/14	NC		%	30
4787452	AS6	QC Standard	Total Suspended Solids	2016/12/12		97	%	85 - 115
4787452	AS6	Method Blank	Total Suspended Solids	2016/12/12	<10		mg/L	
4787452	AS6	RPD	Total Suspended Solids	2016/12/12	NC		%	25
4787490	KH2	Matrix Spike	4-Bromofluorobenzene	2016/12/12		100	%	70 - 130
			D4-1,2-Dichloroethane	2016/12/12		110	%	70 - 130
			D8-Toluene	2016/12/12		98	%	70 - 130
			Acetone (2-Propanone)	2016/12/12		100	%	60 - 140
			Benzene	2016/12/12		93	%	70 - 130
			Bromodichloromethane	2016/12/12		100	%	70 - 130
			Bromoform	2016/12/12		103	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Bromomethane	2016/12/12		73	%	60 - 140
			Carbon Tetrachloride	2016/12/12		90	%	70 - 130
			Chlorobenzene	2016/12/12		99	%	70 - 130
			Chloroform	2016/12/12		95	%	70 - 130
			Dibromochloromethane	2016/12/12		102	%	70 - 130
			1,2-Dichlorobenzene	2016/12/12		97	%	70 - 130
			1,3-Dichlorobenzene	2016/12/12		94	%	70 - 130
			1,4-Dichlorobenzene	2016/12/12		96	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2016/12/12		82	%	60 - 140
			1,1-Dichloroethane	2016/12/12		95	%	70 - 130
			1,2-Dichloroethane	2016/12/12		101	%	70 - 130
			1,1-Dichloroethylene	2016/12/12		95	%	70 - 130
			cis-1,2-Dichloroethylene	2016/12/12		98	%	70 - 130
			trans-1,2-Dichloroethylene	2016/12/12		92	%	70 - 130
			1,2-Dichloropropane	2016/12/12		101	%	70 - 130
			cis-1,3-Dichloropropene	2016/12/12		97	%	70 - 130
			trans-1,3-Dichloropropene	2016/12/12		97	%	70 - 130
			Ethylbenzene	2016/12/12		94	%	70 - 130
			Ethylene Dibromide	2016/12/12		105	%	70 - 130
			Hexane	2016/12/12		99	%	70 - 130
			Methylene Chloride(Dichloromethane)	2016/12/12		100	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2016/12/12		107	%	60 - 140
			Methyl Isobutyl Ketone	2016/12/12		113	%	70 - 130
			Methyl t-butyl ether (MTBE)	2016/12/12		99	%	70 - 130
			Styrene	2016/12/12		94	%	70 - 130
			1,1,1,2-Tetrachloroethane	2016/12/12		98	%	70 - 130
			1,1,2,2-Tetrachloroethane	2016/12/12		110	%	70 - 130
			Tetrachloroethylene	2016/12/12		89	%	70 - 130
			Toluene	2016/12/12		88	%	70 - 130
			1,1,1-Trichloroethane	2016/12/12		89	%	70 - 130
			1,1,2-Trichloroethane	2016/12/12		105	%	70 - 130
			Trichloroethylene	2016/12/12		91	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2016/12/12		94	%	70 - 130
			Vinyl Chloride	2016/12/12		91	%	70 - 130
			p+m-Xylene	2016/12/12		94	%	70 - 130
			o-Xylene	2016/12/12		93	%	70 - 130
			F1 (C6-C10)	2016/12/12		94	%	60 - 140
4787490	KH2	Spiked Blank	4-Bromofluorobenzene	2016/12/12		101	%	70 - 130
			D4-1,2-Dichloroethane	2016/12/12		98	%	70 - 130
			D8-Toluene	2016/12/12		100	%	70 - 130
			Acetone (2-Propanone)	2016/12/12		85	%	60 - 140
			Benzene	2016/12/12		93	%	70 - 130
			Bromodichloromethane	2016/12/12		94	%	70 - 130
			Bromoform	2016/12/12		90	%	70 - 130
			Bromomethane	2016/12/12		67	%	60 - 140
			Carbon Tetrachloride	2016/12/12		96	%	70 - 130
			Chlorobenzene	2016/12/12		98	%	70 - 130
			Chloroform	2016/12/12		94	%	70 - 130
			Dibromochloromethane	2016/12/12		93	%	70 - 130
			1,2-Dichlorobenzene	2016/12/12		94	%	70 - 130
			1,3-Dichlorobenzene	2016/12/12		95	%	70 - 130
			1,4-Dichlorobenzene	2016/12/12		96	%	70 - 130
			Dichlorodifluoromethane (FREON 12)	2016/12/12		60 (1)	%	60 - 140
			1,1-Dichloroethane	2016/12/12		95	%	70 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			1,2-Dichloroethane	2016/12/12		91	%	70 - 130
			1,1-Dichloroethylene	2016/12/12		98	%	70 - 130
			cis-1,2-Dichloroethylene	2016/12/12		97	%	70 - 130
			trans-1,2-Dichloroethylene	2016/12/12		95	%	70 - 130
			1,2-Dichloropropane	2016/12/12		96	%	70 - 130
			cis-1,3-Dichloropropene	2016/12/12		90	%	70 - 130
			trans-1,3-Dichloropropene	2016/12/12		85	%	70 - 130
			Ethylbenzene	2016/12/12		98	%	70 - 130
			Ethylene Dibromide	2016/12/12		92	%	70 - 130
			Hexane	2016/12/12		105	%	70 - 130
			Methylene Chloride(Dichloromethane)	2016/12/12		94	%	70 - 130
			Methyl Ethyl Ketone (2-Butanone)	2016/12/12		88	%	60 - 140
			Methyl Isobutyl Ketone	2016/12/12		92	%	70 - 130
			Methyl t-butyl ether (MTBE)	2016/12/12		94	%	70 - 130
			Styrene	2016/12/12		93	%	70 - 130
			1,1,1,2-Tetrachloroethane	2016/12/12		96	%	70 - 130
			1,1,2,2-Tetrachloroethane	2016/12/12		94	%	70 - 130
			Tetrachloroethylene	2016/12/12		95	%	70 - 130
			Toluene	2016/12/12		90	%	70 - 130
			1,1,1-Trichloroethane	2016/12/12		94	%	70 - 130
			1,1,2-Trichloroethane	2016/12/12		93	%	70 - 130
			Trichloroethylene	2016/12/12		95	%	70 - 130
			Trichlorofluoromethane (FREON 11)	2016/12/12		97	%	70 - 130
			Vinyl Chloride	2016/12/12		86	%	70 - 130
			p+m-Xylene	2016/12/12		96	%	70 - 130
			o-Xylene	2016/12/12		94	%	70 - 130
			F1 (C6-C10)	2016/12/12		83	%	60 - 140
4787490	KH2	Method Blank	4-Bromofluorobenzene	2016/12/12		99	%	70 - 130
			D4-1,2-Dichloroethane	2016/12/12		98	%	70 - 130
			D8-Toluene	2016/12/12		101	%	70 - 130
			Acetone (2-Propanone)	2016/12/12	<10		ug/L	
			Benzene	2016/12/12	<0.20		ug/L	
			Bromodichloromethane	2016/12/12	<0.50		ug/L	
			Bromoform	2016/12/12	<1.0		ug/L	
			Bromomethane	2016/12/12	<0.50		ug/L	
			Carbon Tetrachloride	2016/12/12	<0.20		ug/L	
			Chlorobenzene	2016/12/12	<0.20		ug/L	
			Chloroform	2016/12/12	<0.20		ug/L	
			Dibromochloromethane	2016/12/12	<0.50		ug/L	
			1,2-Dichlorobenzene	2016/12/12	<0.50		ug/L	
			1,3-Dichlorobenzene	2016/12/12	<0.50		ug/L	
			1,4-Dichlorobenzene	2016/12/12	<0.50		ug/L	
			Dichlorodifluoromethane (FREON 12)	2016/12/12	<1.0		ug/L	
			1,1-Dichloroethane	2016/12/12	<0.20		ug/L	
			1,2-Dichloroethane	2016/12/12	<0.50		ug/L	
			1,1-Dichloroethylene	2016/12/12	<0.20		ug/L	
			cis-1,2-Dichloroethylene	2016/12/12	<0.50		ug/L	
			trans-1,2-Dichloroethylene	2016/12/12	<0.50		ug/L	
			1,2-Dichloropropane	2016/12/12	<0.20		ug/L	
			cis-1,3-Dichloropropene	2016/12/12	<0.30		ug/L	
			trans-1,3-Dichloropropene	2016/12/12	<0.40		ug/L	
			Ethylbenzene	2016/12/12	<0.20		ug/L	
			Ethylene Dibromide	2016/12/12	<0.20		ug/L	
			Hexane	2016/12/12	<1.0		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Methylene Chloride(Dichloromethane)	2016/12/12	<2.0		ug/L	
			Methyl Ethyl Ketone (2-Butanone)	2016/12/12	<10		ug/L	
			Methyl Isobutyl Ketone	2016/12/12	<5.0		ug/L	
			Methyl t-butyl ether (MTBE)	2016/12/12	<0.50		ug/L	
			Styrene	2016/12/12	<0.50		ug/L	
			1,1,1,2-Tetrachloroethane	2016/12/12	<0.50		ug/L	
			1,1,2,2-Tetrachloroethane	2016/12/12	<0.50		ug/L	
			Tetrachloroethylene	2016/12/12	<0.20		ug/L	
			Toluene	2016/12/12	<0.20		ug/L	
			1,1,1-Trichloroethane	2016/12/12	<0.20		ug/L	
			1,1,2-Trichloroethane	2016/12/12	<0.50		ug/L	
			Trichloroethylene	2016/12/12	<0.20		ug/L	
			Trichlorofluoromethane (FREON 11)	2016/12/12	<0.50		ug/L	
			Vinyl Chloride	2016/12/12	<0.20		ug/L	
			p+m-Xylene	2016/12/12	<0.20		ug/L	
			o-Xylene	2016/12/12	<0.20		ug/L	
			Total Xylenes	2016/12/12	<0.20		ug/L	
			F1 (C6-C10)	2016/12/12	<25		ug/L	
			F1 (C6-C10) - BTEX	2016/12/12	<25		ug/L	
4787490	KH2	RPD	Acetone (2-Propanone)	2016/12/12	NC		%	30
			Benzene	2016/12/12	NC		%	30
			Bromodichloromethane	2016/12/12	NC		%	30
			Bromoform	2016/12/12	NC		%	30
			Bromomethane	2016/12/12	NC		%	30
			Carbon Tetrachloride	2016/12/12	NC		%	30
			Chlorobenzene	2016/12/12	NC		%	30
			Chloroform	2016/12/12	NC		%	30
			Dibromochloromethane	2016/12/12	NC		%	30
			1,2-Dichlorobenzene	2016/12/12	NC		%	30
			1,3-Dichlorobenzene	2016/12/12	NC		%	30
			1,4-Dichlorobenzene	2016/12/12	NC		%	30
			Dichlorodifluoromethane (FREON 12)	2016/12/12	NC		%	30
			1,1-Dichloroethane	2016/12/12	NC		%	30
			1,2-Dichloroethane	2016/12/12	NC		%	30
			1,1-Dichloroethylene	2016/12/12	NC		%	30
			cis-1,2-Dichloroethylene	2016/12/12	NC		%	30
			trans-1,2-Dichloroethylene	2016/12/12	NC		%	30
			1,2-Dichloropropane	2016/12/12	NC		%	30
			cis-1,3-Dichloropropene	2016/12/12	NC		%	30
			trans-1,3-Dichloropropene	2016/12/12	NC		%	30
			Ethylbenzene	2016/12/12	NC		%	30
			Ethylene Dibromide	2016/12/12	NC		%	30
			Hexane	2016/12/12	NC		%	30
			Methylene Chloride(Dichloromethane)	2016/12/12	NC		%	30
			Methyl Ethyl Ketone (2-Butanone)	2016/12/12	NC		%	30
			Methyl Isobutyl Ketone	2016/12/12	NC		%	30
			Methyl t-butyl ether (MTBE)	2016/12/12	NC		%	30
			Styrene	2016/12/12	NC		%	30
			1,1,1,2-Tetrachloroethane	2016/12/12	NC		%	30
			1,1,2,2-Tetrachloroethane	2016/12/12	NC		%	30
			Tetrachloroethylene	2016/12/12	NC		%	30
			Toluene	2016/12/12	NC		%	30
			1,1,1-Trichloroethane	2016/12/12	NC		%	30
			1,1,2-Trichloroethane	2016/12/12	NC		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Trichloroethylene	2016/12/12	NC		%	30
			Trichlorofluoromethane (FREON 11)	2016/12/12	NC		%	30
			Vinyl Chloride	2016/12/12	NC		%	30
			p+m-Xylene	2016/12/12	NC		%	30
			o-Xylene	2016/12/12	NC		%	30
			Total Xylenes	2016/12/12	NC		%	30
			F1 (C6-C10)	2016/12/12	NC		%	30
			F1 (C6-C10) - BTEX	2016/12/12	NC		%	30
4787545	MC	Matrix Spike	Mercury (Hg)	2016/12/13		114	%	75 - 125
4787545	MC	Spiked Blank	Mercury (Hg)	2016/12/13		110	%	80 - 120
4787545	MC	Method Blank	Mercury (Hg)	2016/12/13	<0.0001		mg/L	
4787545	MC	RPD	Mercury (Hg)	2016/12/13	NC		%	20
4787552	MC	Matrix Spike	Mercury (Hg)	2016/12/14		112	%	75 - 125
4787552	MC	Spiked Blank	Mercury (Hg)	2016/12/14		108	%	80 - 120
4787552	MC	Method Blank	Mercury (Hg)	2016/12/14	<0.1		ug/L	
4787552	MC	RPD	Mercury (Hg)	2016/12/14	NC		%	20
4787803	XQI	Matrix Spike	Total Cyanide (CN)	2016/12/12		105	%	80 - 120
4787803	XQI	Spiked Blank	Total Cyanide (CN)	2016/12/12		102	%	80 - 120
4787803	XQI	Method Blank	Total Cyanide (CN)	2016/12/12	<0.0050		mg/L	
4787803	XQI	RPD	Total Cyanide (CN)	2016/12/12	NC		%	20
4787902	SAU	Matrix Spike	Fluoride (F-)	2016/12/12		99	%	80 - 120
4787902	SAU	Spiked Blank	Fluoride (F-)	2016/12/12		98	%	80 - 120
4787902	SAU	Method Blank	Fluoride (F-)	2016/12/12	<0.10		mg/L	
4787902	SAU	RPD	Fluoride (F-)	2016/12/12	NC		%	20
4787903	SAU	Spiked Blank	pH	2016/12/12		102	%	98 - 103
4787903	SAU	RPD	pH	2016/12/12	1.5		%	N/A
4788468	APT	Matrix Spike	Total Aluminum (Al)	2016/12/12		104	%	80 - 120
			Total Antimony (Sb)	2016/12/12		102	%	80 - 120
			Total Arsenic (As)	2016/12/12		102	%	80 - 120
			Total Beryllium (Be)	2016/12/12		99	%	80 - 120
			Total Cadmium (Cd)	2016/12/12		100	%	80 - 120
			Total Chromium (Cr)	2016/12/12		95	%	80 - 120
			Total Cobalt (Co)	2016/12/12		90	%	80 - 120
			Total Copper (Cu)	2016/12/12		98	%	80 - 120
			Total Iron (Fe)	2016/12/12		93	%	80 - 120
			Total Lead (Pb)	2016/12/12		88	%	80 - 120
			Total Manganese (Mn)	2016/12/12		NC	%	80 - 120
			Total Molybdenum (Mo)	2016/12/12		97	%	80 - 120
			Total Nickel (Ni)	2016/12/12		89	%	80 - 120
			Total Phosphorus (P)	2016/12/12		108	%	80 - 120
			Total Selenium (Se)	2016/12/12		101	%	80 - 120
			Total Silver (Ag)	2016/12/12		94	%	80 - 120
			Total Tin (Sn)	2016/12/12		93	%	80 - 120
			Total Titanium (Ti)	2016/12/12		99	%	80 - 120
			Total Zinc (Zn)	2016/12/12		98	%	80 - 120
4788468	APT	Spiked Blank	Total Aluminum (Al)	2016/12/12		93	%	80 - 120
			Total Antimony (Sb)	2016/12/12		101	%	80 - 120
			Total Arsenic (As)	2016/12/12		98	%	80 - 120
			Total Beryllium (Be)	2016/12/12		100	%	80 - 120
			Total Cadmium (Cd)	2016/12/12		98	%	80 - 120
			Total Chromium (Cr)	2016/12/12		96	%	80 - 120
			Total Cobalt (Co)	2016/12/12		97	%	80 - 120
			Total Copper (Cu)	2016/12/12		96	%	80 - 120
			Total Iron (Fe)	2016/12/12		98	%	80 - 120

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Total Lead (Pb)	2016/12/12		97	%	80 - 120
			Total Manganese (Mn)	2016/12/12		103	%	80 - 120
			Total Molybdenum (Mo)	2016/12/12		100	%	80 - 120
			Total Nickel (Ni)	2016/12/12		97	%	80 - 120
			Total Phosphorus (P)	2016/12/12		102	%	80 - 120
			Total Selenium (Se)	2016/12/12		99	%	80 - 120
			Total Silver (Ag)	2016/12/12		94	%	80 - 120
			Total Tin (Sn)	2016/12/12		99	%	80 - 120
			Total Titanium (Ti)	2016/12/12		97	%	80 - 120
			Total Zinc (Zn)	2016/12/12		102	%	80 - 120
4788468	APT	Method Blank	Total Aluminum (Al)	2016/12/12	<0.1		mg/L	
			Total Antimony (Sb)	2016/12/12	<0.02		mg/L	
			Total Arsenic (As)	2016/12/12	<0.01		mg/L	
			Total Beryllium (Be)	2016/12/12	<0.0005		mg/L	
			Total Cadmium (Cd)	2016/12/12	<0.002		mg/L	
			Total Chromium (Cr)	2016/12/12	<0.01		mg/L	
			Total Cobalt (Co)	2016/12/12	<0.002		mg/L	
			Total Copper (Cu)	2016/12/12	<0.01		mg/L	
			Total Iron (Fe)	2016/12/12	<0.02		mg/L	
			Total Lead (Pb)	2016/12/12	<0.01		mg/L	
			Total Manganese (Mn)	2016/12/12	<0.001		mg/L	
			Total Molybdenum (Mo)	2016/12/12	<0.005		mg/L	
			Total Nickel (Ni)	2016/12/12	<0.005		mg/L	
			Total Phosphorus (P)	2016/12/12	<0.05		mg/L	
			Total Selenium (Se)	2016/12/12	<0.02		mg/L	
			Total Silver (Ag)	2016/12/12	<0.01		mg/L	
			Total Tin (Sn)	2016/12/12	<0.02		mg/L	
			Total Titanium (Ti)	2016/12/12	<0.005		mg/L	
			Total Zinc (Zn)	2016/12/12	<0.005		mg/L	
4788468	APT	RPD	Total Aluminum (Al)	2016/12/12	NC		%	20
			Total Antimony (Sb)	2016/12/12	NC		%	20
			Total Arsenic (As)	2016/12/12	NC		%	20
			Total Cadmium (Cd)	2016/12/12	NC		%	20
			Total Chromium (Cr)	2016/12/12	NC		%	20
			Total Cobalt (Co)	2016/12/12	NC		%	20
			Total Copper (Cu)	2016/12/12	NC		%	20
			Total Lead (Pb)	2016/12/12	NC		%	20
			Total Manganese (Mn)	2016/12/12	8.5		%	20
			Total Molybdenum (Mo)	2016/12/12	NC		%	20
			Total Nickel (Ni)	2016/12/12	NC		%	20
			Total Phosphorus (P)	2016/12/12	NC		%	20
			Total Selenium (Se)	2016/12/12	NC		%	20
			Total Silver (Ag)	2016/12/12	NC		%	20
			Total Tin (Sn)	2016/12/12	NC		%	20
			Total Titanium (Ti)	2016/12/12	NC		%	20
			Total Zinc (Zn)	2016/12/12	4.2		%	20
4788497	ADB	Matrix Spike	Dissolved Sulphate (SO4)	2016/12/13		NC	%	75 - 125
4788497	ADB	Spiked Blank	Dissolved Sulphate (SO4)	2016/12/13		97	%	80 - 120
4788497	ADB	Method Blank	Dissolved Sulphate (SO4)	2016/12/13	<1.0		mg/L	
4788497	ADB	RPD	Dissolved Sulphate (SO4)	2016/12/13	0.40		%	20
4788872	AMJ	Spiked Blank	Total Oil & Grease	2016/12/13		98	%	85 - 115
4788872	AMJ	RPD	Total Oil & Grease	2016/12/13	2.5		%	25
4788872	AMJ	Method Blank	Total Oil & Grease	2016/12/13	<0.50		mg/L	
4788902	AMJ	Spiked Blank	Total Oil & Grease Mineral/Synthetic	2016/12/13		93	%	85 - 115

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
4788902	AMJ	RPD	Total Oil & Grease Mineral/Synthetic	2016/12/13	4.2		%	25
4788902	AMJ	Method Blank	Total Oil & Grease Mineral/Synthetic	2016/12/13	<0.50		mg/L	
4789147	PBA	Matrix Spike [DPE293-03]	Dissolved Antimony (Sb)	2016/12/13		106	%	80 - 120
			Dissolved Arsenic (As)	2016/12/13		101	%	80 - 120
			Dissolved Barium (Ba)	2016/12/13		106	%	80 - 120
			Dissolved Beryllium (Be)	2016/12/13		103	%	80 - 120
			Dissolved Boron (B)	2016/12/13		NC	%	80 - 120
			Dissolved Cadmium (Cd)	2016/12/13		103	%	80 - 120
			Dissolved Chromium (Cr)	2016/12/13		103	%	80 - 120
			Dissolved Cobalt (Co)	2016/12/13		101	%	80 - 120
			Dissolved Copper (Cu)	2016/12/13		96	%	80 - 120
			Dissolved Lead (Pb)	2016/12/13		105	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/12/13		109	%	80 - 120
			Dissolved Nickel (Ni)	2016/12/13		98	%	80 - 120
			Dissolved Selenium (Se)	2016/12/13		103	%	80 - 120
			Dissolved Silver (Ag)	2016/12/13		101	%	80 - 120
			Dissolved Sodium (Na)	2016/12/13		NC	%	80 - 120
			Dissolved Thallium (Tl)	2016/12/13		107	%	80 - 120
			Dissolved Uranium (U)	2016/12/13		105	%	80 - 120
			Dissolved Vanadium (V)	2016/12/13		104	%	80 - 120
			Dissolved Zinc (Zn)	2016/12/13		98	%	80 - 120
4789147	PBA	Spiked Blank	Dissolved Antimony (Sb)	2016/12/13		106	%	80 - 120
			Dissolved Arsenic (As)	2016/12/13		104	%	80 - 120
			Dissolved Barium (Ba)	2016/12/13		107	%	80 - 120
			Dissolved Beryllium (Be)	2016/12/13		105	%	80 - 120
			Dissolved Boron (B)	2016/12/13		104	%	80 - 120
			Dissolved Cadmium (Cd)	2016/12/13		104	%	80 - 120
			Dissolved Chromium (Cr)	2016/12/13		106	%	80 - 120
			Dissolved Cobalt (Co)	2016/12/13		106	%	80 - 120
			Dissolved Copper (Cu)	2016/12/13		103	%	80 - 120
			Dissolved Lead (Pb)	2016/12/13		109	%	80 - 120
			Dissolved Molybdenum (Mo)	2016/12/13		107	%	80 - 120
			Dissolved Nickel (Ni)	2016/12/13		105	%	80 - 120
			Dissolved Selenium (Se)	2016/12/13		105	%	80 - 120
			Dissolved Silver (Ag)	2016/12/13		102	%	80 - 120
			Dissolved Sodium (Na)	2016/12/13		109	%	80 - 120
			Dissolved Thallium (Tl)	2016/12/13		113	%	80 - 120
			Dissolved Uranium (U)	2016/12/13		107	%	80 - 120
			Dissolved Vanadium (V)	2016/12/13		106	%	80 - 120
			Dissolved Zinc (Zn)	2016/12/13		105	%	80 - 120
4789147	PBA	Method Blank	Dissolved Antimony (Sb)	2016/12/13	<0.50		ug/L	
			Dissolved Arsenic (As)	2016/12/13	<1.0		ug/L	
			Dissolved Barium (Ba)	2016/12/13	<2.0		ug/L	
			Dissolved Beryllium (Be)	2016/12/13	<0.50		ug/L	
			Dissolved Boron (B)	2016/12/13	<10		ug/L	
			Dissolved Cadmium (Cd)	2016/12/13	<0.10		ug/L	
			Dissolved Chromium (Cr)	2016/12/13	<5.0		ug/L	
			Dissolved Cobalt (Co)	2016/12/13	<0.50		ug/L	
			Dissolved Copper (Cu)	2016/12/13	<1.0		ug/L	
			Dissolved Lead (Pb)	2016/12/13	<0.50		ug/L	
			Dissolved Molybdenum (Mo)	2016/12/13	<0.50		ug/L	
			Dissolved Nickel (Ni)	2016/12/13	<1.0		ug/L	
			Dissolved Selenium (Se)	2016/12/13	<2.0		ug/L	
			Dissolved Silver (Ag)	2016/12/13	<0.10		ug/L	

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Dissolved Sodium (Na)	2016/12/13	<100		ug/L	
			Dissolved Thallium (Tl)	2016/12/13	<0.050		ug/L	
			Dissolved Uranium (U)	2016/12/13	<0.10		ug/L	
			Dissolved Vanadium (V)	2016/12/13	<0.50		ug/L	
			Dissolved Zinc (Zn)	2016/12/13	<5.0		ug/L	
4789147	PBA	RPD [DPE293-03]	Dissolved Antimony (Sb)	2016/12/13	NC		%	20
			Dissolved Arsenic (As)	2016/12/13	6.1		%	20
			Dissolved Barium (Ba)	2016/12/13	1.8		%	20
			Dissolved Beryllium (Be)	2016/12/13	NC		%	20
			Dissolved Boron (B)	2016/12/13	0.0071		%	20
			Dissolved Cadmium (Cd)	2016/12/13	NC		%	20
			Dissolved Chromium (Cr)	2016/12/13	NC		%	20
			Dissolved Cobalt (Co)	2016/12/13	NC		%	20
			Dissolved Copper (Cu)	2016/12/13	NC		%	20
			Dissolved Lead (Pb)	2016/12/13	NC		%	20
			Dissolved Molybdenum (Mo)	2016/12/13	4.1		%	20
			Dissolved Nickel (Ni)	2016/12/13	NC		%	20
			Dissolved Selenium (Se)	2016/12/13	NC		%	20
			Dissolved Silver (Ag)	2016/12/13	NC		%	20
			Dissolved Sodium (Na)	2016/12/13	1.2		%	20
			Dissolved Thallium (Tl)	2016/12/13	NC		%	20
			Dissolved Uranium (U)	2016/12/13	8.2		%	20
			Dissolved Vanadium (V)	2016/12/13	NC		%	20
			Dissolved Zinc (Zn)	2016/12/13	NC		%	20
4789880	XQI	Matrix Spike	Free Cyanide	2016/12/13		106	%	80 - 120
4789880	XQI	Spiked Blank	Free Cyanide	2016/12/13		103	%	80 - 120
4789880	XQI	Method Blank	Free Cyanide	2016/12/13	<1		ug/L	
4789880	XQI	RPD	Free Cyanide	2016/12/13	NC		%	20
4790073	DRM	Matrix Spike	Dissolved Chloride (Cl)	2016/12/14		NC	%	80 - 120
4790073	DRM	Spiked Blank	Dissolved Chloride (Cl)	2016/12/14		102	%	80 - 120
4790073	DRM	Method Blank	Dissolved Chloride (Cl)	2016/12/14	<1.0		mg/L	
4790073	DRM	RPD	Dissolved Chloride (Cl)	2016/12/14	1.7		%	20
4790140	LLE	Matrix Spike	Chromium (VI)	2016/12/13		99	%	80 - 120
4790140	LLE	Spiked Blank	Chromium (VI)	2016/12/13		98	%	80 - 120
4790140	LLE	Method Blank	Chromium (VI)	2016/12/13	<0.50		ug/L	
4790140	LLE	RPD	Chromium (VI)	2016/12/13	NC		%	20
4790200	FFS	Matrix Spike	Phenols-4AAP	2016/12/13		104	%	80 - 120
4790200	FFS	Spiked Blank	Phenols-4AAP	2016/12/13		102	%	85 - 115
4790200	FFS	Method Blank	Phenols-4AAP	2016/12/13	<0.0010		mg/L	
4790200	FFS	RPD	Phenols-4AAP	2016/12/13	NC		%	20
4790226	RAJ	Matrix Spike	D10-Anthracene	2016/12/13		106	%	50 - 130
			D14-Terphenyl (FS)	2016/12/13		109	%	50 - 130
			D8-Acenaphthylene	2016/12/13		106	%	50 - 130
			Acenaphthene	2016/12/13		99	%	50 - 130
			Acenaphthylene	2016/12/13		100	%	50 - 130
			Anthracene	2016/12/13		96	%	50 - 130
			Benzo(a)anthracene	2016/12/13		106	%	50 - 130
			Benzo(a)pyrene	2016/12/13		107	%	50 - 130
			Benzo(b/j)fluoranthene	2016/12/13		104	%	50 - 130
			Benzo(g,h,i)perylene	2016/12/13		95	%	50 - 130
			Benzo(k)fluoranthene	2016/12/13		105	%	50 - 130
			Chrysene	2016/12/13		103	%	50 - 130
			Dibenz(a,h)anthracene	2016/12/13		98	%	50 - 130
			Fluoranthene	2016/12/13		108	%	50 - 130

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Fluorene	2016/12/13		101	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2016/12/13		98	%	50 - 130
			1-Methylnaphthalene	2016/12/13		97	%	50 - 130
			2-Methylnaphthalene	2016/12/13		98	%	50 - 130
			Naphthalene	2016/12/13		91	%	50 - 130
			Phenanthrene	2016/12/13		100	%	50 - 130
			Pyrene	2016/12/13		112	%	50 - 130
4790226	RAJ	Spiked Blank	D10-Anthracene	2016/12/13		104	%	50 - 130
			D14-Terphenyl (FS)	2016/12/13		105	%	50 - 130
			D8-Acenaphthylene	2016/12/13		103	%	50 - 130
			Acenaphthene	2016/12/13		94	%	50 - 130
			Acenaphthylene	2016/12/13		96	%	50 - 130
			Anthracene	2016/12/13		92	%	50 - 130
			Benzo(a)anthracene	2016/12/13		102	%	50 - 130
			Benzo(a)pyrene	2016/12/13		102	%	50 - 130
			Benzo(b/j)fluoranthene	2016/12/13		98	%	50 - 130
			Benzo(g,h,i)perylene	2016/12/13		93	%	50 - 130
			Benzo(k)fluoranthene	2016/12/13		100	%	50 - 130
			Chrysene	2016/12/13		98	%	50 - 130
			Dibenz(a,h)anthracene	2016/12/13		96	%	50 - 130
			Fluoranthene	2016/12/13		102	%	50 - 130
			Fluorene	2016/12/13		98	%	50 - 130
			Indeno(1,2,3-cd)pyrene	2016/12/13		97	%	50 - 130
			1-Methylnaphthalene	2016/12/13		95	%	50 - 130
			2-Methylnaphthalene	2016/12/13		92	%	50 - 130
			Naphthalene	2016/12/13		87	%	50 - 130
			Phenanthrene	2016/12/13		96	%	50 - 130
			Pyrene	2016/12/13		105	%	50 - 130
4790226	RAJ	Method Blank	D10-Anthracene	2016/12/13		107	%	50 - 130
			D14-Terphenyl (FS)	2016/12/13		105	%	50 - 130
			D8-Acenaphthylene	2016/12/13		104	%	50 - 130
			Acenaphthene	2016/12/13	<0.050		ug/L	
			Acenaphthylene	2016/12/13	<0.050		ug/L	
			Anthracene	2016/12/13	<0.050		ug/L	
			Benzo(a)anthracene	2016/12/13	<0.050		ug/L	
			Benzo(a)pyrene	2016/12/13	<0.010		ug/L	
			Benzo(b/j)fluoranthene	2016/12/13	<0.050		ug/L	
			Benzo(g,h,i)perylene	2016/12/13	<0.050		ug/L	
			Benzo(k)fluoranthene	2016/12/13	<0.050		ug/L	
			Chrysene	2016/12/13	<0.050		ug/L	
			Dibenz(a,h)anthracene	2016/12/13	<0.050		ug/L	
			Fluoranthene	2016/12/13	<0.050		ug/L	
			Fluorene	2016/12/13	<0.050		ug/L	
			Indeno(1,2,3-cd)pyrene	2016/12/13	<0.050		ug/L	
			1-Methylnaphthalene	2016/12/13	<0.050		ug/L	
			2-Methylnaphthalene	2016/12/13	<0.050		ug/L	
			Naphthalene	2016/12/13	<0.050		ug/L	
			Phenanthrene	2016/12/13	<0.030		ug/L	
			Pyrene	2016/12/13	<0.050		ug/L	
4790226	RAJ	RPD	Anthracene	2016/12/13	NC		%	30
			Benzo(a)anthracene	2016/12/13	NC		%	30
			Benzo(a)pyrene	2016/12/13	NC		%	30
			Benzo(g,h,i)perylene	2016/12/13	NC		%	30
			Benzo(k)fluoranthene	2016/12/13	NC		%	30

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QUALITY ASSURANCE REPORT(CONT'D)

QA/QC Batch	Init	QC Type	Parameter	Date Analyzed	Value	Recovery	UNITS	QC Limits
			Chrysene	2016/12/13	NC		%	30
			Dibenz(a,h)anthracene	2016/12/13	NC		%	30
			Fluoranthene	2016/12/13	NC		%	30
			Fluorene	2016/12/13	NC		%	30
			Naphthalene	2016/12/13	NC		%	30
			Phenanthrene	2016/12/13	NC		%	30
4790932	ZZ	Matrix Spike	o-Terphenyl	2016/12/14		116	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2016/12/14		113	%	50 - 130
			F3 (C16-C34 Hydrocarbons)	2016/12/14		119	%	50 - 130
			F4 (C34-C50 Hydrocarbons)	2016/12/14		129	%	50 - 130
4790932	ZZ	Spiked Blank	o-Terphenyl	2016/12/14		101	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2016/12/14		89	%	60 - 130
			F3 (C16-C34 Hydrocarbons)	2016/12/14		91	%	60 - 130
			F4 (C34-C50 Hydrocarbons)	2016/12/14		94	%	60 - 130
4790932	ZZ	Method Blank	o-Terphenyl	2016/12/13		96	%	60 - 130
			F2 (C10-C16 Hydrocarbons)	2016/12/13	<100		ug/L	
			F3 (C16-C34 Hydrocarbons)	2016/12/13	<200		ug/L	
			F4 (C34-C50 Hydrocarbons)	2016/12/13	<200		ug/L	
4790932	ZZ	RPD	F2 (C10-C16 Hydrocarbons)	2016/12/14	NC		%	30
			F3 (C16-C34 Hydrocarbons)	2016/12/14	NC		%	30
			F4 (C34-C50 Hydrocarbons)	2016/12/14	NC		%	30
4792532	AAY	Matrix Spike	Total Kjeldahl Nitrogen (TKN)	2016/12/15		NC	%	80 - 120
4792532	AAY	QC Standard	Total Kjeldahl Nitrogen (TKN)	2016/12/15		112	%	80 - 120
4792532	AAY	Spiked Blank	Total Kjeldahl Nitrogen (TKN)	2016/12/15		93	%	80 - 120
4792532	AAY	Method Blank	Total Kjeldahl Nitrogen (TKN)	2016/12/15	<0.10		mg/L	
4792532	AAY	RPD	Total Kjeldahl Nitrogen (TKN)	2016/12/15	NC		%	20

N/A = Not Applicable

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 (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spiked amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than 2x that of the native sample concentration).

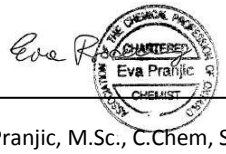
NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (one or both samples < 5x RDL).

(1) The recovery was below the lower control limit. This may represent a low bias in some results for this specific analyte.

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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

Jigar Shah

Jigar Shah, Microbiology Analyst

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.

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CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#1391 Terraprobe	Company Name:		Quotation #:	B62850	Maxxam Job #:	Bottle Order #:
Attention:	Central Accounting	Attention:	Suvish Melanta	P.O. #:			590410
Address:	11 Indell Lane Brampton ON L6T 3Y3	Address:		Project:	1-16-0688 -46	COC #:	Project Manager:
Tel:	(905) 796-2650 Fax: (905) 796-2250	Tel:	(905) 796-2650 x Fax:	Project Name:		C#590410-01-01	Ashton Gibson
Email:	accounting@terraprobe.ca	Email:	smelanta@terraprobe.ca	Site #:	1-16-0680 - 46		
				Sampled By:			

MOE REGULATED DRINKING WATER OR WATER INTENDED FOR HUMAN CONSUMPTION MUST BE SUBMITTED ON THE MAXXAM DRINKING WATER CHAIN OF CUSTODY

Regulation 153 (2011)
- ☐ Table 1 ☒ Res/Park ☐ Medium/Fine
- ☒ Table 2 ☐ Ind/Comm ☒ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558 ☐ Storm Sewer Bylaw
- ☐ MISA Municipality ___
- ☐ PWQO
- ☐ Other ___

Special Instructions

Include Criteria on Certificate of Analysis (Y/N)? ___

Turnaround Time (TAT) Required:

Please provide advance notice for rush projects

Regular (Standard) TAT: ☒
(will be applied if Rush TAT is not specified)
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: ___ Time Required: ___ ☐
Rush Confirmation Number: ___ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	ANALYSIS REQUESTED (PLEASE BE SPECIFIC): Halton Sewer	O.Reg 153 Metals & Inorganics Pkg (Wtr)	O.Reg 153 VOCs & F1-F4 (Water)	O.Reg 153 PAHs (Water)						# of Bottles	Comments
1		~~1-16-0679~~			GW												
2		SUB-UF	Dec8/16		GW	NO	✓									15	
3		Sa #1	Dec8/16		GW	NO		✓	✓	✓						12	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

08-Dec-16 17:18
Ashton Gibson
B6Q8047
TSP ENV-945

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal	Yes	No
Bob Rachar BR	16/12/08	4:10	Ashitha Sukumaran ASHITHA SUKUMARAN	2016/12/08	17:18			4/8/9	Present		✓
									Intact		✓

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

SAMPLES MUST BE KEPT COOL (< 10° C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

White: Maxxam Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Exceedence Summary Table – Reg153/04 T2-PGW-C

Result Exceedences

Sample ID	Maxxam ID	Parameter	Criteria	Result	DL	Units
SUB-UF	DPE292-09	Total Cobalt (Co)	0.0038	0.013	0.002	mg/L

Detection Limit Exceedences

Sample ID	Maxxam ID	Parameter	Criteria	Result	DL	Units
SUB-UF	DPE292-09	Total Antimony (Sb)	0.006	<0.02	0.02	mg/L
SUB-UF	DPE292-09	Total Selenium (Se)	0.01	<0.02	0.02	mg/L
SUB-UF	DPE292-09	Total Silver (Ag)	0.0015	<0.01	0.01	mg/L

The exceedence summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

Exceedence Summary Table – Halton Sanitary Sewer

Result Exceedences

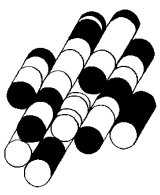
Sample ID	Maxxam ID	Parameter	Criteria	Result	DL	Units
SUB-UF	DPE292-04	Total Suspended Solids	350	1900	50	mg/L

The exceedence summary table is for information purposes only and should not be considered a comprehensive listing or statement of conformance to applicable regulatory guidelines.

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

APPENDIX D

TERRAPROBE INC.



Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

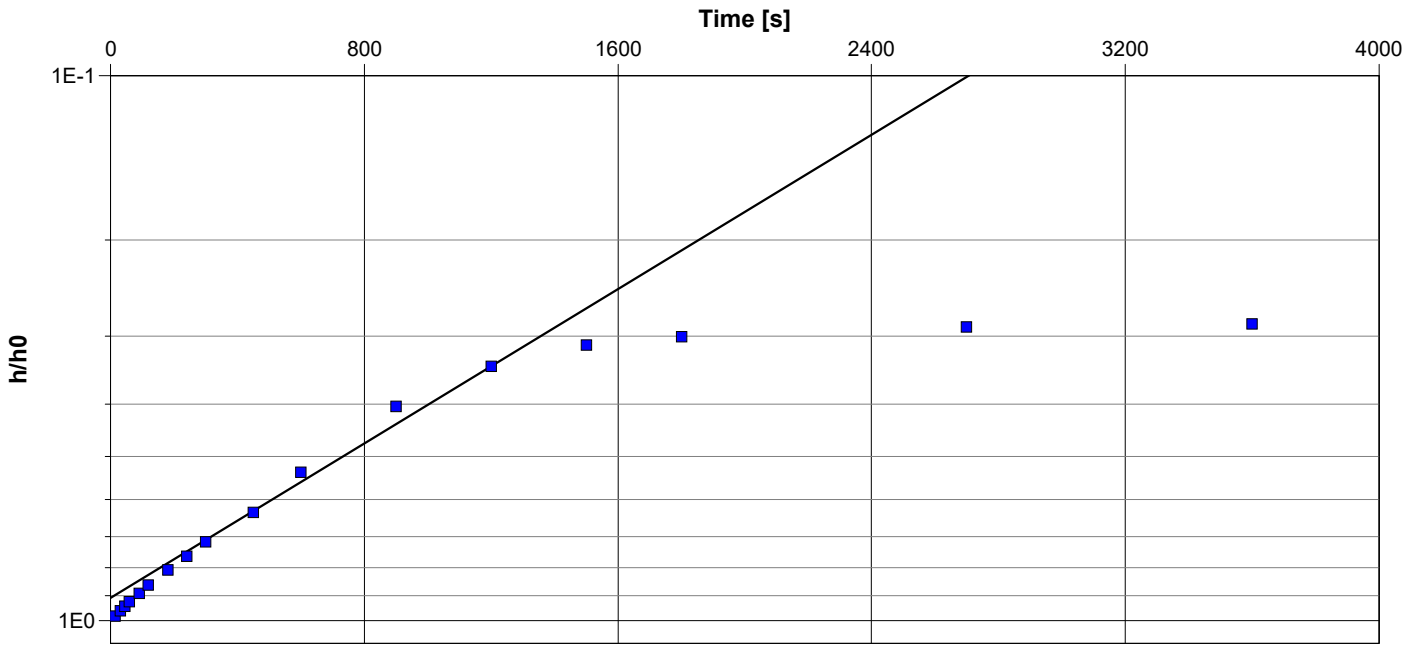
Slug Test Analysis Report

Project: 2107 & 2119 Old Lakeshore Rd

Number: 1-16-0680-46

Client: Carriage Gate Homes

Location: Burlington, Ontario	Slug Test: Rising Head Test BH1	Test Well: BH1
Test Conducted by: BR		Test Date: 12/8/2016
Analysis Performed by: ZW	Rising Head Test BH1	Analysis Date: 12/22/2016
Aquifer Thickness: 40.00 m		



Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH1	3.21×10^{-7}	

Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Engineering, Inspection & Testing

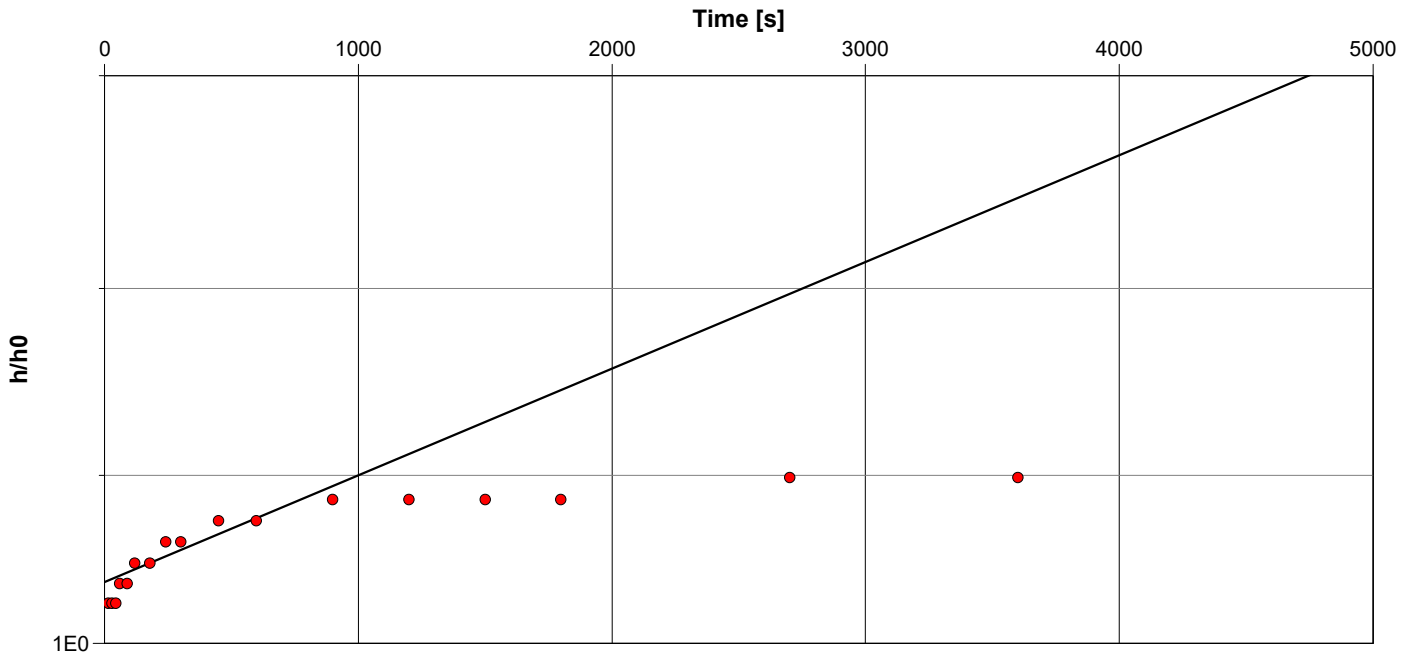
Slug Test Analysis Report

Project: 2107 & 2119 Old Lakeshore Rd

Number: 1-16-0680-46

Client: Carriage Gate Homes

Location: Burlington, Ontario	Slug Test: Rising Head Test BH2	Test Well: BH2
Test Conducted by: BR		Test Date: 12/22/2016
Analysis Performed by: ZW	Rising Head Test BH2	Analysis Date: 12/22/2016
Aquifer Thickness: 3.10 m		

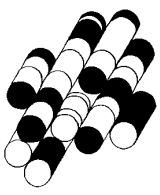


Calculation using Bouwer & Rice

Observation Well	Hydraulic Conductivity [m/s]	
BH2	2.50×10^{-8}	

APPENDIX E

TERRAPROBE INC.

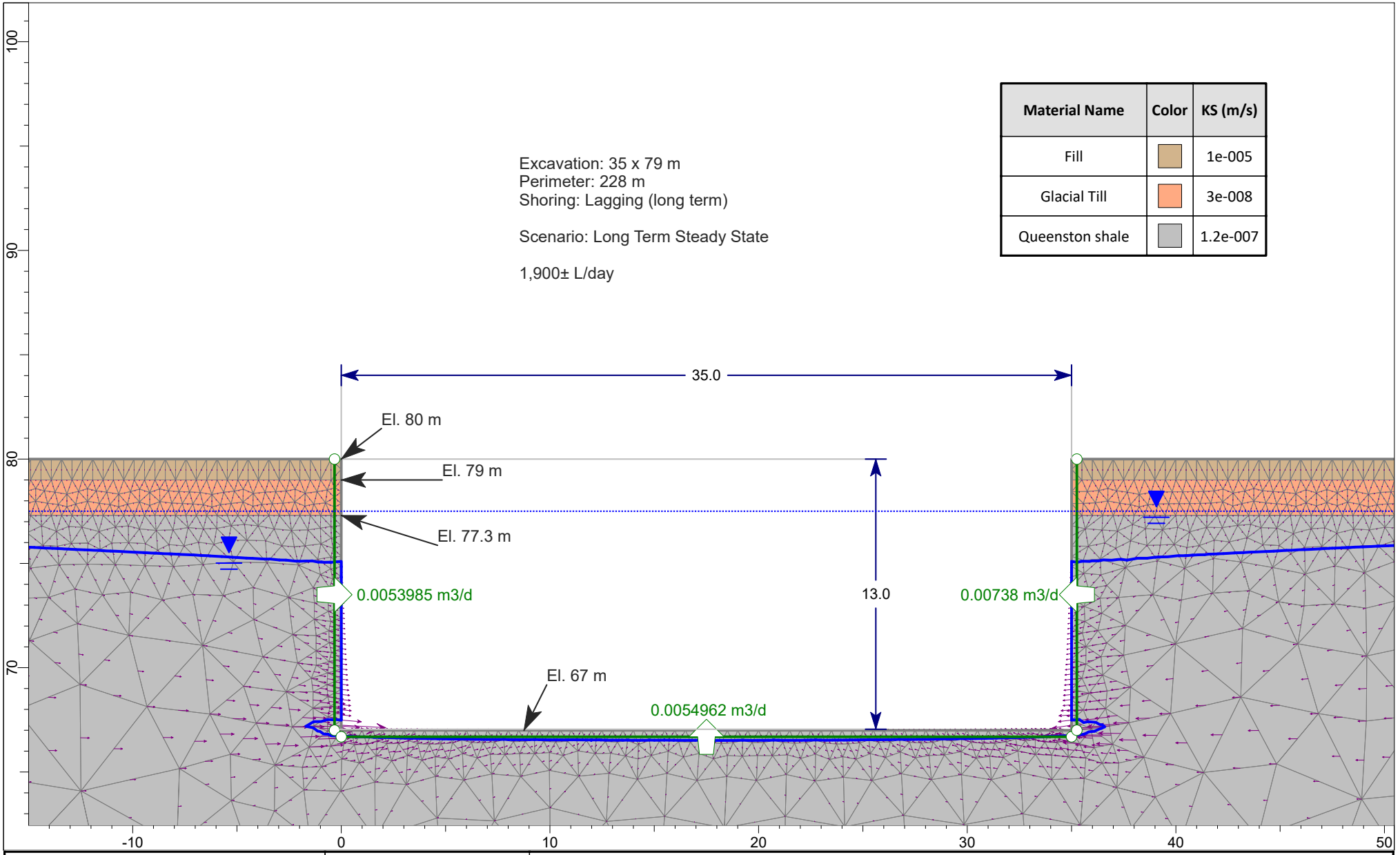


Material Name	Color	KS (m/s)
Fill		1e-005
Glacial Till		3e-008
Queenston shale		1.2e-007

Excavation: 35 x 79 m
Perimeter: 228 m
Shoring: Lagging (long term)

Scenario: Long Term Steady State

1,900± L/day



Terraprobe
Consulting Geotechnical & Environmental Engineering
Construction Materials Inspection & Testing

SLIDEINTERPRET 7.020

Notes
Refer to Hydrogeological Report for factual information supporting this analysis.

Project **1-16-0679-46 | 2107 & 2119 Old Lakeshore Road**

Analysis Dewatering FEM

Date	Scale	File
12/23/2016	1:250	1-16-0680-46 FEM.slmd

By	Ref.
MD	Terraprobe Hydrogeological Report