



REPORT ON

Phase II Environmental Site Assessment Proposed Residential Development of Riverside South Lands Between River Road and Spratt Road and East of 805-809 River Road Ottawa, Ontario

Submitted to:

Claridge Homes Corporation 2001 - 210 Gladstone Avenue Ottawa, Ontario K2P 0Y6

Report Number: 1658448-5000

Distribution:

6 copies - Claridge Homes Corporation 1 e-copy - Claridge Homes Corporation 1 e-copy - Golder Associates Ltd.







Executive Summary

Golder Associates Ltd. (Golder) was retained by Claridge Homes Corporation (Claridge) to conduct a Phase II Environmental Site Assessment (Phase II ESA) on part of the property located in the Riverside South Development Lands, between River Road and Spratt Road and east of 805-809 River Road, Ottawa, Ontario (hereinafter collectively referred to as the "Site"), as shown on the attached Figures 1 and 2. The Phase II ESA was undertaken on a one hectare section of land located on the western end of the proposed development lands.

Based on the soil analytical results, three areas of contaminated soil were identified at the Site as follows and as shown on Figure 2:

- The fill material located to the north of the farm/maintenance compound contains petroleum hydrocarbon (PHC) fraction F3 impacts above the applicable site standards. These PHC impacts were identified in the analyzed fill samples from borehole 17-8 and test pits TP17-01 through TP17-04. As shown on Figure 2, the northern and eastern extent of this area of impacted fill is delineated by the locations of test pits TP17-01 and TP17-02 which were completed at the very edge of the fill in these directions. The western edge likely extends to the Site boundary in the westward direction. The southern limit extends south beyond test pit TP17-04. Although not tested, the next borehole 17-33 did contain documented asphalt fragments and as such there is the potential that the impacts extend further south, however, the fill layer further south (as observed in boreholes 17-33, 17-32 and 17-29) is much thinner that than in the area of documented impacts. Based on the average thickness of the fill material in this area (approximately 0.5 metres), the volume of PHC impacted fill in this area is approximately 1,200 cubic metres (m³). This material should be removed from the Site during redevelopment.
- Electrical conductivity (EC) and/or sodium adsorption ratio (SAR) concentrations above the applicable site standard were identified in the native clay samples collected from the vicinity of the salt storage shed (specifically boreholes 17-30, 17-31 and 17-32 and test pits TP17-05 and TP17-07). Given that the native clay sample collected from borehole 17-8 located north of the farm/maintenance compound satisfied the MOE Table 3 Standards for these parameters, the elevated concentrations of EC and SAR in the vicinity of the salt storage shed are inferred to be road salt impacts. Given that these impacts were not found in the remaining boreholes and test pits, the EC and/or SAR impacted soil in this area is inferred to extend midway to the next cleanest boreholes/test pits and likely is present along the driveway of the farm/maintenance compound as shown on Figure 2. The total area of salt impacted soil is 2,000 metres squared (m²); however, the vertical extent of the salt impacted soil in not known as it was present in the deepest soil sample collected from a depth of 3.0 metres below ground surface at test pit TP17-05. Soil from this area should be removed from the upper 1.5 metres of the final site development grade in residential areas or reused in road allowances where it would be subject to continued road salt application.
- The fill pile located on the southern portion of the farm/maintenance compound contains PHC F3 and F4 impact above the MOE Table 3 Standards. Given that all four soil samples collected from this fill pile contained hydrocarbon impacts, the entire pile of fill (approximately 450 m³) is inferred to contain PHC impacts. This material should be removed from the Site during redevelopment.

i



October 2017 Report No. 1658448-5000



It is also noted that salt-related impacts, specifically chloride, were identified in the groundwater in the vicinity of salt storage shed (monitoring well 17-30). This salt impacted groundwater is not anticipated to extend beyond the area of the salt impacted soil at the Site and is not anticipated to represent a concern for the proposed development. In addition, the groundwater in the vicinity of the fuel ASTs (monitoring well 17-31) contained PHC F4 impacts above the applicable site standards. Given that hydrocarbon impacts were not identified in the soil samples collected from this borehole or the test pits completed in this area and the groundwater samples collected from the adjacent monitoring wells 17-29 and 17-30 did not contain detectable PHCs, the lateral extent of PHC impacted groundwater is inferred to be localized to the vicinity of monitoring well 17-31 and is inferred to be the result historical Site activities or leaching from the hydrocarbon impacted fill on the Site. It is likely that removal of the hydrocarbon impacted fill from the Site and discontinuation of fuelling/vehicle maintenance on the Site will improve the groundwater quality in this area.





Table of Contents

EXE	CUTIV	E SUMMARY	i
1.0	INTR	ODUCTION	1
	1.1	Background and Site Description	1
	1.2	Scope of Investigation	2
2.0	APPL	ICABLE SITE CONDITION STANDARDS	4
3.0	METH	HODOLOGY AND INVESTIGATIVE TECHNIQUES	5
	3.1	Borehole Drilling and Soil Sampling	5
	3.2	Test Pit Excavation and Soil Sampling	6
	3.3	Monitoring Well Installation	6
	3.4	Groundwater Sampling	6
	3.5	Sampling Location Survey	6
4.0	RESU	JLTS	6
	4.1	Geology and Soil Stratigraphy	6
	4.2	Hydrogeological Conditions	7
5.0	EVAL	.UATION OF RESULTS	7
	5.1	Soil	7
	5.2	Groundwater	9
	5.3	Quality Assurance and Quality Control	10
6.0	SUMI	MARY AND CONCLUSIONS	11
7.0	LIMIT	ATIONS	12
8.0	CLOS	SURE	13
TAB	LES E	MBEDDED WITHIN REPORT	
Tabl	e 1: Inv	vestigation Rationale	3
Tabl	e 2: Gr	oundwater Levels and Elevations	7
Tabl	e 3: So	il Quality Samples	7
Tabl	e 4: Gr	oundwater Quality Samples	9





TABLES FOLLOWING THE TEXT OF THE REPORT

Table 5a – Soil Analytical Results: Petroleum Hydrocarbons and BTEX

Table 5b - Soil Analytical Results: Polycyclic Aromatic Hydrocarbons

Table 5c - Soil Analytical Results: Volatile Organic Compounds

Table 5d - Soil Analytical Results: Metals and Inorganics

Table 6a – Groundwater Analytical Results: Petroleum Hydrocarbons and BTEX

Table 6b – Groundwater Analytical Results: Polycyclic Aromatic Hydrocarbons

Table 6c - Groundwater Analytical Results: Volatile Organic Compounds

Table 6d - Groundwater Analytical Results: Metals and Inorganics

FIGURES

Figure 1 - Site Plan

Figure 2 – Details Site Plan

Figure 3 - Soil Exceedances

Figure 4 – Groundwater Exceedances

APPENDICES

APPENDIX A

Record of Boreholes

APPENDIX B

Record of Test Pits

APPENDIX C

Laboratory Certificates of Analysis





1.0 INTRODUCTION

Golder Associates Ltd. (Golder) was retained by Claridge Homes Corporation (Claridge) to conduct a Phase II Environmental Site Assessment (Phase II ESA) on part of the property located in the Riverside South Development Lands, between River Road and Spratt Road and east of 805-809 River Road, Ottawa, Ontario (hereinafter collectively referred to as the "Site"), as shown on the attached Figures 1 and 2. The Phase II ESA was undertaken on a one hectare section of land located on the western end of the proposed development lands.

The Phase II ESA was initiated in January 2017 and was completed following recommendations to conduct a Phase II ESA in Golder's Phase I ESA report dated January, 2017, entitled "Phase One Environmental Site Assessment, Riverside South Lands Proposed Development Ottawa, Ontario", Report No. 1658448. This Phase II ESA investigation was conducted for due diligence purposes.

The Phase II ESA was completed in general accordance with Canadian Standards Association (CSA) Standard Z769-00 (R2013), *Phase II Environmental Site Assessment* for the purpose of identifying contaminants of potential concern that may be present at concentrations exceeding the applicable regulatory criteria.

1.1 Background and Site Description

The Site is located in the Riverside South Development Lands, between River Road and Spratt Road and east of 805-809 River Road, Ottawa, Ontario and consists of a 96 acre parcel partially used for agricultural crop production and farm equipment/vehicle maintenance, and partially vacant. Historically, the Site has been used solely for agricultural purposes since at least 1965; however, some vehicle maintenance occurred in the area of the farm/maintenance compound which is located on the westernmost portion of the Site, just east of 805 River Road. Within this area are the following four structures: a farm equipment maintenance shop/garage that encroaches the Site but is not entirely located on the property, a salt storage shed, a small wooden storage shed and an out-of-service silo.

A Phase I ESA was completed for the Site by Golder in December 2016. Based on the information obtained during the Phase I ESA, the following issues of potential environmental concern related to potential impacts to soil and/or groundwater were identified:

- Current presence of a maintenance shop/garage where fueling of farm equipment has taken place. It is located immediately west of the Site at 805 River Road and encroached on the western portion of the Site.
- Current presence of road salt stored in a salt storage shed located within the farm/maintenance compound
 on the westernmost portion of the Site, to the east of the maintenance shop/garage.
- Current presence of six diesel and/or gasoline aboveground storage tanks (ASTs) on the Site in the farm/maintenance compound, between the maintenance shop/garage and the salt storage shed.
- Current presence of a burn bin in which waste is burned located in the farm/maintenance compound, on the east side of the salt storage shed.
- Current presence of a stockpile of fill material on the eastern portion of the farm/maintenance compound, east of the salt storage shed (hereinafter referred to as "Fill Pile 1").
- Current presence of a stockpile of fill material on the southernmost portion of the farm/maintenance compound (hereinafter referred to as "Fill Pile 2").
- Historical activities occurring on-Site in the general farm/maintenance compound, including the potential for fill to be have placed elsewhere on the Site than the two current fill piles.

In order to address the above issues of potential environmental concern, a Phase II ESA was completed at the Site.





1.2 Scope of Investigation

The Phase II ESA was completed in two stages. In conjunction with the geotechnical and hydrogeological investigation, Golder carried out the first stage of the Phase II ESA at select boreholes, identified as geo-environmental boreholes on the Detailed Site Plan (Figure 2), to address the issues of potential environmental concern flagged in the Phase I ESA and as summarized in below. A second stage of investigation was subsequently carried out to delineate impacts in soil that were identified in the first stage of the Phase II ESA.

The first stage of the Phase II ESA included the following scope of work:

- Collection of soil samples from eight geo-environmental boreholes (see Figure 2) at regular depth intervals during drilling for visual characterization, headspace screening of organic vapours and potential laboratory analysis;
- Analysis of one soil sample from each borehole for petroleum hydrocarbon fractions F1- F4 (PHCs F1-F4), benzene, toluene, ethylbenzene and xylenes (BTEX), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), electrical conductivity (EC) and/or sodium adsorption ratio (SAR) to evaluate the soil quality at the Site;
- Collection and laboratory analysis of one sample of fill from each of the two fill piles located in the farm/maintenance compound. Laboratory analysis on these samples included PHCs F1-F4, BTEX, PAHs and metals;
- Completion of the three boreholes (boreholes 17-29, 17-30 and 17-31) as monitoring wells (hereinafter referred to as monitoring wells 17-29, 17-30 and 17-31, respectively);
- Collection of one groundwater sample from each of the three monitoring wells for submission to an accredited laboratory for analysis of PHCs F1-F4, BTEX, PAHs, VOCs and/or dissolved metals; and,
- An elevation survey of borehole and monitoring well locations using a Trimble R8 to a geodetic benchmark.

The second stage of the Phase II ESA included the following scope of work:

- Advancement of test pits (test pits TP17-01 through TP17-10, inclusively, as shown on Figure 2) to depths ranging between 0.75 metres below ground surface (mbgs) and 3.1 mbgs;
- Collection of soil samples from each test pit for visual characterization, headspace screening of organic vapours and potential laboratory analysis;
- Analysis of one soil samples from each test pit for PHCs F1-F4, BTEX, EC and/or SAR;
- Collection and laboratory analysis of three samples of fill from the fill pile located on the southern portion of the farm/maintenance compound where previous PHC impacts were identified. Laboratory analysis on these samples included PHCs F1-F4;
- Collection of one duplicate soil sample for analyses of the PHCs F1-F4, BTEX, EC and SAR for Quality Assurance and Quality Control (QA/QC); and,
- Interpretation of the results and preparation of this report.





The rationale for the investigation locations are presented in Table 1 below.

Table 1: Investigation Rationale

	First Stage of Phase II ESA							
Borehole/ Monitoring Well	Rationale							
17-8	Assessment of fill quality and analysis of native soil to determine background concentrations of EC and SAR.							
17-29	Characterization of soil and groundwater related to the current maintenance shop/garage, fuel ASTs and historical activities occurring in the general farm/maintenance compound.							
17-30	Characterization of soil and groundwater related to the current salt storage and fuel ASTs.							
17-31	Characterization of soil and groundwater related to the current fuel ASTs, salt storage and/or historical activities occurring in the general farm/maintenance compound.							
17-32	Characterization of soil and groundwater related to the current burn bin and salt storage.							
17-33	Characterization of soil and groundwater related to the current maintenance shop/garage, fuel ASTs and historical activities occurring in the general farm/maintenance compound.							
17-34 ⁽¹⁾	Visual characterization and headspace screening of organic vapours of soil samples to identify any potential soil contamination related to the historical activities occurring in the general farm/maintenance compound.							
17-35 ⁽¹⁾	Visual characterization and headspace screening of organic vapours of soil samples to identify any potential soil contamination related to the historical activities occurring in the general farm/maintenance compound.							
Fill Pile 1	Assessment of fill quality.							
Fill Pile 2	Assessment of fill quality.							







Table 1: Investigation Rationale

	Second Stage of Phase II ESA
Test Pit	Rationale
TP17-01	Lateral delineation of PHC impacted fill that was identified in borehole 17-8
TP17-02	located on the northern portion of the farm/maintenance compound. TP17-01 was completed at the northern extent of the fill in this location and TP17-02 was
TP17-03	completed at the eastern extent of fill in this location. The soil sample submitted from TP17-04 was also submitted for lateral
TP17-04	delineation of EC and SAR impacts that were identified in the vicinity of the salt storage shed.
TP17-05	Characterization of soil related the current presence of fuel ASTs and associated
TP17-06	hydrocarbon impacts in groundwater as well as the lateral delineation of EC and SAR impacts that were identified in the vicinity of the salt storage shed. A deeper
TP17-07	soil samples was also submitted from TP17-05 for vertical delineation of EC and SAR impacts.
TP17-08	
TP17-09	Lateral delineation of EC and SAR impacts that were identified in the vicinity of the salt storage shed.
TP17-10	
Fill Pile 2	Further assessment of fill quality due to the presence of PHC impacts in the sample of fill collected during the first stage to the Phase II ESA.

⁽¹⁾ No soil samples were submitted for laboratory analysis from this borehole due to the absence of field evidence of impacts

2.0 APPLICABLE SITE CONDITION STANDARDS

The soil and groundwater analytical results obtained for this Phase II ESA were compared to the standards for a potable groundwater condition presented in the Ontario Ministry of the Environment and Climate Change's (MOE's) "Soil, Ground Water and Sediment Standards for Use under Part XV.1 of the Environmental Protection Act", dated April 15, 2011 (MOE 2011a). The following was considered in selecting the applicable standards:

- The Site is currently used for agricultural crop production and farm equipment/vehicle maintenance and is partially vacant; however, Site is to be redeveloped with a residential subdivision and as such, the standards for residential land uses have been selected;
- The Site is to be redeveloped with residential buildings supplied with municipal water. As such, non-potable groundwater conditions have been selected;
- The Site is not an environmentally sensitive site as defined by Section 41, Part IX, Ontario Regulation (O.Reg.) 153/04;





- The nearest water body is Rideau River located approximately 400 m west of the Site. As such, the Site is not located within 30 m of a water body;
- The thickness of overburden encountered during borehole drilling on-Site completed as part of the Phase II ESA was greater than 2 m; and,
- The standards for coarse-textured soil was selected as most of the impacts were located within the coarse grained upper fills.

Based on the above, the applicable standards are considered to be the MOE Table 3 Standards, Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition for coarse-textured soil and Residential/Parkland/Institutional property use.

3.0 METHODOLOGY AND INVESTIGATIVE TECHNIQUES

The following sections describe the pre-field work activities and field investigation methodology employed during the Phase II ESA conducted at the Site. The field work was conducted between January 6, 2017 and July 21, 2017.

Prior to initiating the fieldwork, Golder developed and implemented site-specific protocols to protect the health and safety of its employees, its subcontractors and the environment through a Site-specific Health, Safety and Environmental Plan. Prior to any intrusive investigations, Golder arranged for the completion of public and private utility clearances.

3.1 Borehole Drilling and Soil Sampling

As part of the geotechnical investigation completed for the Site, 35 boreholes (numbered boreholes 17-1 through 17-35, inclusively) were advanced on the Site as shown on Figure 1. The boreholes were advanced to depths ranging from 2.13 to 8.22 metres below ground surface (mbgs). For the purpose of the Phase II ESA report, only the boreholes within the investigation area (Figure 2) are discussed herein.

All boreholes were advanced by CCC Geotechnical and Environmental Drilling of Ottawa, Ontario using a CME-850 track-mounted drill rig. All intrusive investigations were monitored in the field by Golder field personnel. During borehole drilling activities, overburden soil samples were recovered at regular depth intervals (0.75 m) using split spoon soil sampling equipment and augers using 200 mm outside diameter (OD) hollow stem augers.

All soil samples were logged as to soil type, texture, moisture content, presence of staining, odour and debris, if any. Field observations made during the borehole drilling activities are summarized in the Record of Borehole sheets provided in Appendix A. Soil samples were collected into laboratory supplied bottles, placed in coolers with ice, and where recovered soil volumes permitted, additional bagged samples were collected for soil vapour headspace readings, which were conducted in the field using a MiniRAE 3000 Photoionization detector (PID).

Based on field observations and soil headspace organic vapour measurements, one to two soil samples from each geo-environmental borehole were submitted under chain of custody documentation for laboratory analysis of PHCs F1- F4, BTEX, PAHs, VOCs, EC and/or SAR with the exception of boreholes 17-34 and 17-35 from which no soil samples were submitted for laboratory analysis given that these boreholes due to the absence of field evidence of hydrocarbon impacts.





3.2 Test Pit Excavation and Soil Sampling

Ten test pits (TP 17-01 to TP 17-10) were excavated on the Site for environmental purposes on July 21, 2017. The 10 test pits were excavated to depths ranging from 0.75 to 3.1 metres below ground surface (mbgs).

The approximate location of the test pits is shown on Figure 2.

Soil samples were collected from each of the test pits completed on the Site. The samples were retrieved directly from the excavator bucket using a clean, gloved hand at regular depth intervals (approximately every 0.5 to 1 m), from the different fill and soil layers, and/or from visually impacted soil layers (if observed).

Each soil sample collected from the ten test pits was logged in the field, placed in laboratory supplied glass sample jars and refrigerated until selected samples were delivered to the laboratory for analysis. Representative portions of each soil sample were collected in sealed plastic bags for organic vapour screening using a calibrated MiniRae 2000 PID.

3.3 Monitoring Well Installation

Monitoring wells were completed at three of the geo-environmental boreholes (boreholes 17-29, 17-30 and 17-31) by installing 1.5 m long screen (51 millimetre (mm) slotted schedule 40 PVC screens) and solid riser. The annular space from the base of the screen to up to approximately 0.3 m above the screen was backfilled with silica sand. A bentonite seal was placed from the top of the sand pack to approximately 0.3 to 0.6 below ground surface above which silica sand was placed up to ground surface. All monitoring wells were completed with flush mount style protective casings. The riser pipes were sealed with a protective cap. Standpipes were also installed in boreholes 17-1, 17-3, 17-9, 17-14A, 17-18A, 17-21, 17-24A, 17-27, 17-28 for hydrogeological purposes and are discussed under separate cover.

3.4 Groundwater Sampling

Following monitoring well installation, the water levels in each monitoring well were measured and each monitoring well was equipped with dedicated low density polyethylene (LDPE) tubing and inertial footvalves. Groundwater samples collected from each monitoring well were collected using the inertial samples. All groundwater samples were collected directly into laboratory supplied bottles and vials, placed in coolers with ice, and submitted to for laboratory analysis of PHCs F1-F4, BTEX, PAHs and/or VOCs.

3.5 Sampling Location Survey

The locations and elevations of the boreholes and monitoring wells were surveyed using a Trimble R8 to a geodetic benchmark.

4.0 RESULTS

4.1 Geology and Soil Stratigraphy

Eight boreholes were advanced at the Site as part of the Phase II ESA to depths ranging between 2.13 to 5.94 mbgs and ten test pits were completed to depths ranging between 0.75 and 3.1 mbgs. As previously discussed, an additional 27 boreholes were drilled elsewhere on the development site for geotechnical purposes.





In general, the subsurface conditions across this Site consist of surficial layers of topsoil, fill, and silty sand. The surficial soils across the majority of the Site are underlain by a deposit of weathered silty clay, clayey silt, and silty sand, which is underlain by unweathered silty clay and/or glacial till. No bedrock was encountered within the Phase II ESA investigation area.

Headspace readings obtained as part of the borehole drilling and test pitting programs ranged from 0.1 parts per million (ppm) (in soil sample TP17-09 SA1 and soil sample FB2 SA3 collected from Fill Pile 2) to 8.1 (in soil sample 17-32 SA2) using the PID.

During drilling, asphaltic concrete fragments were observed in the fill material at boreholes 17-8 and 17-31 and the fill material at boreholes 17-29 and 17-33 was described as asphaltic concrete. Pieces of asphalt were also observed in the fill material at test pits TP17-01, TP1-7-02, TP17-03 and TP17-04 (i.e., the test pits that were completed surrounding borehole 17-8) and pieces of wood, concrete, brick and plastic were also observed in the fill at test pit TP17-03. In addition, black staining was observed in the uppermost portion of the native silty clay layers at boreholes 17-29 and 17-33. No obvious visual or olfactory evidence of environmental impact (i.e., hydrocarbon odours and/or staining) was noted in any of the remaining boreholes.

4.2 Hydrogeological Conditions

The following groundwater elevations in relation to geodetic benchmark were measured on January 30, 2017:

Table 2: Groundwater Levels and Elevations

Location	Water Level (mbgs)	Groundwater Elevation (m)		
17-29	89.5	90.2		
17-30	89.4	90.0		
17-31	89.4	90.1		

Notes:

mbgs: metres below ground surface

Based on the hydrogeological study of the entire Site, local groundwater flow is interpreted to be west/southwest towards the Rideau River.

No hydrocarbon sheens or odour were detected in the monitoring wells during groundwater sampling.

5.0 EVALUATION OF RESULTS

5.1 Soil

The following soil samples were submitted for laboratory analysis, based on field observations, soil headspace screening measurements, changes in stratigraphy and targeted depth intervals:

Table 3: Soil Quality Samples

Sample Location	Sample Name	Sample Depth (mbgs)	Soil Type	Analyses					
	First Stage of Phase II ESA								
17-8	17-8 BH17-8 SA1		Fill (sand and gravel, contains asphaltic concrete fragments)	PHCs F1-F4, BTEX, PAHs and metals					
17-8	BH17-8 SA7	4.42 – 5.03	Silty clay	EC and SAR					

October 2017

Report No. 1658448-5000





Table 3: Soil Quality Samples

Table 3: Soil Quality Samples								
Sample Location	Sample Name	Sample Depth (mbgs)	Soil Type	Analyses				
17-29	BH17-29 SA2	0.46 – 0.76	Sandy silty	PHCs F1-F4, BTEX, PAHs, VOCs and metals				
17-30	BH17-30 SA2	0.76 – 1.37	Silty clay to clay	PHC F1-F4, BTEX, EC and SAR				
17-31	BH17-31 SA2	0.76 – 1.37	Silty clay to clay	PHC F1-F4, BTEX, EC and SAR				
17-32	BH17-32 SA2	0.76 – 1.37	Silty clay to clay	PHCs F1-F4, BTEX, PAHs, metals, EC and SAR				
17-33	BH17-33 SA3 ⁽¹⁾	0.76 – 1.37	Silty clay to clay	PHCs F1-F4, BTEX, PAHs, VOCs and metals				
Fill Pile 1	FP1 SA1	N/A	Sill sand to sandy silt with trace gravel, come organics and occasional chunks of concrete	PHCs F1-F4, BTEX, PAHs and metals				
Fill Pile 2	FP2 SA2	N/A	Sand and gravel with asphalt grindings and asphalts chunks.	PHCs F1-F4, BTEX, PAHs and metals				
		Second Stag	e of Phase II ESA					
TP17-01	TP17-1 SA1	0.15 – 0.30	Fill (gravelly sand, contains asphalt)	PHCs F1-F4, BTEX				
TP17-02	TP17-2 SA1	0.35 – 0.50	Fill (gravelly sand, contains asphalt)	PHCs F1-F4, BTEX				
TP17-03	TP17-3 SA1	0.07 – 0.47	Fill (gravelly sand, contains asphalt, concrete, brick and plastic)	PHCs F1-F4, BTEX				
TP17-04	TP17-4 SA1	0.20 - 0.40	Fill (gravelly sand, contains asphalt)	PHCs F1-F4, BTEX, EC and SAR				
	TP17-5 SA3	2.80 – 3.0	Silty clay to clay	PHCs F1-F4, BTEX, EC and SAR				
TP17-05	TP17-5 SA13 (Duplicate of TP17-5 SA3)	2.80 – 3.0	Silty clay to clay	PHCs F1-F4, BTEX, EC and SAR				
TP17-06	TP17-6 SA1	0.90 – 0.95	Silty clay to clay	PHCs F1-F4, BTEX, EC and SAR				
TP17-07	TP17-7 SA2	1.80 – 1.90	Silty clay to clay	PHCs F1-F4, BTEX, EC and SAR				
TP17-08	TP17-8 SA1	0.90 - 1.0	Silty clay to clay	EC and SAR				
TP17-09	TP17-9 SA3	2.80 - 3.0	Silty clay to clay	EC and SAR				
TP17-10	TP17-10 SA1	0.90 – 1.0	Silty clay to clay	EC and SAR				
	FB2 SA1	N/A	Sand and gravel with asphalt grindings and asphalts chunks.	PHCs F1-F4 and BTEX				
Fill Pile 2	FB2 SA2	N/A	Sand and gravel with asphalt grindings and asphalts chunks.	PHCs F1-F4 and BTEX				
	FB2 SA3	N/A	Sand and gravel with asphalt grindings and asphalts chunks.	PHCs F1-F4 and BTEX				

⁽¹⁾ Sample ID on Laboratory Certificates of Analysis is BH17-33 SA2.





The soil analytical results compared to the applicable standards (MOE Table 3) are provided in Tables 5a, 5b, 5c and 5d following the test of this report. The soil analytical results indicated the following:

- The sample of fill collected from borehole 17-8 located north of the farm/maintenance compound had an exceedance of the MOE Table 3 Standard for PHCs F3 (1,100 ug/g) relative to the criteria of 300 ug/g. The samples of fill collected from test pits TP17-01, TP17-02, TP17-03 and TP17-04 (i.e., surrounding borehole 17-8) also contained exceedances of the MOE Table 3 Standards for PHC F3 with concentrations detected between 560 and 2,300 ug/g vs the standard of 300 ug/g.
- The native clay samples collected from the borehole completed at the salt storage shed (borehole 17-30) as well as the boreholes completed east and west of the salt storage shed (boreholes 17-32 and 17-31, respectively) contained concentrations of salt-related impacts (EC and/or SAR) above the MOE Table 3 Standards. EC and/SAR also exceeded of the applicable site standards in the native soil samples collected from test pits TP17-05 and TP17-07; however, exceedances of these parameters were not found in the remaining test pits. Additionally, the native clay sample collected from borehole 17-8, furthest from the salt storage shed, satisfied the MOE Table 3 Standards for EC and SAR.
- The soil sample collected from Fill Pile 2 (located on the southern portion of the farm/maintenance compound) during the first stage of the Phase II ESA as well as the three soil samples collected from this fill pile during the second stage of the Phase II ESA all had exceedances of the MOE Table 3 Standards for PHC F3. One of these samples collected during the second stage of the Phase II ESA also had a concentration of PHC F4 above the MOE Table 3 Standard.
- The soil samples collected from boreholes 17-29 and 17-33, test pits TP17-06, TP17-08, TP17-09 and TP17-10 as well as the soil samples collected from Fill Pile 1 did not have any exceedances of the MOE Table 3 Standards for the parameters analyzed.

5.2 Groundwater

The following groundwater samples were submitted for laboratory analysis as part of the first stage of the Phase II ESA:

Table 4: Groundwater Quality Samples

Sample Location	Sample Name	Screened Unit	Analysis
17-29	MW #17-29	Silty clay to clay	PHCs F1-F4, BTEX, PAHs, VOCs and metals,
17-30	MW #17-30	Silty clay to clay	PHCs F1-F4, BTEX, sodium and chloride
17-31	MW #17-31	Silty clay to clay	PHCs F1-F4 and BTEX





The groundwater analytical results compared to the applicable standards (MOE Table 3) are provided in Tables 6a, 6b and 6c following the text of the report. The groundwater sample collected from monitoring well 17-30 had an exceedance of chloride (4,200,000 ug/L) compared to the MOE Table 3 Standard of 2,300,000 ug/L and the groundwater sample collected from monitoring well 17-31 had an exceedance of the PHC F4 (600 ug/L) compared to the MOE Table 3 Standard of 500 ug/L. These groundwater samples satisfied the MOE Table 3 Standards for the remaining parameters analyzed and the groundwater sample collected from monitoring well 17-29 satisfied the applicable site standards for all parameters analyzed.

5.3 Quality Assurance and Quality Control

One duplicate soil sample was collected from test pit TP17-05 (original sample TP17-05 SA3 and duplicate sample TP17-05 SA13) and submitted for analysis of PHCs F1-F4, BTEX and inorganics (specifically EC and SAR).

To determine the precision of the analytical methods and field sampling procedures, a blind duplicate sample was collected during groundwater sampling. Precision is determined by the relative percent difference (RPD) between the duplicate and original samples and was calculated as follows:

 $RPD = \frac{|x_1 - x_2|}{x_m}$

Where x_1 initial sample results

x₂ duplicate sample results

 x_m mean of x_1 , x_2

RPDs are calculated only if the concentrations of a parameter are greater than the laboratory reported detection limit (RDL) in both the duplicate and original samples. In addition, lower precision in the RPD calculation is expected when concentrations of the analytes are less than ten (10) times the RDL. Therefore, RPDs were calculated for the original and duplicate groundwater samples only in cases where the measured concentrations of analytes in both samples were ten (10) times greater than the RDL.

The following RPD limits were considered reasonable and are based on the MOE Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act, March 9, 2004 (amended in July 2009 and effective as of July 1, 2011): RPDs in soil, 30% for metals and inorganics and 30% for PHCs/BTEX.

RPDs could not be calculated for PHCs, BTEX, EC and SAR in the original and duplicate soil samples, as these results were below the laboratory RDL or less that ten times greater than the RDL.

Based on the review of field QA/QC measures, Golder considers the data obtained during the Phase II ESA investigation described herein to be reliable and representative of Site conditions at the time of the investigation.





6.0 SUMMARY AND CONCLUSIONS

Based on the soil analytical results, three areas of contaminated soil were identified at the Site as follows and as shown on Figure 2:

- The fill material located to the north of the farm/maintenance compound contains PHC F3 impacts above the applicable site standards. These PHC impacts were identified in the analyzed fill samples from borehole 17-8 and test pits TP17-01 through TP17-04. As shown on Figure 2, the northern and eastern extent of this area of impacted fill is delineated by the locations of test pits TP17-01 and TP17-02 which were completed at the very edge of the fill in these directions. The western edge likely extends to the Site boundary in the westward direction. The southern limit extends south beyond test pit TP17-04. Although not tested, the next borehole 17-33 did contain documented asphalt fragments and as such there is the potential that the impacts extend further south, however, the fill layer further south (as observed in boreholes 17-33, 17-32 and 17-29) is much thinner that than in the area of documented impacts. Based on the average thickness of the fill material in this area (approximately 0.5 metres), the volume of PHC impacted fill in this area is approximately 1,200 cubic metres (m³). This material should be removed from the Site during redevelopment.
- EC and/or SAR concentrations above the applicable site standard were identified in the native clay samples collected from the vicinity of the salt storage shed (specifically boreholes 17-30, 17-31 and 17-32 and test pits TP17-05 and TP17-07). Given that the native clay sample collected from borehole 17-8 located north of the farm/maintenance compound satisfied the MOE Table 3 Standards for these parameters, the elevated concentrations of EC and SAR in the vicinity of the salt storage shed are inferred to be road salt impacts. Given that these impacts were not found in the remaining boreholes and test pits, the EC and/or SAR impacted soil in this area is inferred to extend midway to the next cleanest boreholes/test pits and likely is present along the driveway of the farm/maintenance compound as shown on Figure 2. The total area of salt impacted soil is 2,000 metres squared (m²); however, the vertical extent of the salt impacted soil in not known as it was present in the deepest soil sample collected from a depth of 3.0 mbgs at test pit TP17-05. Soil from this area should be removed from the upper 1.5 metres of the final site development grade in residential areas or reused in road allowances where it would be subject to continued road salt application.
- The fill pile located on the southern portion of the farm/maintenance compound contains PHC F3 and F4 impact above the MOE Table 3 Standards. Given that all four soil samples collected from this fill pile contained hydrocarbon impacts, the entire pile of fill (approximately 450 m³) is inferred to contain PHC impacts. This material should be removed from the Site during redevelopment.

It is also noted that salt-related impacts, specifically chloride, were identified in the groundwater in the vicinity of salt storage shed (monitoring well 17-30). This salt impacted groundwater is not anticipated to extend beyond the area of the salt impacted soil at the Site and is not anticipated to represent a concern for the proposed development. In addition, the groundwater in the vicinity of the fuel ASTs (monitoring well 17-31) contained PHC F4 impacts above the applicable site standards. Given that hydrocarbon impacts were not identified in the soil samples collected from this borehole or the test pits completed in this area and the groundwater samples collected from the adjacent monitoring wells 17-29 and 17-30 did not contain detectable PHCs, the lateral extent of PHC impacted groundwater is inferred to be localized to the vicinity of monitoring well 17-31 and is inferred to be the result historical Site activities or leaching from the hydrocarbon impacted fill on the Site. It is likely that removal of the hydrocarbon impacted fill from the Site and discontinuation of fuelling/vehicle maintenance on the Site will improve the groundwater quality in this area.





7.0 LIMITATIONS

This report was prepared for the exclusive use of the Claridge Homes Corporation. Any use of this document by a third party is expressly forbidden. No assurance is made regarding the accuracy and completeness of these data. Golder disclaims responsibility for consequential financial effects on transactions or property values, or requirements for follow-up actions and costs.

This report is intended to provide an assessment of the potential environmental conditions of the Site as defined by the Site boundaries in Figure 1, which is defined as the property located between River Road and Spratt Road and east of 805-809 River Road in Ottawa, Ontario.

The assessment of the environmental conditions and hazards at this Site has been made using the results of chemical analysis of discrete samples from a limited number of locations. The Site conditions between sampling locations have been inferred based on conditions observed at test locations. Soil and groundwater conditions will vary between and beyond sample locations. Additional study can reduce the inherent uncertainties associated with this type of study. However, it is never possible, even with exhaustive sampling and testing, to dismiss the possibility of undetected contamination.

The services performed as described in this document were conducted in a manner consistent with the level of care and skill normally exercised by other members of the engineering and science professions currently practicing under similar conditions, subject to the time limits and financial and physical constraints applicable to the services.

The content of this document is based on information collected during site investigations, our present understanding of the site conditions, and our professional judgment in light of such information at the time of this document. This document provides a professional opinion and, therefore, no warranty is either expressed, implied, or made as to the conclusions, advice and recommendations offered in this document. This document does not provide a legal opinion regarding compliance with applicable laws. With respect to regulatory compliance issues, it should be noted that regulatory statutes and the interpretation of regulatory statutes are subject to change. The groundwater monitors installed during the course of this investigation have been left in place. These monitors are the property of the owner/client and not Golder Associates Ltd.





8.0 CLOSURE

We trust that the information presented in this report meets your current requirements. Should you have any questions or concerns, please do not hesitate to contact the undersigned.

GOLDER ASSOCIATES LTD.

Clyssa Troke, B.Sc., E.I.T. Environmental Consultant

Keith Holmes, P.Geo., PMP Geoscientist/Associate

AT/KPH/hw

\golder.gds\gal\ottawa\active\2016\3 proj\1658448 claridge riverside south lands ottawa\08_reports\phase ii esa\final report\1658448 - draft phase ii esa - 805 river road.docx

Golder, Golder Associates and the GA globe design are trademarks of Golder Associates Corporation.



			17-8	17-29	17-30	17-31	17-32	17-33	Fill Pile 1
		MOE Table 3 Standards		23-Jan-17	13-Jan-17	13-Jan-17	13-Jan-17	23-Jan-17	23-Jan-17
Parameter	Unit	(R/P/I) ^{(1) (2)}	BH17-8 SA1	BH17-29 SA2	BH17-30 SA2	BH17-31 SA2	BH17-32 SA2	BH17-32 SA3 ⁽³⁾	FP1 SA1
Sample Depth	m		0 - 0.41	0.46 - 0.76	0.76 - 1.37	0.76 - 1.37	0.76 - 1.37	0.76 - 1.37	N/A
Benzene	μg/g	0.21	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	<0.02
Toluene	μg/g	2.3	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Ethylbenzene	μg/g	2.0	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Xylenes	μg/g	3.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Petroleum Hydrocarbons - F1 (C6-C10)	μg/g	55	<5	<5	<5	<5	< 5	<5	<5
Petroleum Hydrocarbons - F2 (C10-C16)	μg/g	98	<10	<10	<10	<10	<10	<10	<10
Petroleum Hydrocarbons - F3 (C16-C34)	μg/g	300	1100	<50	<50	<50	<50	<50	58
Petroleum Hydrocarbons - F4 (C34-C50)	μg/g	2800	1500	<50	<50	<50	<50	<50	<50

- < value = Indicates parameter not detected above laboratory method detection limit.
- > value = Indicates parameter detected above equipment analytical range.
- -- Chemical not analyzed or criteria not defined.
- (1) Ontario Reg 153/04 (2011) Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Residential/Parkland/Institutional Property Use for Coarse Grained Soils
- (2) Grey and bold background indicated paramater concentration greater than the MOE Table 3 Standards
- (3) Sample ID on Laboratory Certificates of Analysis is BH17-33 SA2.

			Fill Pile 2	TP17-01	TP17-02	TP17-03	TP17-04	TI	P17-05
	MOE Table 3 Standards	23-Jan-17	21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17	
		(R/P/I) (1) (2)							(Duplicate of TP17-
Parameter	Unit	(K/F/I)	FP2 SA2	TP17-1 SA1	TP17-2 SA1	TP17-3 SA1	TP17-4 SA1	TP17-5 SA3	5 SA3)
Sample Depth	m		N/A	0.15 - 0.30	0.35 - 0.50	0.07 - 0.47	0.20 - 0.40	2.80 - 3.0	2.80 - 3.0
Benzene	μg/g	0.21	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02	< 0.02
Toluene	μg/g	2.3	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Ethylbenzene	μg/g	2.0	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Total Xylenes	μg/g	3.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Petroleum Hydrocarbons - F1 (C6-C10)	μg/g	55	<5	<5	<5	<5	<5	<5	<5
Petroleum Hydrocarbons - F2 (C10-C16)	μg/g	98	<10	<10	<10	<10	<10	<10	<10
Petroleum Hydrocarbons - F3 (C16-C34)	μg/g	300	920	560	630	1100	2300	<50	<50
Petroleum Hydrocarbons - F4 (C34-C50)	μg/g	2800	1800	1100	1000	1800	2800	<50	<50

- < value = Indicates parameter not detected above laboratory method detection limit.
- > value = Indicates parameter detected above equipment analytical range.
- -- Chemical not analyzed or criteria not defined.
- (1) Ontario Reg 153/04 (2011) Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Residential/Parkland/Institutional Property Use for Coarse Grained Soils
- (2) Grey and bold background indicated paramater concentration greater than the MOE Table 3 Standards
- (3) Sample ID on Laboratory Certificates of Analysis is BH17-33 SA2.

			TP17-06	TP17-07	Fill Pile 2		
		MOE Table 3 Standards	21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17
Parameter	Unit	(R/P/I) ^{(1) (2)}	TP17-6 SA1	TP17-7 SA2	FB2 SA1	FB2 SA2	FB2 SA3
Sample Depth	m		0.90 - 0.95	1.80 - 1.90	N/A	N/A	N/A
Benzene	μg/g	0.21	< 0.02	< 0.02		< 0.02	< 0.02
Toluene	μg/g	2.3	<0.08	<0.08		<0.08	<0.08
Ethylbenzene	μg/g	2.0	< 0.05	< 0.05		< 0.05	< 0.05
Total Xylenes	μg/g	3.1	< 0.05	< 0.05		< 0.05	< 0.05
Petroleum Hydrocarbons - F1 (C6-C10)	μg/g	55	<5	<5	<5	<5	<5
Petroleum Hydrocarbons - F2 (C10-C16)	μg/g	98	<10	<10	<10	<10	<10
Petroleum Hydrocarbons - F3 (C16-C34)	μg/g	300	<50	<50	2800	750	790
Petroleum Hydrocarbons - F4 (C34-C50)	μg/g	2800	<50	<50	3400	1100	1200

- < value = Indicates parameter not detected above laboratory method detection limit.
- > value = Indicates parameter detected above equipment analytical range.
- -- Chemical not analyzed or criteria not defined.
- (1) Ontario Reg 153/04 (2011) Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Residential/Parkland/Institutional Property Use for Coarse Grained Soils
- (2) Grey and bold background indicated paramater concentration greater than the MOE Table 3 Standards
- (3) Sample ID on Laboratory Certificates of Analysis is BH17-33 SA2.

			17-8	17-29	17-32	17-33	Fill Pile 1	Fill Pile 2
		MOE Table 3	23-Jan-17	23-Jan-17	13-Jan-17	23-Jan-17	23-Jan-17	23-Jan-17
Parameter	Unit	Standards (R/P/I) (1) (2)	BH17-8 SA1	BH17-29 SA2	BH17-32 SA2	BH17-33 SA2	FP1 SA1	FP2 SA2
Sample Depth	m		0 - 0.41	0.46 - 0.76	0.76 - 1.37	0.76 - 1.37	N/A	N/A
Naphthalene	μg/g	0.6	< 0.05	<0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	μg/g	7.9	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	μg/g	62	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	μg/g	6.2	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	μg/g	0.67	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	μg/g	0.69	< 0.05	<0.05	<0.05	< 0.05	0.10	< 0.05
Pyrene	μg/g	78	< 0.05	<0.05	< 0.05	< 0.05	0.09	< 0.05
Benz(a)anthracene	μg/g	0.5	< 0.05	< 0.05	< 0.05	< 0.05	0.05	< 0.05
Benzo(b)fluoranthene	μg/g	0.78	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	μg/g	0.78	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	μg/g	0.3	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	μg/g	0.38	< 0.05	<0.05	<0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	μg/g	0.1	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(g,h,i)perylene	μg/g	6.6	< 0.05	<0.05	<0.05	< 0.05	< 0.05	< 0.05
2-and 1-methyl Naphthalene	μg/g	0.99	< 0.05	<0.05	<0.05	< 0.05	< 0.05	< 0.05

- < value = Indicates parameter not detected above laboratory method
- > value = Indicates parameter detected above equipment analytical
- -- Chemical not analyzed or criteria not defined.
- (1) Ontario Reg 153/04 (2011) Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Residential/Parkland/Institutional Property Use for Coarse Grained Soils
- (2) Grey and bold background indicated paramater concentration greater than the MOE Table 3 Standards

			17-29	17-33	
		MOE Table 3	23-Jan-17	23-Jan-17	
Parameter	Unit	Standards (R/P/I) (1) (2)	BH17-29 SA2	BH17-33 SA2	
Sample Depth	m	1	0.46 - 0.76	0.76 - 1.37	
Dichlorodifluoromethane	μg/g	16	< 0.05	< 0.05	
Vinyl Chloride	ug/g	0.02	<0.02	<0.02	
Bromomethane	ug/g	0.05	<0.05	<0.05	
Trichlorofluoromethane	ug/g	4	<0.05	<0.05	
Acetone	ug/g	16	<0.50	<0.50	
1,1-Dichloroethylene	ug/g	0.05	< 0.05	<0.05	
Methylene Chloride	ug/g	0.1	< 0.05	<0.05	
Trans- 1,2-Dichloroethylene	ug/g	0.084	< 0.05	<0.05	
Methyl tert-butyl Ether	ug/g	0.75	< 0.05	< 0.05	
1,1-Dichloroethane	ug/g	3.5	< 0.02	<0.02	
Methyl Ethyl Ketone	ug/g	16	< 0.50	<0.50	
Cis- 1,2-Dichloroethylene	ug/g	3.4	< 0.02	<0.02	
Chloroform	ug/g	0.05	< 0.04	<0.04	
1,2-Dichloroethane	ug/g	0.05	< 0.03	< 0.03	
1,1,1-Trichloroethane	ug/g	0.38	< 0.05	< 0.05	
Carbon Tetrachloride	ug/g	0.05	< 0.05	< 0.05	
1,2-Dichloropropane	ug/g	0.05	< 0.03	< 0.03	
Trichloroethylene	ug/g	0.061	< 0.03	< 0.03	
Bromodichloromethane	ug/g	13	< 0.05	<0.05	
Methyl Isobutyl Ketone	ug/g	1.7	< 0.50	<0.50	
1,1,2-Trichloroethane	ug/g	0.05	< 0.04	<0.04	
Dibromochloromethane	ug/g	9.4	< 0.05	<0.05	
Ethylene Dibromide	ug/g	0.05	< 0.04	<0.04	
Tetrachloroethylene	ug/g	0.28	< 0.05	<0.05	
1,1,1,2-Tetrachloroethane	ug/g	0.058	< 0.04	<0.04	
Chlorobenzene	ug/g	2.4	< 0.05	<0.05	
Bromoform	ug/g	0.27	< 0.05	<0.05	
Styrene	ug/g	0.7	< 0.05	<0.05	
1,1,2,2-Tetrachloroethane	ug/g	0.05	< 0.05	<0.05	
1,3-Dichlorobenzene	ug/g	4.8	< 0.05	< 0.05	
1,4-Dichlorobenzene	ug/g	0.083	< 0.05	<0.05	
1,2-Dichlorobenzene	ug/g	3.4	< 0.05	<0.05	
1,3-Dichloropropene	ug/g	0.05	<0.04	<0.04	
n-Hexane	ug/g	2.8	< 0.05	< 0.05	

- < value = Indicates parameter not detected above laboratory method detection limit.
- > value = Indicates parameter detected above equipment analytical range.
- -- Chemical not analyzed or criteria not defined.
- (1) Ontario Reg 153/04 (2011) Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Residential/Parkland/Institutional Property Use for Coarse Grained Soils
- (2) Grey and bold background indicated paramater concentration greater than the MOE Table 3 Standards

			17-8	17-8	17-29	17-30	17-31	17-32	17-33
		MOE Table 3 Standards	23-Jan-17	23-Jan-17	23-Jan-17	13-Jan-17	13-Jan-17	13-Jan-17	23-Jan-17
Parameter	Unit	(R/P/I) (1) (2)	BH17-8 SA1	BH17-8 SA7	BH17-29 SA2	BH17-30 SA2	BH17-31 SA2	BH17-32 SA2	BH17-33 SA2
Sample Depth	m		0 - 0.41	4.42 - 5.03	0.46 - 0.76	0.76 - 1.37	0.76 - 1.37	0.76 - 1.37	0.76 - 1.37
Metals									
Antimony	μg/g	7.5	<0.8		<0.8			<0.8	<0.8
Arsenic	ug/g	18	3		1			4	2
Barium	ug/g	390	61		48			303	123
Beryllium	ug/g	4	<0.5		<0.5			1	0.6
Boron	ug/g	120	7		<5			7	<5
Boron (Hot Water Soluble)	ug/g	1.5	0.15		<0.10			ı.	0.14
Cadmium	ug/g	1.2	<0.5		<0.5		-	<0.5	<0.5
Chromium	ug/g	160	10		19			83	42
Cobalt	ug/g	22	4.7		5.3			20.3	10.1
Copper	ug/g	140	11		5			36	21
Lead	ug/g	120	8		3			10	5
Molybdenum	ug/g	6.9	1.3		<0.5			<0.5	<0.5
Nickel	ug/g	100	11		11			48	24
Selenium	ug/g	2.4	<0.4		<0.4	-	i	<0.4	0.5
Silver	ug/g	20	<0.2		<0.2			< 0.2	< 0.2
Thallium	ug/g	1	<0.4		<0.4	-		<0.4	< 0.4
Uranium	ug/g	23	<0.5		0.9	1	Ī	0.8	0.6
Vanadium	ug/g	86	37		33	1	Ī	76	53
Zinc	ug/g	340	29		25			107	42
Chromium VI	ug/g	8	<0.2		<0.2			1	<0.2
Mercury	ug/g	0.27	<0.10		<0.10	-		1	<0.10
Inorganics			<u> </u>		<u> </u>	<u> </u>		<u> </u>	<u> </u>
Electrical Conductivity	mS/cm	0.7		0.303		2.38	2.42	0.958	
Sodium Adsorption Ratio		5		0.254		47.8	42.5	3.69	

- < value = Indicates parameter not detected above laboratory method detection
- > value = Indicates parameter detected above equipment analytical range.
- -- Chemical not analyzed or criteria not defined.
- (1) Ontario Reg 153/04 (2011) Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Residential/Parkland/Institutional Property Use for Coarse Grained Soils
- (2) Grey and bold background indicated paramater concentration greater than the MOE Table 3 Standards

			Fill Pile 1	Fill Pile 2	TP17-04		TP17-05	TP17-06
		MOE Table 3 Standards	23-Jan-17	23-Jan-17	21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17
		(R/P/I) (1) (2)					TP17-5 SA13 (Duplicate of	
Parameter	Unit	(1017)	FP1 SA1	FP2 SA2	TP17-4 SA1	TP17-5 SA3	TP17-5 SA3)	TP17-6 SA1
Sample Depth	epth m		N/A	N/A	0.20 - 0.40	2.80 - 3.0	2.80 - 3.0	0.90 - 0.95
Metals								
Antimony	μg/g	7.5	<0.8	<0.8				
Arsenic	ug/g	18	2	5				
Barium	ug/g	390	59	57				
Beryllium	ug/g	4	<0.5	<0.5				
Boron	ug/g	120	<5	7				
Boron (Hot Water Soluble)	ug/g	1.5	0.71	0.13				
Cadmium	ug/g	1.2	<0.5	<0.5				
Chromium	ug/g	160	17	13				
Cobalt	ug/g	22	4.2	6.9				
Copper	ug/g	140	11	11				
Lead	ug/g	120	12	28				
Molybdenum	ug/g	6.9	0.7	3.3				
Nickel	ug/g	100	9	13				
Selenium	ug/g	2.4	0.5	<0.4				
Silver	ug/g	20	< 0.2	< 0.2				
Thallium	ug/g	1	<0.4	<0.4				
Uranium	ug/g	23	0.8	0.6				
Vanadium	ug/g	86	25	32				
Zinc	ug/g	340	51	20				
Chromium VI	ug/g	8	<0.2	<0.2				
Mercury	ug/g	0.27	<0.10	<0.10				
Inorganics								
Electrical Conductivity	mS/cm	0.7			0.146	0.861	0.809	0.251
Sodium Adsorption Ratio		5			0.174	2.91	2.86	0.289

- < value = Indicates parameter not detected above laboratory method detection
- > value = Indicates parameter detected above equipment analytical range.
- -- Chemical not analyzed or criteria not defined.
- (1) Ontario Reg 153/04 (2011) Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Residential/Parkland/Institutional Property Use for Coarse Grained Soils
- (2) Cray and hald hapkground indicated parameter concentration greater
- (2) Grey and bold background indicated paramater concentration greater than the MOE Table 3 Standards

			TP17-07	TP17-08	TP17-09	TP17-10 SA1
		MOE Table 3 Standards	21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17
Parameter	Unit	(R/P/I) (1) (2)	TP17-7 SA2	TP17-8 SA1	TP17-9 SA3	TP17-10 SA1
Sample Depth	m		1.80 - 1.90	0.90 - 1.0	2.80 - 3.0	0.90 - 1.0
Metals						
Antimony	μg/g	7.5		-		
Arsenic	ug/g	18				
Barium	ug/g	390				
Beryllium	ug/g	4				
Boron	ug/g	120				
Boron (Hot Water Soluble)	ug/g	1.5				
Cadmium	ug/g	1.2				
Chromium	ug/g	160				
Cobalt	ug/g	22				
Copper	ug/g	140				
Lead	ug/g	120				
Molybdenum	ug/g	6.9				
Nickel	ug/g	100				
Selenium	ug/g	2.4				
Silver	ug/g	20	==	-		
Thallium	ug/g	1		1		-
Uranium	ug/g	23				
Vanadium	ug/g	86				
Zinc	ug/g	340	==			
Chromium VI	ug/g	8	==			
Mercury	ug/g	0.27				
Inorganics						
Electrical Conductivity	mS/cm	0.7	1.49	0.311	0.043	0.143
Sodium Adsorption Ratio		5	27.2	2.35	0.203	0.816

- < value = Indicates parameter not detected above laboratory method detection
- > value = Indicates parameter detected above equipment analytical range.
- -- Chemical not analyzed or criteria not defined.
- (1) Ontario Reg 153/04 (2011) Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition,
- Residential/Parkland/Institutional Property Use for Coarse Grained Soils
- (2) Grey and bold background indicated paramater concentration greater than the MOE Table 3 Standards

_		MOE Table 3	17-29	17-30	17-31
Parameter	Units	Standards (1)(2)	MW #17-29	MW #17-30	MW #17-31
			30-Jan-17	30-Jan-17	30-Jan-17
Benzene	ug/L	44	<0.80	<0.20	<0.20
Toluene	ug/L	18000	<0.80	<0.20	<0.20
Ethylbenzene	ug/L	2300	< 0.40	<0.10	<0.10
Total Xylenes	ug/L	4200	<0.80	<0.20	<0.20
Petroleum Hydrocarbons - F1 (C6-C10)	ug/L	750	<25	<25	<25
Petroleum Hydrocarbons - F2 (C10-C16)	ug/L	150	<100	<100	<100
Petroleum Hydrocarbons - F3 (C16-C34)	ug/L	500	<100	<100	480
Petroleum Hydrocarbons - F4 (C34-C50)	ug/L	500	<100	<100	600

- < value = Indicates parameter not detected above laboratory method detection limit.
- > value = Indicates parameter detected above equipment analytical range.
- -- Chemical not analyzed or criteria not defined.
- (1) O.Reg 153/04 (2011) Table 3: Full Depth Generic Site Conditions in a Non-Potable Groundwater Condition, All Types of Property Use
- (2) Grey and bold background indicated paramater concentration greater than the MOE Table 3 Standards

October 2017 1658448-5000

Table 6b: Groundwater Analytical Results: Polycyclic Aromatic Hydrocarbons

		MOE Table 3	17-29
Parameter	Units	Standards (1)(2)	MW #17-29
			30-Jan-17
Naphthalene	ug/L	1400	<0.20
Acenaphthylene	ug/L	1.8	<0.20
Acenaphthene	ug/L	600	<0.20
Fluorene	ug/L	400	<0.20
Phenanthrene	ug/L	580	<0.10
Anthracene	ug/L	2.4	<0.10
Fluoranthene	ug/L	130	<0.20
Pyrene	ug/L	68	<0.20
Benz(a)anthracene	ug/L	4.7	<0.20
Chrysene	ug/L	1	<0.10
Benzo(b)fluoranthene	ug/L	0.75	<0.10
Benzo(k)fluoranthene	ug/L	0.4	<0.10
Benzo(a)pyrene	ug/L	0.81	<0.01
Indeno(1,2,3-cd)pyrene	ug/L	0.2	<0.20
Dibenz(a,h)anthracene	ug/L	0.52	<0.20
Benzo(g,h,i)perylene	ug/L	0.2	<0.20
1- and 2-Methylnaphthalene ⁽³⁾	ug/L	1800	<0.20

Footnotes:

- < value = Indicates parameter not detected above laboratory method detection limit.
- > value = Indicates parameter detected above equipment analytical range.
- -- Chemical not analyzed or criteria not defined.
- (1) O.Reg 153/04 (2011) Table 3: Full Depth Generic Site Conditions in a Non-Potable Groundwater Condition, All Types of Property Use
- (2) Grey and bold background indicated paramater concentration greater than the MOE Table 3 Standards
- (3) The methylnaphthalene standards are applicable to both 1-Methylnaphthalene and 2-Methylnaphthalene, with the provision that if both are detected the sum of the two must not exceed the standard.

Bassassian	Unite	MOE Table 3	17-29
Parameter	Units	Standards (1)(2)	MW #17-29
			30-Jan-17
1,1,1,2-Tetrachloroethane	ug/L	3.3	<0.40
1,1,1-Trichloroethane	ug/L	640	<1.20
1,1,2,2-Tetrachloroethane	ug/L	3.2	<0.40
1,1,2-Trichloroethane	ug/L	4.7	<0.80
1,1-Dichloroethane	ug/L	320	<1.20
1,1-Dichloroethylene	ug/L	1.6	<1.20
1,2-Dichlorobenzene	ug/L	4600	<0.40
1,2-Dichloroethane	ug/L	1.6	<0.80
1,2-Dichloropropane	ug/L	16	<0.80
1,3-Dichlorobenzene	ug/L	9600	<0.40
1,3-Dichloropropene	ug/L	5.2	<1.20
1,4-Dichlorobenzene	ug/L	8	<0.40
Acetone	ug/L	130000	<4.0
Bromodichloromethane	ug/L	85000	<0.80
Bromoform	ug/L	380	<0.40
Bromomethane	ug/L	5.6	<0.80
Carbon Tetrachloride	ug/L	0.79	<0.79
Chlorobenzene	ug/L	630	<0.40
Chloroform	ug/L	2.4	<0.80
cis- 1,2-Dichloroethylene	ug/L	1.6	<0.80
Dibromochloromethane	ug/L	82000	<0.40
Dichlorodifluoromethane	ug/L	4400	<0.80
Ethylene Dibromide	ug/L	0.25	<0.25
Methyl Ethyl Ketone	ug/L	470000	<4.0
Methyl Isobutyl Ketone	ug/L	140000	<4.0
Methyl tert-butyl ether	ug/L	190	<0.80
Methylene Chloride	ug/L	610	<1.20
n-Hexane	ug/L	51	<0.80
Styrene	ug/L	1300	<0.40
Tetrachloroethylene	ug/L	1.6	<0.80
trans- 1,2-Dichloroethylene	ug/L	1.6	<0.80
Trichloroethylene	ug/L	1.6	<0.80
Trichlorofluoromethane	ug/L	2500	<1.60
Vinyl Chloride	ug/L	0.5	<0.50

Tables should be read in conjunction with the accompanying document.

- < value = Indicates parameter not detected above laboratory method detection limit.
- > value = Indicates parameter detected above equipment analytical range.
- -- Chemical not analyzed or criteria not defined.

Grey background indicates exceedances.

- (1) O.Reg 153/04 (2011) Table 3: Full Depth Generic Site Conditions in a Non-Potable Groundwater Condition, All Types of Property Use
- (2) Grey and bold background indicated paramater concentration greater than the MOE Table 3 Standards

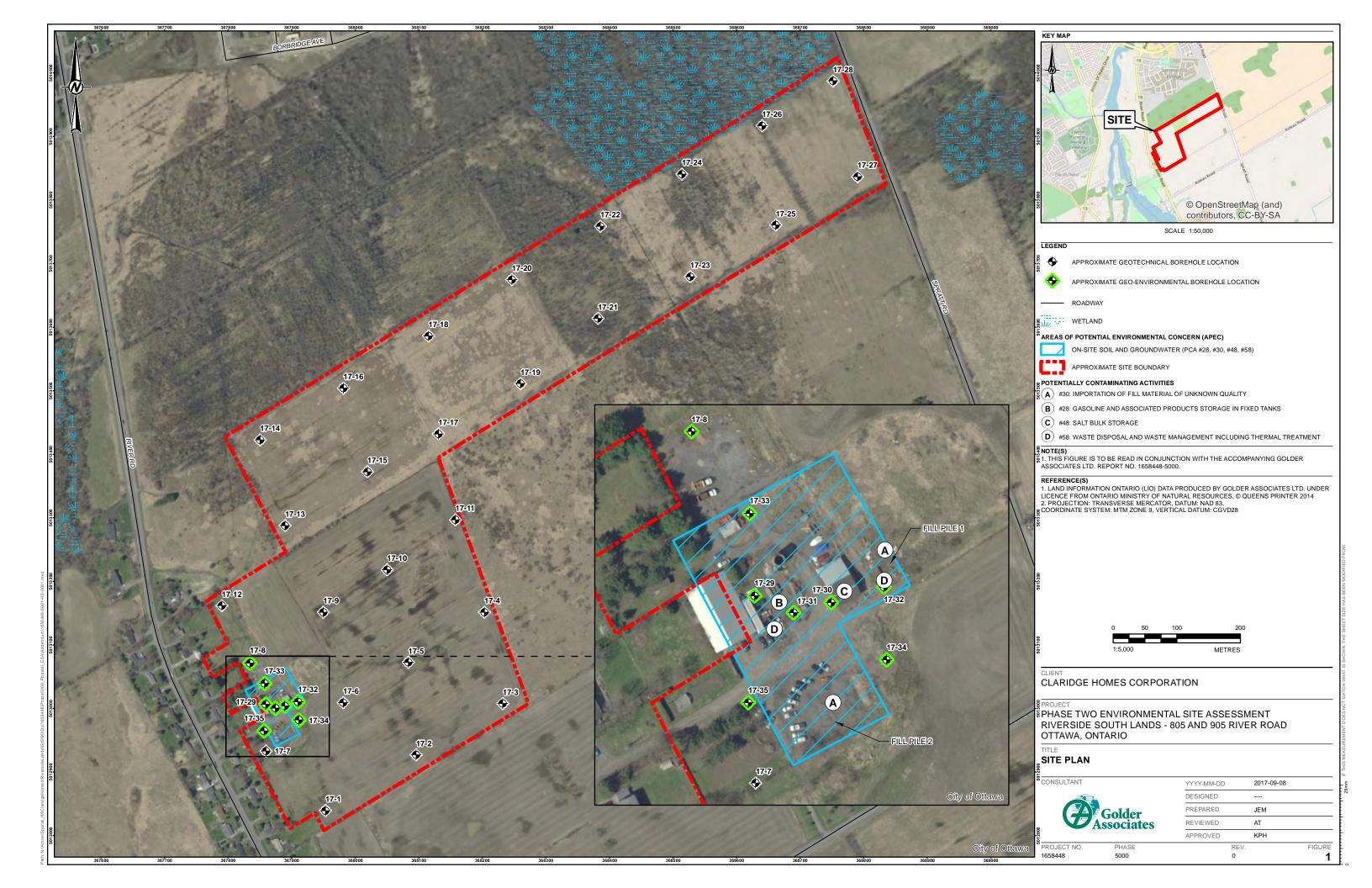
Barrandan	11	MOE Table 3	17-29	17-30	
Parameter	Units	Standards (1)(2)	MW #17-29	MW #17-30	
			30-Jan-17	30-Jan-17	
Metals					
Antimony	ug/L	20000	<1.0		
Arsenic	ug/L	1900	1.2		
Barium	ug/L	29000	956		
Beryllium	ug/L	67	<0.5		
Boron	ug/L	45000	<10.0		
Cadmium	ug/L	2.7	<0.2		
Chromium	ug/L	810	5.1		
Cobalt	ug/L	66	24.1		
Copper	ug/L	87	9.0		
Lead	ug/L	25	<0.5		
Molybdenum	ug/L	9200	3.7		
Nickel	ug/L	490	21.6		
Selenium	ug/L	63	<1.0		
Silver	ug/L	1.5	<0.2		
Thallium	ug/L	510	<0.3		
Uranium	ug/L	420	9.0		
Vanadium	ug/L	250	0.7		
Zinc	ug/L	1100	17.6		
Mercury	ug/L	0.29	<0.02		
Chromium VI	ug/L	140	<5		
Inorganics					
Sodium	ug/L	2300000		1760000	
Chloride	ug/L	2300000		4200000	

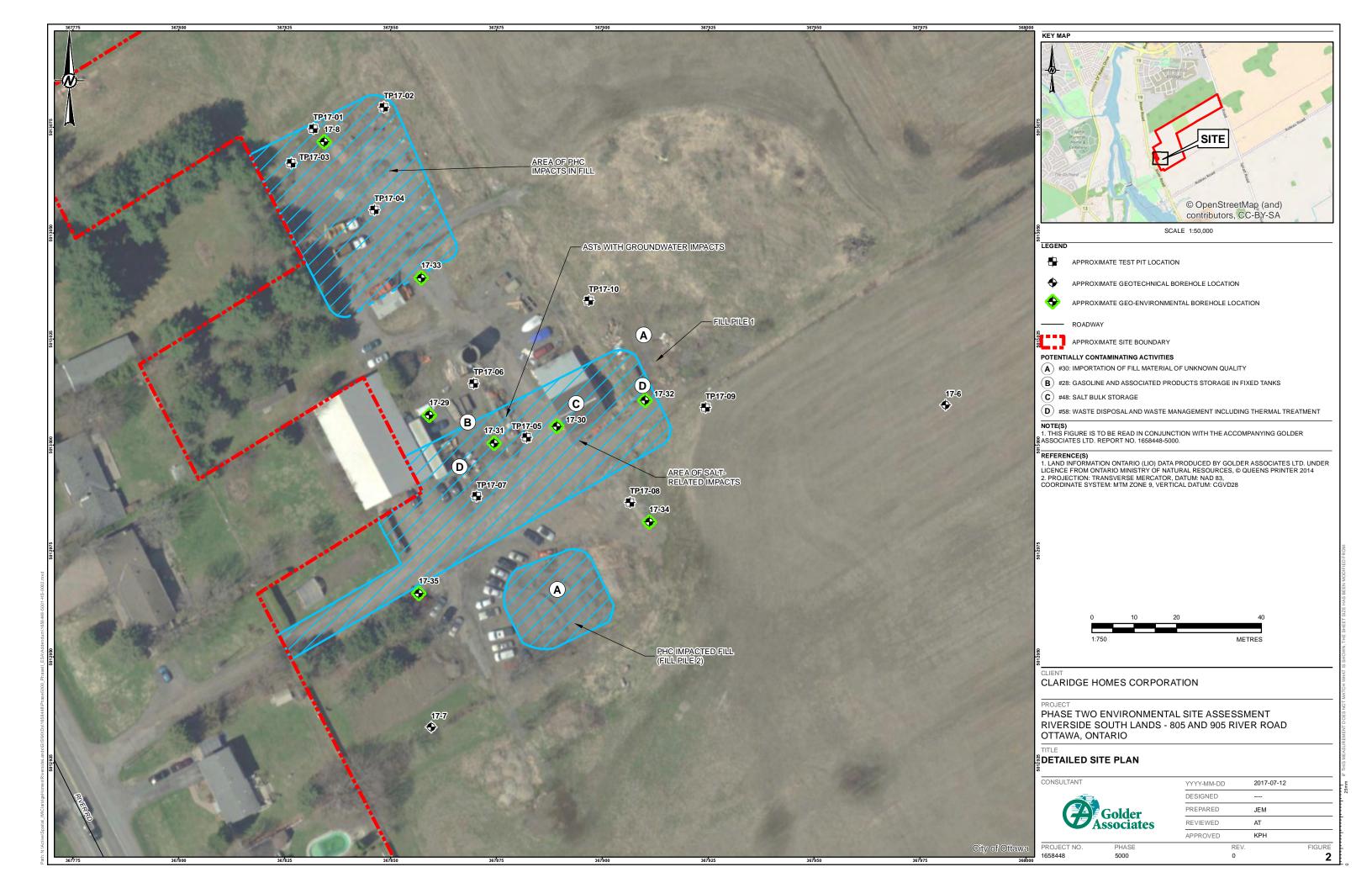
Tables should be read in conjunction with the accompanying document.

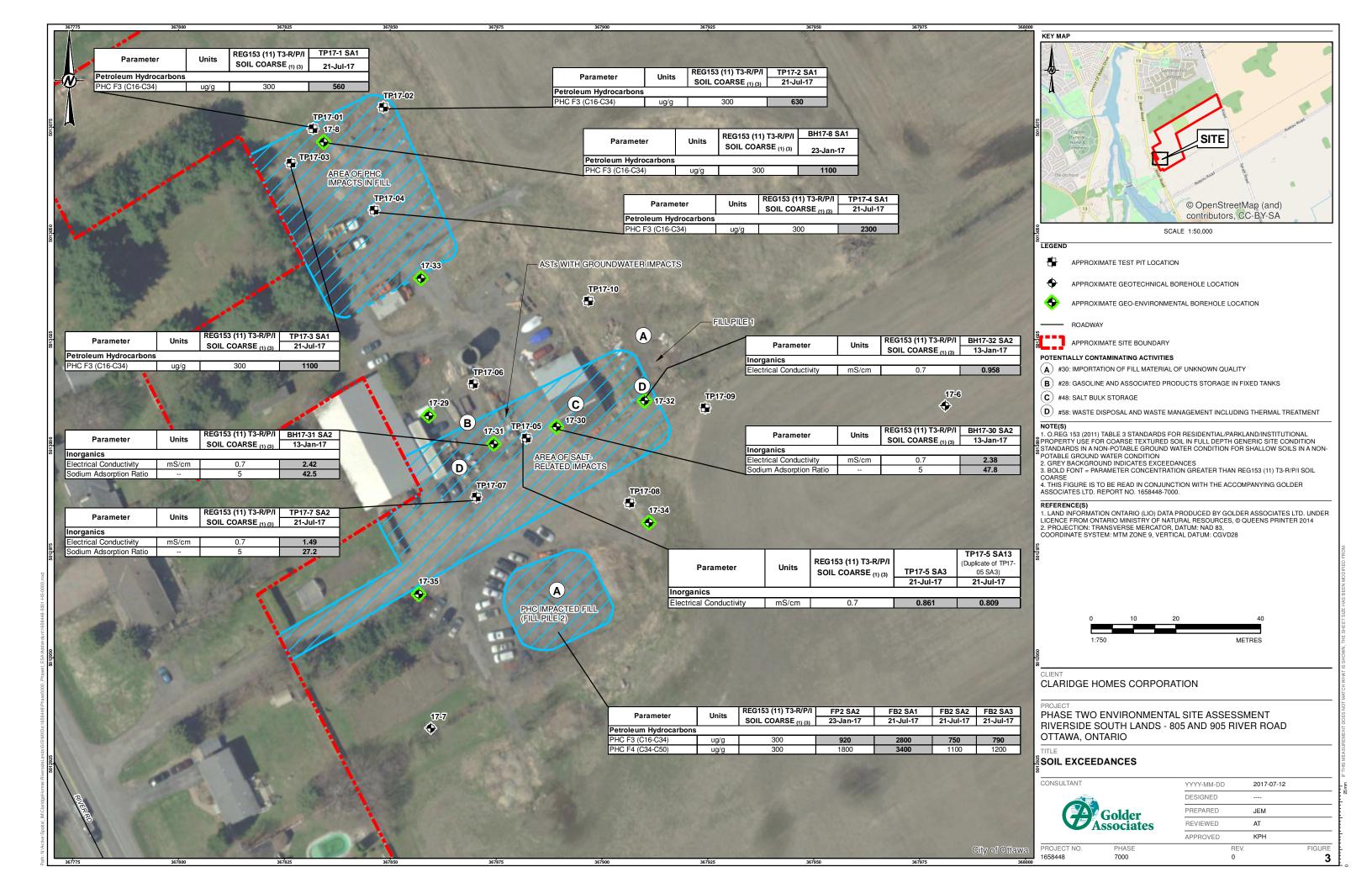
- < value = Indicates parameter not detected above laboratory method detection limit.
- > value = Indicates parameter detected above equipment analytical range.
- -- Chemical not analyzed or criteria not defined.

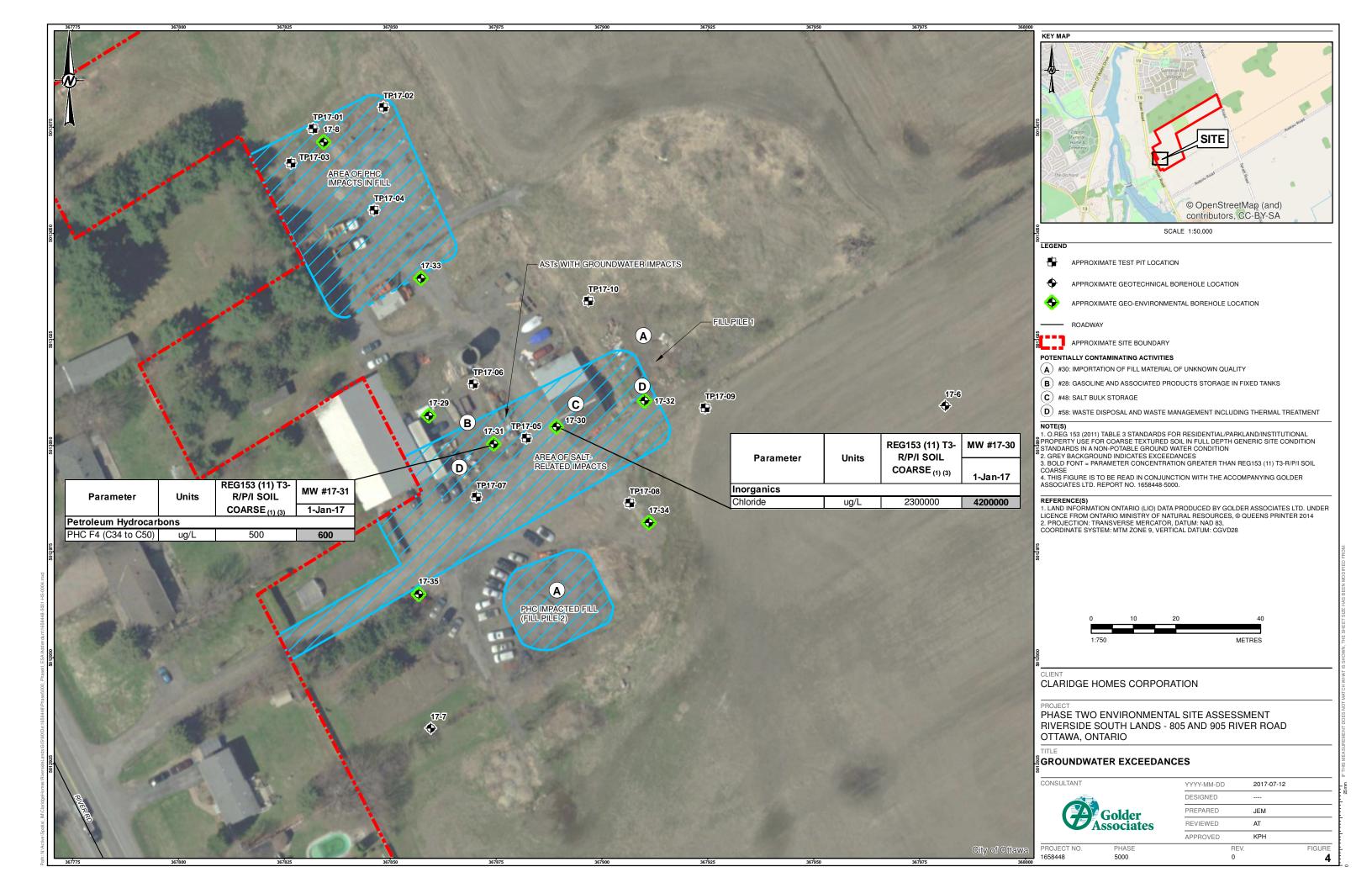
Grey background indicates exceedances.

- (1) O.Reg 153/04 (2011) Table 3: Full Depth Generic Site Conditions in a Non-Potable Groundwater Condition, All Types of Property Use
- (2) Grey and bold background indicated paramater concentration greater than the MOE Table 3 Standards











APPENDIX A

Record of Boreholes

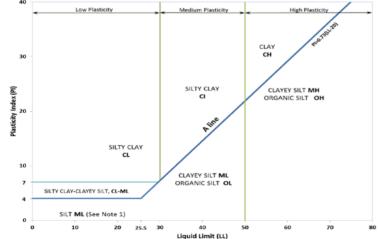




METHOD OF SOIL CLASSIFICATION

The Golder Associates Ltd. Soil Classification System is based on the Unified Soil Classification System (USCS)

Organic or Inorganic	Soil Group	Type of Soil Gradation or Plasticity $Cu = \frac{D_{60}}{D_{10}}$ $Cc = \frac{(D_{30})^2}{D_{10}xD_0}$		$\frac{(30)^2}{(xD_{60})}$	Organic Content	USCS Group Symbol	Group Name																					
	_	of is nm)	Gravels with ≤12%	Poorly Graded		<4		≤1 or ≥	≥3		GP	GRAVEL																
ass) .S .75 mm)	VELS / mass action 1 4.75 r	fines (by mass)	Well Graded		≥4		1 to 3	3		GW	GRAVEL																	
by ma	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm) SANDS GRAVELS (>50% by mass of (>50% by mass of coarse fraction is	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with	Below A Line			n/a				GM	SILTY GRAVEL																
SANIC t ≤30%	AINED rger th	>12% Solution Sol		Above A Line			n/a			≤30%	GC	CLAYEY GRAVEL																
INORGANIC (Organic Content ≤30% by mass)	SE-GR ss is la	of is mm)	Sands with ≤12%	Poorly Graded		<6		≤1 or ≥	≥3	230 /6	SP	SAND																
ganic (COAR(by ma	SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	fines (by mass)	Well Graded		≥6		1 to 3	3		SW	SAND																
Ō.	(>50%	SAN 50% by parse fi	Sands with >12%	Below A Line			n/a				SM	SILTY SAND																
		χί) Sma	fines (by mass)	Above A Line			n/a				SC	CLAYEY SAND																
Organic	Soil					ا	Field Indica	ators		Organia	USCS Group	Brimory																
or Inorganic	Group	Type of Soil		Laboratory Tests	Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)	Organic Content	Symbol	Primary Name																
	INORGANIC (Organic Content <30% by mass) FINE-GRAINED SOILS (250% by mass is smaller than 0.075 mm) CLAYS SILTS	L plot		L plot		.L plot		Liquid Limit	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT												
ss)		and L	city low)		Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT																
by ma	OILS ian 0.0	SILTS (Non-Plastic or PI and LL plot	below A-Line on Plasticity Chart below)		Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT																
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS mass is smaller than 0.		-r pag	n-Plasti	n-Plast	n-Plasti	-Plast	Plast.	Plast.	-Plast	-Plast	-r pag	<u> </u>	<u> </u>	<u> </u>	<u> </u>	<u> </u>	n-Plast	n-Plast	n-Plast be or CP	Liquid Limit	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	МН
INORGANIC	-GRAII s is sm	Š		≥50	None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	ОН	ORGANIC SILT																
ganic (FINE by mas	olot	e on nart	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0%	CL	SILTY CLAY																
Ö	≥50% k	LAYS	CLAYS (Pl and LL plot above A-Line on Plasticity Chart below)	Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium	to 30%	CI	SILTY CLAY																
	٣	C C		Liquid Limit ≥50	None	High	Shiny	<1 mm	High	(see Note 2)	СН	CLAY																
ANIC LS anic	ass)	mix	mineral soil tures						•	30% to 75%	o 5%	SILTY PEAT, SANDY PEAT																
Peat and mineral soil mixtures Predominantly peat, may contain some mineral soil, fibrous or amorphous peat										75% to 100%	PT	PEAT																



Note 1 - Fine grained materials with PI and LL that plot in this area are named (ML) SILT with slight plasticity. Fine-grained materials which are non-plastic (i.e. a PL cannot be measured) are

Note 2 – For soils with <5% organic content, include the descriptor "trace organics" for soils with between 5% and 30% organic content include the prefix "organic" before the Primary name.

Dual Symbol — A dual symbol is two symbols separated by a hyphen, for example, GP-GM, SW-SC and CL-ML.

For non-cohesive soils, the dual symbols must be used when the soil has between 5% and 12% fines (i.e. to identify transitional material between "clean" and "dirty" sand or gravel.

For cohesive soils, the dual symbol must be used when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart (see Plasticity Chart at left).

Borderline Symbol — A borderline symbol is two symbols separated by a slash, for example, CL/CI, GM/SM, CL/ML. A borderline symbol should be used to indicate that the soil has been identified as having properties that are on the transition between similar materials. In addition, a borderline symbol may be used to indicate a range of similar soil types within a stratum.



February 2017



ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

	4		
Soil Constituent	Particle Size Description	Millimetres	Inches (US Std. Sieve Size)
BOULDERS	Not Applicable	>300	>12
COBBLES	Not Applicable	75 to 300	3 to 12
GRAVEL	Coarse Fine	19 to 75 4.75 to 19	0.75 to 3 (4) to 0.75
SAND	Coarse Medium Fine	2.00 to 4.75 0.425 to 2.00 0.075 to 0.425	(10) to (4) (40) to (10) (200) to (40)
SILT/CLAY	Classified by plasticity	<0.075	< (200)

MODIFIERS FOR SECONDARY AND MINOR CONSTITUENTS

Percentage by Mass	Modifier
>35	Use 'and' to combine major constituents (i.e., SAND and GRAVEL, SAND and CLAY)
> 12 to 35	Primary soil name prefixed with "gravelly, sandy, SILTY, CLAYEY" as applicable
> 5 to 12	some
≤ 5	trace

PENETRATION RESISTANCE

Standard Penetration Resistance (SPT), N:

The number of blows by a 63.5 kg (140 lb) hammer dropped 760 mm (30 in.) required to drive a 50 mm (2 in.) split-spoon sampler for a distance of 300 mm (12 in.).

Cone Penetration Test (CPT)

An electronic cone penetrometer with a 60° conical tip and a project end area of $10~\text{cm}^2$ pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_i), porewater pressure (u) and sleeve frictions are recorded electronically at 25 mm penetration intervals.

Dynamic Cone Penetration Resistance (DCPT); N_d:

The number of blows by a $63.5 \, \text{kg}$ (140 lb) hammer dropped 760 mm (30 in.) to drive uncased a 50 mm (2 in.) diameter, 60° cone attached to "A" size drill rods for a distance of 300 mm (12 in.).

PH: Sampler advanced by hydraulic pressure
PM: Sampler advanced by manual pressure
WH: Sampler advanced by static weight of hammer
WR: Sampler advanced by weight of sampler and rod

NON-COHESIVE (COHESIONLESS) SOILS

Compactness² Term SPT 'N' (blows/0.3m)¹ Very Loose 0 - 4 Loose 4 to 10 Compact 10 to 30 Dense 30 to 50 Very Dense >50

- SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects.
- 2. Definition of compactness descriptions based on SPT 'N' ranges from Terzaghi and Peck (1967) and correspond to typical average N_{60} values.

Field Moisture Condition

Term	Description
Dry	Soil flows freely through fingers.
Moist	Soils are darker than in the dry condition and may feel cool.
Wet	As moist, but with free water forming on hands when handled.

SAMPLES

AS	Auger sample
BS	Block sample
CS	Chunk sample
DO or DP	Seamless open ended, driven or pushed tube sampler – note size
DS	Denison type sample
FS	Foil sample
GS	Grab Sample
RC	Rock core
SC	Soil core
SS	Split spoon sampler – note size
ST	Slotted tube
TO	Thin-walled, open – note size
TP	Thin-walled, piston – note size
WS	Wash sample

SOIL TESTS

w	water content
PL, w _p	plastic limit
LL, w _L	liquid limit
С	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test1
CIU	consolidated isotropically undrained triaxial test with porewater pressure measurement ¹
D _R	relative density (specific gravity, Gs)
DS	direct shear test
GS	specific gravity
М	sieve analysis for particle size
MH	combined sieve and hydrometer (H) analysis
MPC	Modified Proctor compaction test
SPC	Standard Proctor compaction test
OC	organic content test
SO ₄	concentration of water-soluble sulphates
UC	unconfined compression test
UU	unconsolidated undrained triaxial test
V (FV)	field vane (LV-laboratory vane test)
γ	unit weight

 Tests which are anisotropically consolidated prior to shear are shown as CAD, CAU.
 COHESIVE SOILS

Consistency

Term	Undrained Shear Strength (kPa)	SPT 'N' ^{1,2} (blows/0.3m)
Very Soft	<12	0 to 2
Soft	12 to 25	2 to 4
Firm	25 to 50	4 to 8
Stiff	50 to 100	8 to 15
Very Stiff	100 to 200	15 to 30
Hard	>200	>30

- SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; approximate only.
- enects; approximate only.

 2. SPT 'N' values should be considered ONLY an approximate guide to consistency; for sensitive clays (e.g., Champlain Sea clays), the N-value approximation for consistency terms does NOT apply. Rely on direct measurement of undrained shear strength or other manual observations.

Water Content

Term	Description
w < PL	Material is estimated to be drier than the Plastic Limit.
w ~ PL	Material is estimated to be close to the Plastic Limit.
w > PL	Material is estimated to be wetter than the Plastic Limit.

February 2017 2





LIST OF SYMBOLS

Unless otherwise stated, the symbols employed in the report are as follows:

l.	GENERAL	(a) w	Index Properties (continued) water content
π	3.1416	w _i or LL	liquid limit
In x	natural logarithm of x	w _p or PL	plastic limit
log ₁₀	x or log x, logarithm of x to base 10	l _p or PI	plasticity index = $(w_l - w_p)$
g	acceleration due to gravity	Ws	shrinkage limit
ť	time	ال	liquidity index = $(w - w_p) / I_p$
		Ic	consistency index = $(w_l - w) / I_p$
		e max	void ratio in loosest state
		e min	void ratio in densest state
		l _D	density index = $(e_{max} - e) / (e_{max} - e_{min})$
II.	STRESS AND STRAIN		(formerly relative density)
γ	shear strain	(b)	Hydraulic Properties
Δ	change in, e.g. in stress: Δ σ	h	hydraulic head or potential rate of flow
3	linear strain	q	
εν	volumetric strain	V i	velocity of flow hydraulic gradient
η	coefficient of viscosity Poisson's ratio	k	hydraulic gradient hydraulic conductivity
υ	total stress	N.	(coefficient of permeability)
σ σ'	effective stress ($\sigma' = \sigma - u$)	j	seepage force per unit volume
σ'_{vo}	initial effective overburden stress	J	coopage force per affic volume
	principal stress (major, intermediate,		
01, 02, 00	minor)	(c)	Consolidation (one-dimensional)
	,	Cc	compression index
σ_{oct}	mean stress or octahedral stress		(normally consolidated range)
	$= (\sigma_1 + \sigma_2 + \sigma_3)/3$	C_{r}	recompression index
τ	shear stress		(over-consolidated range)
<u>u</u>	porewater pressure	Cs	swelling index
E	modulus of deformation	C_{α}	secondary compression index
G K	shear modulus of deformation	m _v	coefficient of volume change coefficient of consolidation (vertical
K	bulk modulus of compressibility	Cv	direction)
		Ch	coefficient of consolidation (horizontal direction)
	COU DECEMENTS	Τ _ν	time factor (vertical direction)
III.	SOIL PROPERTIES	U -'	degree of consolidation pre-consolidation stress
(a)	Index Properties	σ′ρ OCR	over-consolidation ratio = σ'_p / σ'_{vo}
(α) ρ(γ)	bulk density (bulk unit weight)*	OCK	over-consolidation ratio = 8 p / 8 vo
ρα(γ _d)	dry density (dry unit weight)	(d)	Shear Strength
$\rho_w(\gamma_w)$	density (unit weight) of water	τ _p , τ _r	peak and residual shear strength
ρs(γs)	density (unit weight) of solid particles		effective angle of internal friction
γ'	unit weight of submerged soil	φ' δ	angle of interface friction
·	$(\gamma' = \gamma - \gamma_w)$	μ	coefficient of friction = $tan \delta$
D_R	relative density (specific gravity) of solid	C'	effective cohesion
	particles ($D_R = \rho_s / \rho_w$) (formerly G_s)	C_{u},S_{u}	undrained shear strength ($\phi = 0$ analysis)
е	void ratio	р	mean total stress $(\sigma_1 + \sigma_3)/2$
n	porosity	p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
S	degree of saturation	q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
		q _u	compressive strength (σ_1 - σ_3)
		St	sensitivity
	ity symbol is ρ . Unit weight symbol is γ	Notes: 1	$\tau = c' + \sigma' \tan \phi'$
	e $\gamma = \rho g$ (i.e. mass density multiplied by leration due to gravity)	2	shear strength = (compressive strength)/2



February 2017 3

RECORD OF BOREHOLE: 17-1

SHEET 1 OF 1

LOCATION: N 5012839.8 ;E 367953.0

BORING DATE: January 13, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

Щ.	오	SOIL PROFILE			SA	MPLE		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	k, cm/s	무일	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 60 80 SHEAR STRENGTH nat V. + Q - • Cu, kPa	10° 10° 10° 10° 10° WATER CONTENT PERCENT Wp OWN 1 WI	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
	ш	GROUND SURFACE	S	89.98		H	ш	20 40 60 80	20 40 60 80		
- 0		TOPSOIL - (ML) sandy SILT; dark brown; non-cohesive (CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		0.06	1	SS	5		0		∑ Native Backfill
- 2	Power Auger 200 mm Diam. (Hollow Stem)	(CI/CH) SILTY CLAY to CLAY; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		87.85 2.13	2		5				
- 3	200 mm			86.78							Bentonite Seal
		(ML-SM) gravelly sandy SILT to SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact		3.20	4	SS	8				Native Backfill Silica Sand
4				85.48	5	SS	26				Standpipe
5		End of Borehole Auger Refusal		4.50							WL in Standpipe at Elev. 89.58 m on Jan. 30, 2017
6											
7											
8											
- 9											
- 10											
	PTH:	SCALE						Golder		LC	OGGED: PAH

RECORD OF BOREHOLE: 17-2

BORING DATE: January 16, 2017

SHEET 1 OF 1 DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

LOCATION: N 5012927.0 ;E 368096.0

Щ			SOIL PROFILE	1.		SA	AMPL		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	PIEZOMETER
DEPTH SCALE METRES	Take Civid C	BORING MEI HOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 60 80 SHEAR STRENGTH nat V. + Q - Cu, kPa rem V. ⊕ U -	10 ⁶ 10 ⁵ 10 ⁴ 10 ³ WATER CONTENT PERCENT Wp W W	PIEZOMETER OR STANDPIPE INSTALLATION
0	-	n	GROUND SURFACE TOPSOIL - (SM) SILTY SAND, fine; dark brown; non-cohesive		90.52			BL	20 40 60 80	20 40 60 80	
			(SM) SILTY SAND, fine; brown; non-cohesive, moist (CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams, fissured (WEATHERED CRUST);		0.25 90.00 0.52						
1		m)	cohesive, w>PL, very stiff (Cl/CH-ML and SM) SILTY CLAY,		89.15 1.37		ss	7			
2	ower Auger	200 mm Diam. (Hollow Stem)	CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		88.39	2	ss	3			
	PC	200 mm D	(Cl/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHRED CRUST); cohesive, w>PL, very stiff		2.13		ss	4			
3						4	ss	8			
4			End of Borehole Auger Refusal		86.71 3.81			-			
7			Auger Nerusan								
5											
6											
7											
8											
9											
10											
	PT	нѕ	CALE	<u> </u>					Golder		LOGGED: PAH

LOCATION: N 5012927.0 ;E 368096.0

RECORD OF BOREHOLE: 17-2A

BORING DATE: January 16, 2017

SHEET 1 OF 1

DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT BLOWS/0.30m 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp ⊢ (m) GROUND SURFACE 90.52 Probable Silty Clay to Clay 4 DCPT Probable Glacial Till 135 153 82.60 7.92 End of DCPT 1658448.GPJ GAL-MIS.GDT 10/10/17 JM 9 10 DEPTH SCALE LOGGED: PAH Golder 1:50 CHECKED: SAT

RECORD OF BOREHOLE: 17-3

SHEET 1 OF 1

LOCATION: N 5013008.0 ;E 368232.2

BORING DATE: January 10, 2017

DATUM: Geodetic

SES SES	1ETHOD	SOIL PROFILE	TO:			MPLE		DYNAMIC PENETRA RESISTANCE, BLOV 20 40	TION VS/0.3m 60	80	HYDRAULIC k, cr 10 ⁻⁶	n/s	10 ⁻⁴ 10 ⁻³	STING	PIEZOMETER OR
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	SHEAR STRENGTH Cu, kPa		+ Q - ● ⊕ U - ○		CONTEN	T PERCENT	ADDITIONAL LAB. TESTING	STANDPIPE INSTALLATION
0		GROUND SURFACE TOPSOIL - (ML) CLAYEY SILT; brown; non-cohesive (ML and SM) SILT, CLAYEY SILT and SILTY SAND; grey brown; non-cohesive, wet, very loose to loose		91.08 0.00 90.78 0.30											
1					1	SS	5				0				Native Backfill
2		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		89.25 1.83	2	SS	3								
3	Power Auger Diam. (Hollow Stem)	(SM) gravelly SILTY SAND; grey brown.		88.09 2.99	3	SS	4					0			Bentonite Seal
	Powe 200 mm Diam	(SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense			4	SS	10								
4							34								Native Backfill
5					6	SS	28				0				Silica Sand
6		End of Borehole		84.98 6.10	7	SS	32								Standpipe
7															WL in Standpipe at Elev. 89.76 m on Jan. 30, 2017
8															
9															
10															

RECORD OF BOREHOLE: 17-4

SHEET 1 OF 1

LOCATION: N 5013152.1 ;E 368203.6

BORING DATE: January 10, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm PENETRATION TEST HAMMER, 64kg; DROP, 760mm

, ALE	ПНОБ	SOIL PROFILE	L	1	SA	MPL		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	AL	PIEZOMETER
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 60 80 SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ 20 40 60 80	10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³ WATER CONTENT PERCENT Wp	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
0		GROUND SURFACE TOPSOIL - (ML) CLAYEY SILT; dark brown; non-cohesive (ML and SM) SILT, CLAYEY SILT and SILTY SAND; grey brown; non-cohesive, wet, very loose to loose		91.01 0.00 90.71 0.30				20 10 00 00	20 40 00 00		
1					1	SS	6				∇
2		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		89.03 1.98	3	ss	3				
3	Power Auger	(SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders		87.73 3.28	4	ss	3				
4	Pow 200 mm Dia	(GLACIAL TILL); non-cohesive, wet, compact to very dense			5	SS	21				
5					6	ss	>50				
6					7	ss	25				
7		End of Borehole Auger Refusal		84.27 6.74			29				WL in open borehole at 1.10 m depth below ground surface
8											ground surface upon completion of drilling
9											
10											
DE		SCALE	•					Golder Associates			OGGED: PAH ECKED: SAT

00

1:50

RECORD OF BOREHOLE: 17-5

SHEET 1 OF 1

CHECKED: SAT

LOCATION: N 5013072.9 ;E 368083.3

BORING DATE: January 10, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm PENETRATION TEST HAMMER, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT NUMBER STANDPIPE ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - O WATER CONTENT PERCENT BLOWS/0. DESCRIPTION INSTALLATION DEPTH -OW Wn ⊢ (m) GROUND SURFACE 90.40 TOPSOIL - (ML) CLAYEY SILT; brown; 0.00 GRAB non-cohesive 90.15 (ML and SM) SILT, CLAYEY SILT and SILTY SAND; grey brown; non-cohesive, wet, very loose to loose ∇ SS (CI/CH) SILTY CLAY to CLAY; grey brown, fissured, contains clayey silt layers (WEATHERED CRUST); cohesive, w>PL, very stiff 1.37 3 SS 4 (CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); 2 13 SS 3 cohesive, w>PL, very stiff Auger (Hollow (CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff 2 SS 5 >96 ->96 + SS 2 >96 + 84.7<u>6</u> 5.64 >96 + (CI/CH) SILTY CLAY to CLAY; grey, contains clayey silt seams; cohesive, w>PL, very stiff 84.46 5.94 SS (ML) sandy SILT, some gravel; grey (GLACIAL TILL); non-cohesive, wet, 84.15 very loose to loose WL in open borehole at 0.80 m depth below ground surface upon completion of drilling End of Borehole 8 1658448.GPJ GAL-MIS.GDT 10/10/17 9 10 DEPTH SCALE LOGGED: PAH Golder

RECORD OF BOREHOLE: 17-6

SHEET 1 OF 1

LOCATION: N 5013009.8 ;E 367980.8

BORING DATE: January 9, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm PENETRATION TEST HAMMER, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - O WATER CONTENT PERCENT BLOWS/0. DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE 90.26 TOPSOIL - (ML) CLAYEY SILT; dark brown; non-cohesive 0.15 (CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff SS 3 ∇ 2 2 SS 2 3 SS 2 0 Power Auger n Diam. (Hollow (CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff 3.05 SS 3 >96 ->96+ (CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, stiff SS 2 (SM) gravelly SILTY SAND, some gravel; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact SS 16 0 МН End of Borehole WL in open borehole at 1.22 m depth below ground surface upon completion of drilling 1658448.GPJ GAL-MIS.GDT 10/10/17 9 10 MIS-BHS 001

DEPTH SCALE 1:50

LOGGED: PAH Golder CHECKED: SAT

RECORD OF BOREHOLE: 17-7

BORING DATE: January 5, 2017

SHEET 1 OF 1

DATUM: Geodetic

LOCATION: N 5012933.6 ;E 367859.5 SAMPLER HAMMER, 64kg; DROP, 760mm

SE	THOD	SOIL PROFILE	۲		+	AMPL	_	DYNAMIC PENETRATION RESISTANCE, BLOWS	٠,	HYDRAULIC CONDUC k, cm/s 10 ⁻⁶ 10 ⁻⁵		NAL	PIEZOMETER OR
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV DEPTI (m)	_ =	TYPE	BLOWS/0.30m	SHEAR STRENGTH r Cu, kPa		WATER CONTEN	V ₩I	ADDITIONAL LAB. TESTING	STANDPIPE INSTALLATION
	ш	GROUND SURFACE	S)	90.2	1	\vdash	B	20 40 6	0 80	20 40	60 80	++	
0		FILL/TOPSOIL - (SM) SILTY SAND; dark brown; moist		0.0									
		FILL - (SP-CL/CI) Mixture of SAND and SILTY CLAY; brown to grey brown; non-cohesive, moist, loose to very loose		0.3		GRAE	-						
1		(CI/CH) SILTY CLAY to CLAY, some sand; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		89.13 1.00	2	ss	4						
2					3	ss	6						
					4	ss	2						
3													
	Stem)				5	ss	3						
4	Power Auger 200 mm Diam. (Hollow Stem)								>96 +				
5	200 n				6	ss	4						
					7	ss	2						
6		(SM) SILTY SAND, some gravel; grey, contains clayey silt seams, cobbles and boulders (GLACIAL TILL); non-cohesive,		84.4 5.7		-							
		boulders (GLACIAL TILL); non-cohesive, wet, compact			8	ss	24						
7					9	ss	10						
					10	ss	11						
8		End of Borehole		82.0: 8.2:	2	-							
9													
10													
	PTH S 50	SCALE					(Golden	•				GGED: DG CKED: SAT

RECORD OF BOREHOLE: 17-8

BORING DATE: January 23, 2017

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5013071.6 ;E 367834.3 SAMPLER HAMMER, 64kg; DROP, 760mm

Ц 	5	Ź	SOIL PROFILE	1.		SA	MPL		DYNAMIC PENETRA RESISTANCE, BLOV	/S/0.3m	ί.	HYDRAUL k,	cm/s		٠,	[₽] ₽	PIEZOMETER
METRES	BODING METHOD	ב פ	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.30m	20 40 SHEAR STRENGTH	60 nat V.	80 + Q - ●	10 ⁻⁶ WAT	10 ⁻⁵ ER CONT	10 ⁻⁴ ENT PEF	10 ⁻³ CENT	ADDITIONAL LAB. TESTING	OR STANDPIPE
≅	Nigo		DESCRIPTION	'RAT	DEPTH (m)	NOM	Ţ	OWS	Cu, kPa	rem V.	⊕ ŭ-ō				→ WI	ADC LAB.	INSTALLATION
	à	<u> </u>	GROUND SURFACE	ST				BL	20 40	60	80	20	40	60	80	+	
0	\vdash	\dashv	FILL - (SP/GP) SAND and GRAVEL;	***	89.77 0.00								+		+	+	
			dark grey to black, contains asphaltic concrete fragments; non-cohesive, moist		89.36	1	GRAE	-									
			(SM) SILTY SAND; brown; non-cohesive, moist		0.41 89.16	2	GRAE	-									
			(CI/CH) SILTY CLAY to CLAY: red		0.61												
1			brown to grey brown, fissured (WEATHERED CRUST); cohesive,			3	SS	5									
			w>PL, very stiff		88.40												
			(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND: grey		1.37												
			CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff			4	SS	5									
2			concerve, we real, very can														
		Stem)				5	ss	2									
	зег	S wollc					-										
3	Power Auger	m. (Ho	(CI/CH) SILTY CLAY to CLAY; grey		86.87 2.90												
	Pow	m Dia	(CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams (WEATHERED CRUST); cohesive,			6	ss	2									
		200 m	w>PL, very stiff														
											>96+						
4			(CI/CH) SILTY CLAY to CLAY; grey;		85.81 3.96												
			cohesive, w>PL, stiff								+						
						7	SS	WH									
5																	
									Φ +								
									• †								
										+							
6	H	Н	End of Borehole	1993	83.83 5.94						+						
7																	
8																	
9																	
10																	
רר	ידם:	пο	CALE													1.0	GGED: PAH
DΕ	-F11	17 5	CALE						Gold	(A)**						LC	OGED. PAH

RECORD OF BOREHOLE: 17-9

SHEET 1 OF 1

LOCATION: N 5013151.7 ;E 367949.8

BORING DATE: January 16, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

METRES	BORING METHOD	SOIL PROFILE	STRATA PLOT	2	TYPE SITURE SITU	RESIST		WS/0.3m 60	80 - Q - •	HYDRAULIC COI k, cm/s 10 ⁻⁶ 10 ⁻¹ I WATER COI			PIEZOMETER OR STANDPIPE
Σ₩	BORIN	DESCRIPTION	(m)	NOM	TYPE SLOWS/0.3	Cu, kPa	STRENGTH			vvp	→W v		INSTALLATION
0 -		GROUND SURFACE TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive (SM) SILTY SAND; grey brown; non-cohesive, wet (CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams,	90.2i 90.2i 0.0i 89.8i 0.4	5 5	GRAB -	20	0 40	60	80	20 40	60 80	J	Native Backfill
1		brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		2	SS 5								Bentonite Seal
2				3	SS 5								
3				4	SS 2								
	Auger (Hollow Stem)			5	SS 3								Native Backfill
4	Power Auger 200 mm Diam. (Hollo	(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, stiff	86.3 3.9			Φ		+	>96+				
5				6	SS WI	1							
6						Φ	+	+					Silica Sand
				7	ss wi								Standpipe
7				8	SS WI	θ Θ		+ + +					Silica Sand
8		End of Borehole	82.3· 7.9:	2				+					WL in Standpipe at Elev. 90.04 m on Jan. 30, 2017
9													
10													
DEI	PTH :	I SCALE	1 1		<u> </u>		Gold	ler		1 1		L	OGGED: PAH

RECORD OF BOREHOLE: 17-10

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5013218.5 ;E 368049.9

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: January 16, 2017

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

SA	uvii		R HAMMER, 64kg; DROP, 760mm												PE	NETRA	TION TE	ST HAI	VIIVIER,	64kg; DROP, 760mm
Э.	2	ag.	SOIL PROFILE			SA	MPL	.ES	DYNA RESIS	MIC PEN STANCE,	ETRATI BLOWS	ON 5/0.3m	1	HYDRA	AULIC C k, cm/s	ONDUCT	TIVITY,		٥٦	PIEZOMETER
DEPTH SCALE METRES	E	BORING MEI HOD		STRATA PLOT		iκ		BLOWS/0.30m	2	20 4	0	60 8	30	1			0 ⁻⁴ 1	0 ⁻³	ADDITIONAL LAB. TESTING	OR
PTH	2	5	DESCRIPTION	TAP	ELEV. DEPTH	NUMBER	TYPE	VS/0.	SHEA Cu kF	R STREN	IGTH	nat V. + rem V. ⊕	Q - •	W	ATER C	ONTENT	PERCE		B. HE	STANDPIPE INSTALLATION
DE		ğ		STRA	(m)	₹	-	3LOV							p			WI	5 B	
			GROUND SURFACE	0,	90.56			Ë	4	20 4	0	8 06	30		20 2	10 6	80 08	30		
- 0		П	TOPSOIL - (SM) SILTY SAND; dark		0.00	1	GRAI	3 -												
-			brown; non-cohesive (SM) SILTY SAND; brown;		90.33		1													-
-			non-cohesive, moist (CI/CH) SILTY CLAY to CLAY; grey		90.10 0.46															-
			brown to red brown, fissured (WEATHERED CRUST); cohesive,																	=
- 1			(WEATHERED CRUST); cohesive, w>PL, very stiff			2	ss	6												_
-																				=
-			(CI/CH-ML and SM) SILTY CLAY,		89.19 1.37		-													-
-			CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST);			3	SS	3												=
			cohesive, w>PL, very stiff			٦	33	ľ												-
_ 2																				-
_																				<u>-</u>
Ė		(mg)				4	ss	3												- -
Ė	16	low St					1													=
- - - 3	Power Auger	200 mm Diam. (Hollow Stem)					1													_
٦	Powe	Diam				5	SS	3												
<u> </u>		m oc																		- -
-					86.90		ĺ													-
			(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, firm to stiff		3.66				Ф				+							=
4										_										_
_										'										<u>-</u>
-																				=
-						6	SS	WH												=
_ 5																				
- 5																				-
-									⊕			+								<u>-</u>
-												+								-
-					84.62															-
- 6			End of Borehole	VVVV	5.94							+								
_																				-
-																				-
-																				-
- - - 7																				
ļ '																				
Ė																				-
Ė																				=
[]
- 8																				
-																				-
-																				=
																				- -
- - 9																				
ļ Š																				_ -
-																				=
Ė																				=
[
- 10																				
DE	PT	ΉS	CALE						Â		-13								LC	OGGED: PAH
1:								(A GO	olde	r Ates								ECKED: SAT
	_									4 200	<u></u>	C.D								

MIS-BHS 001 1658448.GPJ GAL-MIS.GDT 10/10/17 JM

RECORD OF BOREHOLE: 17-10A

SHEET 1 OF 1

LOCATION: N 5013218.0 ;E 368050.0 BORING DATE: January 16, 2017 DATUM: Geodetic

į	9	<u></u>	SOIL PROFILE			SA	MPL	.ES	DYNAMIC PENETRA RESISTANCE, BLO	ATION \ WS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	٥٦	PIEZOMETER
METRES		BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 I I SHEAR STRENGTH Cu, kPa	60 80	10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
	-	ă	ODOLIND OLIDEAGE	ST				В	20 40	60 80	20 40 60 80		
0		\dashv	GROUND SURFACE For soil stratigraphy refer to Record of		90.56 0.00								
1 2	Power Auger	200 mm Diam. (Hollow Stem)	For soil stratigraphy refer to Record of Borehole 17-10		0.00								
4			End of Borehole		86.14	1	TP	РН					
6													
8													
9													

DEPTH SCAL 1:50

MIS-BHS 001 1658448.GPJ GAL-MIS.GDT 10/10/17 JM

CHECKED: SAT

1:50

RECORD OF BOREHOLE: 17-11

SHEET 1 OF 1

CHECKED: SAT

LOCATION: N 5013297.0 ;E 368157.3

BORING DATE: January 17, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm PENETRATION TEST HAMMER, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 80 NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - O WATER CONTENT PERCENT BLOWS/0. DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE 90.58 TOPSOIL - (ML) sandy SILT; dark brown; non-cohesive (CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff SS 6 2 2 SS 0 2 (CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff SS 4 Power Auger 2 SS 0 200 >96 -(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, stiff SS 0 Ф (ML) sandy SILT, some gravel; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, 5.33 SS 69 0 very dense End of Borehole 1658448.GPJ GAL-MIS.GDT 10/10/17 9 10 MIS-BHS 001 DEPTH SCALE LOGGED: PAH Golder

RECORD OF BOREHOLE: 17-12

SHEET 1 OF 1

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

LOCATION: N 5013161.9 ;E 367790.1

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: January 20, 2017

DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 80 NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - O WATER CONTENT PERCENT BLOWS/0. DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE 89.76 TOPSOIL - (SM) SILTY SAND; dark 0.00 brown; non-cohesive (SM) SILTY SAND; grey brown; non-cohesive, moist 89.15 (CI/CH) SILTY CLAY to CLAY; red brown and grey brown, fissured (WEATHERED CRUST); cohesive, 2 SS 5 w>PL, very stiff 3 SS 5 2 (CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); 2.13 ∇ SS 2 0 cohesive, w>PL, very stiff Power Auger (CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff 2 SS 5 >96 ->96+ (Cl/CH) SILTY CLAY to CLAY; grey with black mottling; cohesive, w>PL, firm ss wh End of Borehole WL in open borehole at 2.35 m depth below ground surface upon completion of drilling 1658448.GPJ GAL-MIS.GDT 10/10/17 9 10 MIS-BHS 001 DEPTH SCALE LOGGED: PAH Golder 1:50 CHECKED: SAT

RECORD OF BOREHOLE: 17-12A

BORING DATE: January 23, 2017

LOCATION: N 5013162.0 ;E 367790.0 DATUM: Geodetic DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER BLOWS/0.30m STRATA PLOT 80 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp ⊢ (m) GROUND SURFACE 89.76 For soil stratigraphy refer to Record of Borehole 17-12 2 Power Auger n Diam. (Hollow ∇ 200 TP PH 0 С 84.73 5.03 End of Borehole WL in open borehole at 2.35 m depth below ground surface upon completion of drilling 8 MIS-BHS 001 1658448.GPJ GAL-MIS.GDT 10/10/17 JM 9 10

Golder

DEPTH SCALE 1:50

LOGGED: PAH CHECKED: SAT

SHEET 1 OF 1

1:50

RECORD OF BOREHOLE: 17-13

SHEET 1 OF 1

CHECKED: SAT

LOCATION: N 5013287.2 ;E 367889.6

BORING DATE: January 20, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm PENETRATION TEST HAMMER, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 80 NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - O WATER CONTENT PERCENT BLOWS/0. DESCRIPTION DEPTH -OW Wp ⊢ (m) GROUND SURFACE 90.32 TOPSOIL - (SM) SILTY SAND; dark 0.00 brown; non-cohesive 90.09 (SP) SAND, some non-plastic fines; grey brown; non-cohesive, moist 1 GRAB 89.59 0.73 (CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); 2 SS ∇ cohesive, w>PL, very stiff C(I/CH) SILTY CLAY to CLAY; red brown and grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff 3 SS 4 2 (CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); 2 13 SS 2 cohesive, w>PL, very stiff to stiff Power Auger 87.20 3.12 (CI/CH) SILTY CLAY to CLAY; grey, 2 5 SS contains silty fine sand seams; cohesive, w>PL, firm Ф + ss wh Ф End of Borehole WL in open borehole at 1.00 m depth below ground surface upon completion of drilling 1658448.GPJ GAL-MIS.GDT 10/10/17 9 10 MIS-BHS 001 DEPTH SCALE LOGGED: PAH Golder

RECORD OF BOREHOLE: 17-14

SHEET 1 OF 1

LOCATION: N 5013422.4 ;E 367850.2

BORING DATE: January 19, 2017

DATUM: Geodetic
PENETRATION TEST HAMMER, 64kg; DROP, 760mm

SAMPLER HAMMER, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - O WATER CONTENT PERCENT BLOWS/0. DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE 90.50 TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive 90.20 (SM) SILTY SAND; brown, contains clayey silt seams; non-cohesive, wet, SS 8 ∇ 89.20 1.30 (CI/CH) SILTY CLAY to CLAY; red brown and grey brown, contains silty fine sand seams, fissured (WEATHERED SS 2 3 CRUST); cohesive, w>PL, very stiff >96 ->96+ (CI/CH) SILTY CLAY to CLAY; grey, Power Auger contains silty fine sand seams; cohesive, w>PL, firm SS 1 3 (Cl/CH) SILTY CLAY to CLAY; grey with black mottling; cohesive, w>PL, firm Φ ss wh End of Borehole WL in open borehole at 1.00 m depth below ground surface upon completion of drilling 1658448.GPJ GAL-MIS.GDT 10/10/17 9 10 MIS-BHS 001 DEPTH SCALE LOGGED: PAH Golder 1:50 CHECKED: SAT

RECORD OF BOREHOLE: 17-14A

LOCATION: N 5013422.0 ;E 367850.0 BORING DATE: January 20, 2017

SHEET 1 OF 1 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT BLOWS/0.30m 80 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp 🛏 (m) GROUND SURFACE 90.50 For soil stratigraphy refer to Record of Borehole 17-14 Native Backfill Power Auger n Diam. (Hollow 2 200 Bentonite Seal Silica Sand TP PH Standpipe End of Borehole WL in Standpipe at Elev. 89.78 m on Jan. 30, 2017 5 MIS-BHS 001 1658448.GPJ GAL-MIS.GDT 10/10/17 JM 9 10 DEPTH SCALE LOGGED: PAH Golder

1:50

CHECKED: SAT

RECORD OF BOREHOLE: 17-15

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5013372.2 ;E 368018.8

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: January 20, 2017

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

SA	IVIFL	ER HAMMER, 64kg; DROP, 760mm															SIDA	VIIVIER,	64kg; DROP, 760mm	
-E	ДОР	SOIL PROFILE			SA	MPL	.ES	DYNAN RESIS	/IC PENET	TRATIC	0.3m	/	HYDR	AULIC C k, cm/s	ONDUCT	TIVITY,		L G	DIEZOMETED	
DEPTH SCALE METRES	BORING METHOD		LOT		~		30m	2				0 `	1			0 ⁻⁴ 1	0 ⁻³	ADDITIONAL LAB. TESTING	PIEZOMETER OR	
PTH	ING	DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.30m		R STRENG	TH n	at V. +	Q - •			ONTENT	PERCE		DOITI B. TE	STANDPIPE INSTALLATION	
DE	BOR		STRA	(m)	N	-	3100							p ——	- OW		WI	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\		
		GROUND SURFACE	0)	90.66				2	0 40	6	8 0	0	2	20 4	10 6	80 08	30			\dashv
<u> </u>		TOPSOIL - (SM) SILTY SAND; dark	EEE	0.00 90.43	1	GRAI														╡
-		brown; non-cohesive (SP) SAND, fine, some non-plastic fines;	zzz: V	0.23 90.25		1														1
		brown; non-cohesive, moist (CI/CH) SILTY CLAY to CLAY; red		0.41																}
-		brown to grey brown, contains silty fine sand seams, fissured (WEATHERED																		1
- - 1		CRUST); cohesive, w>PL, very stiff to			2	SS	4												∇	4
-		stiff																		1
																				}
_					3	SS	4													4
-																				1
<u> </u>																				3
								Ф				+								}
-												>96+								‡
				87.7 <u>6</u>																1
- - 3		(CI/CH) SILTY CLAY to CLAY, some sand; grey with black mottling, contains		2.90		1														-
Ė		silty fine sand seams; cohesive, w>PL,			4	ss	2													‡
Ė		nrm to stirr				-														- [
	uger							Ф		+										}
- - 4	Power Auger							•		'										4
-	A									+										1
	8					ł														1
-					5	ss	WH													4
					-															1
— 5 - -																				3
-								Φ		+										1
-										+										1
																				3
— 6 –																				Ⅎ
-					6	SS	WH													4
																				-
_																				1
- - 7											+									4
											+									- [
ļ.											+									1
-				82.89																1
- - 8		End of Borehole		7.77															WL in open	3
- "																			WL in open borehole at 1.00 m depth below ground surface	1
-																			ground surface upon completion of drilling	1
																				1
-																				4
— 9 -																				4
																				3
-																				4
-																				4
- 10																				\exists
																				\dashv
DE	PTH	SCALE						Â		12 -	_							L	OGGED: PAH	
1:									Go Asso	idei Ocia	tes								ECKED: SAT	
										, LIC	a LU									_

MIS-BHS 001 1658448.GPJ GAL-MIS.GDT 10/10/17 JM 1:50

1:50

RECORD OF BOREHOLE: 17-16

SHEET 1 OF 1

CHECKED: SAT

LOCATION: N 5013504.1 ;E 367981.5

BORING DATE: January 19, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm PENETRATION TEST HAMMER, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 80 NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - O WATER CONTENT PERCENT BLOWS/0. DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE 90.43 TOPSOIL - (ML) sandy SILT; dark 0.00 1 brown; non-cohesive 90.18 (SM) SILTY SAND; brown, contains 2 clayey silt seams; non-cohesive, wet ∇ (CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff 0.76 3 SS 2 (CI/CH) SILTY CLAY to CLAY; red brown and grey brown, fissured (WEATHERED CRUST); cohesive, SS 2 w>PL, very stiff 2 >96 + >96 + (CI/CH) SILTY CLAY to CLAY; grey with black mottling; cohesive, w>PL, stiff to Power ss wh 000 Ф SS WH End of Borehole WL in open borehole at 0.60 m depth below ground surface upon completion of drilling 1658448.GPJ GAL-MIS.GDT 10/10/17 9 10 MIS-BHS 001 DEPTH SCALE LOGGED: PAH Golder

MIS-BHS 001 1658448.GPJ GAL-MIS.GDT 10/10/17 JM

RECORD OF BOREHOLE: 17-17

SHEET 1 OF 1

DATUM: Geodetic

LOCATION: N 5013432.3 ;E 368131.3

BORING DATE: January 17, 2017

SA	MP	LEF	R HAMMER, 64kg; DROP, 760mm													PE	NETR	ATIO	N TE	ST HA	MMER,	64kg; DROP, 760mm
 "	5	3	SOIL PROFILE			SAM	PL	ES	DYN/ RESI	AMIC PE STANCE	NETR	RATIO	N).3m	7	HYDRA	ULIC C		CTIVI	TY,		-15	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD			STRATA PLOT	ELEV.	Ä	ا ي	BLOWS/0.30m		20	40 NOT	60		30	10		I0 ⁻⁵ CONTEI	10-4		0 ⁻³	ADDITIONAL LAB. TESTING	OR STANDPIPE
DEPT ME	Nac		DESCRIPTION	RATA	DEPTH (m)	NUMBER	<u> </u>	/SMO	Cu, k	Pa	ENGII	re	m V. \oplus	Q - • U - O	Wp		ONTE			WI	ADD LAB.	INSTALLATION
	_ a	_	GROUND SURFACE	S	90.44			B		20	40	60) 8	0	20)	40	60	8	30		
_ 0 _		\Box	TOPSOIL - (ML) CLAYEY SILT; dark brown; non-cohesive		0.00 0.15																	-
-			(CI/CH) SILTY CLAY to CLAY; red		0.15																	=
- -			brown and grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff																			<u> </u>
- - - 1						1 :	ss	7														- <u></u> -
- - -					89.07																	- -
-		f	(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND, fine;		1.37																	=
-			grey brown (WEATHERED CRUST); cohesive, w>PL, stiff to very stiff			2	ss	2														=
- - -		إ				3 5	ss	2														- -
- - -		w Stem)			87.70		, u	_														=
- - - 3	Power Auger	200 mm Diam. (Hollow	(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, firm		2.74																	<u>-</u>
-	Powe	m Dian				4 :	ss	WH														-
_		200 m																				=
- - -									⊕	+												- -
4 4		1	(CL/CI) SILTY CLAY to CLAY; grey with black mottling, contains clayey silt		86.48 3.96							+										-
-			seams; cohesive, w>PL, stiff									Ì										-
-																						=
						5 ;	ss	WH														=
— 5 - -																						
- - -									0				+									- - -
- - -													+									- -
- - 6		+	End of Borehole	3332	84.50 5.94								+									<u>-</u>
-																						WL in open borehole at 0.80 m
- -																					1	depth below ground surface upon completion of
-																						drilling
— 7 -																						
- - -																						- -
-																						=
- - 8																						<u>-</u>
_																						=
- - -																						=
- - -																						- - -
— 9 -																						_
-																						=
- - -																						=
- - - 10																						
DE	PTI	H S	CALE								اماد	dow	,								LO	OGGED: PAH
1:	50								V	As	SO(cia	tes_								СН	ECKED: SAT

RECORD OF BOREHOLE: 17-17A

BORING DATE: January 17, 2017 LOCATION: N 5013432.0 ;E 368131.0

SHEET 1 OF 1 DATUM: Geodetic

S	ТНОБ	SOIL PROFILE		1	SA	MPLE		DYNAMIC PENETRAT RESISTANCE, BLOW		HYDRAULIC CONDU		ING	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 L L SHEAR STRENGTH Cu, kPa		WATER CONTEN	V WI	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
	Ф	ODOLIND CLIDEACE	S			i	<u></u>	20 40	60 80	20 40	60 80		
- 0		GROUND SURFACE For soil stratigraphy refer to Record of Borehole 17-17		90.44			-						
- 1	Stem)												
- 2	Power Auger 200 mm Diam. (Hollow Stem)												
- 3				00.70	1	TP F	РН						
- 4		End of Borehole		86.78 3.66									
- 5													
6													
7													
- 8													
- 9													
- 10													
DE 1:		SCALE					(Golde	er er				OGGED: PAH

1:50

RECORD OF BOREHOLE: 17-18

SHEET 1 OF 1

CHECKED: SAT

LOCATION: N 5013586.9 ;E 368115.5

BORING DATE: January 19, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm PENETRATION TEST HAMMER, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD ADDITIONAL LAB. TESTING DEPTH SCALE METRES PIEZOMETER STRATA PLOT 80 NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - O WATER CONTENT PERCENT BLOWS/0. DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE 90.69 TOPSOIL - (ML) sandy SILT; dark brown; non-cohesive 90.39 (CI/CH) SILTY CLAY to CLAY; red brown and grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff SS 5 0 ∇ 89.01 2 SS 2 (CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff to stiff Ф >96 + (CI/CH) SILTY CLAY to CLAY, some sand; grey with black mottling, contains silty fine sand seams; cohesive, w>PL, SS 2 0 + ss wh (CI/CH) SILTY CLAY to CLAY; grey with black mottling, contains clayey silt seams; cohesive, w>PL, stiff Ф SS 2 Ф End of Borehole WL in open borehole at 1.00 m depth below ground surface upon completion of drilling 1658448.GPJ GAL-MIS.GDT 10/10/17 9 10 MIS-BHS 001 DEPTH SCALE LOGGED: PAH Golder

LOCATION: N 5013586.9 ;E 368115.5

RECORD OF BOREHOLE: 17-18A

BORING DATE: January 19, 2017

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT BLOWS/0.30m 80 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp **⊢** (m) GROUND SURFACE 90.69 For soil stratigraphy refer to Record of Borehole 17-18 Native Backfill Power Auger n Diam. (Hollow 2 200 Silica Sand TP PH С Standpipe End of Borehole WL in Standpipe at Elev. 90.39 m on Jan. 30, 2017 5 MIS-BHS 001 1658448.GPJ GAL-MIS.GDT 10/10/17 JM 9 10 LOGGED: PAH

Golder

DEPTH SCALE 1:50

CHECKED: SAT

SHEET 1 OF 1

DATUM: Geodetic

RECORD OF BOREHOLE: 17-19

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5013512.2 ;E 368260.2

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: January 17, 2017

ا . ا	194	SOIL PROFILE	1.		SA	MPL		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	₽ PIEZOMETE
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV.	NUMBER	TYPE	BLOWS/0.30m	20 40 60 80 SHEAR STRENGTH nat V. + Q - ●	10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³ WATER CONTENT PERCENT	OR STANDPIP
∑	ORIN	DESCRIPTION	TRAT,	DEPTH (m)	NOM		LOWS	Cu, kPa rem V. ⊕ U - O	Wp I WI	NSTALLATION INSTALLATION
	В	GROUND SURFACE	S			\vdash	В	20 40 60 80	20 40 60 80	
0		TOPSOIL - (ML) sandy SILT to CLAYEY SILT; dark brown; non-cohesive (CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST);		91.35 0.00 91.15 0.20						
1		cohesive, w>PL, very stiff			1	ss	4			Σ
				89.37	2	ss	3			
2	(ii	(CI/CH) SILTY CLAY to CLAY, some clayey silt seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		1.98				>96+		
3	ver Auger m. (Hollow Stem)				3	SS	3			
	Power Auger 200 mm Diam. (Hollow				4	SS	3			
4								>96 +		
		(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, firm		86.78 4.57	5	SS	1			
5		(SM) gravelly SILTY SAND; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact		86.24 5.11						
6		End of Borehole		85.25 6.10	6	SS	24			
7										WL in open borehole at 1.00 m depth below ground surface upon completion of drilling
•										
8										
9										
10										
DE	PTH:	SCALE		<u> </u>				Golder		LOGGED: PAH

RECORD OF BOREHOLE: 17-20

SHEET 1 OF 1

LOCATION: N 5013674.4 ;E 368246.4 SAMPLER HAMMER, 64kg; DROP, 760mm BORING DATE: January 18, 2017

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DATUM: Geodetic

릴	SOIL PROFILE	I L		SA	MPL		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY k, cm/s	Y, BA	PIEZOMETER
BORING MEI HOD	DESCRIPTION	STRATA PLO	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30rr	SHEAR STRENGTH nat V. + Q - • WATER CONTENT PE Cu, kPa rem V. + U - O Wp - O Wp		OR STANDPIPE INSTALLATION
	GROUND SURFACE		92.23					<u> </u>	
	TOPSOIL - (SM) SILTY SAND; dark			1	GRAE	-			
•	(SM) SILTY SAND; grey brown; non-cohesive, wet, loose		0.25						Σ
-	(SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense		91.32 0.91	2	SS	11			
	compact to dense			3	ss	26			
w Stem)				4	ss	50			
200 mm Diam. (Hollo				5	ss	32			
				6	ss	25			
			97.05	7	ss	11			
•	(SM/GM) SILTY SAND and GRAVEL; grey; non-cohesive, wet, compact		5.18	8	ss	15			
			86.13						
	End of Borehole		6.10						WL in open borehole at 0.61 m depth below ground surface upon completion of drilling
	w Stem)	GROUND SURFACE TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive (SM) SILTY SAND; grey brown; non-cohesive, wet, loose (SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense	GROUND SURFACE TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive (SM) SILTY SAND; grey brown; non-cohesive, wet, loose (SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense	GROUND SURFACE TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive (SM) SILTY SAND; grey brown; non-cohesive, wet, loose (SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense (SM/GM) SILTY SAND and GRAVEL; grey; non-cohesive, wet, compact	GROUND SURFACE TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive (SM) SILTY SAND; grey brown; non-cohesive, wet, loose (SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense (SM) GROUND SURFACE (SM) GROUND SILTY SAND; grey brown; non-cohesive, wet, compact to dense (SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense (SM) GROUND SILTY SAND and GRAVEL; grey; non-cohesive, wet, compact (SM/GM) SILTY SAND and GRAVEL; grey; non-cohesive, wet, compact 8 8 86.13	GROUND SURFACE TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive (SM) SILTY SAND; grey brown; non-cohesive, wet, loose (SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense (SM) SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense (SM) Gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense (SM) Gravelly SILTY SAND and GRAVEL; grey; non-cohesive, wet, compact (SM/GM) SILTY SAND and GRAVEL; grey; non-cohesive, wet, compact 8 SS	GROUND SURFACE TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive (SM) SILTY SAND; grey brown; non-cohesive, wet, loose (SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense (SM) GROUND SURFACE (SM) SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense (SM) GROUND SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense (SM) GROUND SILTY SAND and GRAVEL; grey; non-cohesive, wet, compact (SM/GM) SILTY SAND and GRAVEL; grey; non-cohesive, wet, compact 8 SS 15	GROUND SURFACE	GROUND SURPACE

MIS-BHS 001 1658448.GPJ GAL-MIS.GDT 10/10/17 JM 1:50

Associates

CHECKED: SAT

RECORD OF BOREHOLE: 17-21

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5013613.9 ;E 368382.0

BORING DATE: January 18, 2017

S	ТНОР	SOIL PROFILE	<u> </u>		AMPLI		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	ING ING	PIEZOMETER
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	_ =	TYPE	BLOWS/0.30m	20 40 60 80 SHEAR STRENGTH nat V. + Q - ● Cu, kPa U - O 20 40 60 80	10 ⁶ 10 ⁵ 10 ⁴ 10 ³ WATER CONTENT PERCENT Wp I OW I WI 20 40 60 80	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
0		GROUND SURFACE TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive (SM) SILTY SAND, some gravel; brown; non-cohesive, moist	94.66 0.00 94.46 0.23	1	GRAB	-				
1		(SM/GM) SILTY SAND and GRAVEL; grey brown, contains cobbles and boulders; non-cohesive, moist, dense to very dense	93.90		ss	>50				Native Backfill
2				3	ss	47		0		Bentonite Seal
				4	ss	81				abla
3	Stem)	(SM) SILTY SAND, some gravel; grey brown; non-cohesive, wet, compact	91.75 2.90	5	ss	28		0	МН	
4	Power Auger mm Diam. (Hollow Ste	(ML) sandy SILT, some gravel; grey brown, contains cobbles and boudlers (GLACIAL TILL); non-cohesive, wet, compact	3.5	6	ss	17				
5	200 г			7	ss	21				Native Backfill
		(SM) gravelly SILTY SAND; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact	89.5 5.10		ss	12		0	МН	
6				9	ss	18				
7		(SM) SILTY SAND; grey; non-cohesive, wet, compact	87.60 7.0°							
8		End of Borehole	86.7		ss	15		d		Standpipe 3
9										WL in Standpipe at Elev. 92.15 m on Jan. 30, 2017
10										
DE	PTH S	CALE					Golder		L	OGGED: PAH

RECORD OF BOREHOLE: 17-22

SHEET 1 OF 1

DATUM: Geodetic

LOCATION: N 5013759.1 ;E 368386.0

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: January 24, 2017

» F	HOH		SOIL PROFILE	1 -		SA	MPL		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	NG PE	PIEZOMETER
METRES	BORING METHOD	ONING ME	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 60 80 SHEAR STRENGTH nat V. + Q - ● Cu, kPa rem V. ⊕ U - O	10 ⁶ 10 ⁵ 10 ⁴ 10 ³ WATER CONTENT PERCENT Wp	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
\dashv	ă	1	CDOUND CURE A CE	ST				В	20 40 60 80	20 40 60 80	++	
0	_	\dashv	GROUND SURFACE TOPSOIL - (ML) CLAYEY SILT; dark	EEE	91.97 0.00						++	
1			brown; non-cohesive (CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		91.74 0.23	1	SS	5				
2	Power Auger	Jiam. (Hollow Stem)	(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		90.60 1.37 89.99	2	SS	4				
	۵.	200 mm [(ML) sandy SILT, some gravel; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact		1.98	3	ss	17				
3			(SM) SILTY SAND, some gravel; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact		88.92 3.05 88.31	4	ss	10				
5	DCPT	Open Hole	Probable Glacial Till		3.66							
6			End of Borehole End of DCPT		85.57 6.40							
8												
9												
DE	PTI	H S	CALE						Golder		LOG	GED: PAH

RECORD OF BOREHOLE: 17-23

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5013679.9 ;E 368527.7

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: January 25, 2017

ا ہے	로	SOIL PROFILE		SAMPLE			DYNAMIC PENETR RESISTANCE, BLC	WS/0.3m	λ,	k, cn	CONDUCTIVI n/s	무일	PIEZOMETER		
METRES	BORING METHOD				ER	,,,	BLOWS/0.30m	20 40 60 80			10 ⁻⁶	10 ⁻⁵ 10 ⁻⁴	ADDITIONAL LAB. TESTING	OR STANDPIPE	
ME	RING	DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	WS/C	SHEAR STRENGTI Cu, kPa	l nat V rem V. 6	+ Q - ● Ð U - O	1	CONTENT PE		AB. T	INSTALLATION
נ	BO		STR	(m)	Ż		BLO	20 40		80	Wp 20	40 60	I WI 80	"	
0		GROUND SURFACE		92.56											
Ü		TOPSOIL - (ML) CLAYEY SILT; dark brown; non-cohesive		0.00	1	GRAE	-								
		(CI/CH-ML and SM) SILTY CLAY.		92.26 0.30		1									
		CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST);													
		cohesive, w>PL, very stiff			2	SS	_								
1						55	5								
		(CI/CH) SILTY CLAY to CLAY; grey		91.34 1.22											
		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff													
	Stem)	`			3	SS	4								
2	ger														
	Mer Au									. 00 1					
	Po									>96 +					
	Power Auger									>96+					
	'			89.6 <u>6</u> 2.90											
3		(CI/CH) SILTY CLAY to CLAY; grey, contains clayey silt seams; cohesive,		2.90		000									
		w>PL, stiff			4	SS	1								
						1									
								Φ	#						
4															
				88.22						+					
		End of Borehole Auger Refusal	1	4.34											
		Auger Relusar													
5															
ŭ															
6															
7															
8															
9															
10															
10															
		1	-1								1 1				
DE	PTH	SCALE					- 1	Gold	law					LO	GED: PAH

RECORD OF BOREHOLE: 17-23A

LOCATION: N 5013679.9 ;E 368527.7 BORING DATE: January 25, 2017

SHEET 1 OF 1 DATUM: Geodetic

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER BLOWS/0.30m STRATA PLOT 10⁻⁵ NUMBER STANDPIPE INSTALLATION TYPE ELEV. SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp ⊢ (m) GROUND SURFACE 92.56 For soil stratigraphy refer to Record of Borehole 17-23 Open Hole 2 DCPT End of Borehole DCPT Refusal 5 8 MIS-BHS 001 1658448.GPJ GAL-MIS.GDT 10/10/17 JM 9 10 Golder

DEPTH SCALE 1:50

LOGGED: PAH CHECKED: SAT

RECORD OF BOREHOLE: 17-24

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5013840.9 ;E 368514.0

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: January 24, 2017

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

, F	ДОН.	SOIL PROFILE						DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m	HYDRAULIC CONDUCTIVITY, k, cm/s	NG NG	PIEZOMETER
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 60 80 SHEAR STRENGTH nat V. + Q - ● Cu, kPa rem V. ⊕ U - ○	10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³ WATER CONTENT PERCENT Wp OW WI	ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
\dashv	ш	GROUND SURFACE	S			\vdash	B	20 40 60 80	20 40 60 80	++	
0		TOPSOIL - (ML) sandy SILT; dark brown; non-cohesive (CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST):		92.58 0.00 92.31 0.27							
1		cohesive, w>PL, very stiff			1	SS	4				
2		(CI/CH) SILTY CLAY to CLAY; grey		90.60 1.98	2	SS	2		0		
	Stem)	(CI/CH) SILTY CLAY to CLAY; grey brown, slightly fissured (WEATHERED CRUST); cohesive, w>PL, stiff			3	SS	1		0		
3	Power Auger 200 mm Diam. (Hollow St	(CI/CH) SILTY CLAY to CLAY; grey, contains silty fine sand seams; cohesive, w>PL, firm to stiff		89.53 3.05	4	SS	WH				
4	200 m							+ +			
5					5	SS	WH		0		
6		/ML) sandy SILT some gravel: grey		86.33 6.25	6	SS	3	+			
7		(ML) sandy SILT, some gravel; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, very loose End of Borehole Auger Refusal		1							
8											
9											
10											
DE	PTH:	SCALE						Golder Associates		LOG	GED: PAH

RECORD OF BOREHOLE: 17-24A

LOCATION: N 5013841.0 ;E 368514.0 BORING DATE: January 24, 2017 DATUM: Geodetic DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT BLOWS/0.30m 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp 🛏 (m) GROUND SURFACE 92.58 For soil stratigraphy refer to Record of Borehole 17-24 Native Backfill Bentonite Seal Standpipe TP PH - 0 С End of Borehole WL in Standpipe at Elev. 91.78 m on Jan. 30, 2017 MIS-BHS 001 1658448.GPJ GAL-MIS.GDT 10/10/17 JM 9 10

Golder

DEPTH SCALE 1:50

LOGGED: PAH CHECKED: SAT

SHEET 1 OF 1

RECORD OF BOREHOLE: 17-25

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5013760.8 ;E 368661.4 SAMPLER HAMMER, 64kg; DROP, 760mm BORING DATE: January 25, 2017

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

, L	Į.		SOIL PROFILE	1_	1	SA	MPL		DYNAMIC PENE RESISTANCE, B	LOWS		λ,		cm/s			AL NG	PIEZOMETER
METRES	DODING METHOD	ا <u>ا</u> و	F=200:==	STRATA PLOT	ELEV.	3ER	Ж	BLOWS/0.30m	20 40 SHEAR STRENG			30 · •	10 ⁻⁶ WATE	10 ⁻⁵ R CONTE	10 ⁻⁴ NT PER	10 ⁻³	ADDITIONAL LAB. TESTING	OR STANDPIPE
Ē) NIGC		DESCRIPTION	RATA	DEPTH (m)		TYPE	OWS,	SHEAR STRENC Cu, kPa	r	em V. \oplus	ŭ- 0	Wp I	C	W	—I WI	ADD LAB.	INSTALLATION
	à		GROUND SURFACE	ST				В	20 40	6	0 8	30	20	40	60	80		
0		Н	TOPSOIL - (ML) sandy SILT; dark	 EEE	93.17													
		╽┟	brown; non-cohesive (CI/CH-ML and SM) SILTY CLAY,		92.92 0.25													$\bar{\Sigma}$
			CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST);															
			cohesive, w>PL, very stiff															
1						1	SS	6										
		╽┟	(CI/CH) SILTY CLAY to CLAY; grey		91.95 1.22													
		Ê	(CI/CH) SILTY CLAY to CLAY; grey brown, contains clayey silt seams, fissured (WEATHERED CRUST);															
	L	w Ste	cohesive, w>PL, very stiff			2	SS	5										
2	Power Auger	. (Holk																
	Powe	200 mm Diam. (Hollow Stem)																
		200 mr				3	SS	5										
						E												
3																		
						4	SS	2										
			(ML) sandy SILT, some gravel; grey,		89.33 3.84	-						>96 +						
4			contains cobbles and boulders (GLACIAL TILL): non-cohesive wet		88.98	5	ss	>50										
			very dense End of Borehole	4	4.19													WI in onen
			Auger Refusal															WL in open borehole at 0.30 m depth below
_																		ground surface upon completion of drilling
5																		ag
6																		
Ü																		
7																		
8																		
9																		
10																		
DF	PT	H S	CALE					4									LC	OGGED: PAH
	50								JAGO ASSO	ldei	tac							ECKED: SAT

1:50

RECORD OF BOREHOLE: 17-26

SHEET 1 OF 1

CHECKED: SAT

LOCATION: N 5013917.4 ;E 368640.0

BORING DATE: January 25, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm PENETRATION TEST HAMMER, 64kg; DROP, 760mm DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT 80 NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - O WATER CONTENT PERCENT BLOWS/0. DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE 93.09 TOPSOIL - (ML) CLAYEY SILT; dark 0.00 92.86 tory: content of the ∇ SS 5 3 SS 4 2 Ф Power Auger (CI/CH) SILTY CLAY to CLAY; grey, contains clayey silt seams; cohesive, 3.05 SS 1 200 w>PL, stiff + (SP) SAND; grey brown; non-cohesive, wet, compact SS 11 88.52 4.57 (SM) gravelly SILTY SAND; brown, contains cobbles and boulders; non-cohesive, wet, compact to very 6 SS >50 End of Borehole Auger Refusal WL in open borehole at 0.50 m depth below ground surface upon completion of drilling 1658448.GPJ GAL-MIS.GDT 10/10/17 9 10 MIS-BHS 001 DEPTH SCALE LOGGED: PAH Golder

RECORD OF BOREHOLE: 17-27

SHEET 1 OF 2

DATUM: Geodetic

LOCATION: N 5013836.4 ;E 368790.7

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: January 25-26, 2017

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

٠, ۲		SOIL PROFILE	1 -	1	SA	MPLE		DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m		k, cm/s	Y, R	PIEZOMETER
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	20 40 60 SHEAR STRENGTH nat V. Cu, kPa rem V	80	10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ WATER CONTENT PER Wp I OW 20 40 60	TANDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
0		GROUND SURFACE		93.85								
1	er Iow Stem)	TOPSOIL - (CL) SILTY CLAY; dark brown; cohesive (CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.00 93.65 0.20	1	SS	6					∇
2	Power Auger 200 mm Diam. (Hollow Stem)	(SM) gravelly SILTY SAND; brown, contains cobbles and boulders; non-cohesive, wet, loose		92.02 1.83	2	ss	4			0		Native Backfill
-					3	ss	8			φ	МН	
3	Rotary Drill NW Tricone			90.57	4	RC	DD					
		Borehole continued on RECORD OF DRILLHOLE 17-27	D.MAC	3.28								6221
4												
5												
6												
7												
8												
9												
10												
	DTI (SCALE		•	•			H Golder Associate	•			.OGGED: PAH

1:50

LOCATION: N 5013836.4 ;E 368790.7

RECORD OF DRILLHOLE: 17-27

DRILLING DATE: January 25-26, 2017

SHEET 2 OF 2

CHECKED: SAT

DATUM: Geodetic

DRILL RIG: CME 850

INCLINATION: -90° AZIMUTH: ---DRILLING CONTRACTOR: CCC BD - Bedding FO - Foliation CO - Contact OR - Orthogonal CL - Cleavage JN - Joint FLT - Fault SHR- Shear VN - Vein CJ - Conjugat PL - Planar CU- Curved UN- Undulating ST - Stepped IR - Irregular PO- Polished
K - Slickensided
SM- Smooth
Ro- Rough
MB- Mechanical Break

BR - Broken Rock
NOTE: For additional abbreviations refer to lis of abbreviations & symbols. DRILLING RECORD DEPTH SCALE METRES SYMBOLIC LOG ELEV. DESCRIPTION FRACT. INDEX PER 0.25 m RUN DEPTH RECOVERY DISCONTINUITY DATA Diametra Point Loa Index (MPa) R.Q.D. % DIP w.r.t. CORE AXIS (m) 0000 8848 BEDROCK SURFACE 90.57 Fresh, thinly to medium bedded, grey, fine grained LIMESTONE BEDROCK Rotary Drill Native Backfill Bentonite Seal 2 Silica Sand Rotary Drill ğ Standpipe 00 3 87.24 6.61 End of Drillhole WL in Standpipe at Elev. 93.05 m on Jan. 30, 2017 10 11 MIS-RCK 004 1658448.GPJ GAL-MISS.GDT 10/10/17 JM 12 13 Golder DEPTH SCALE LOGGED: PAH

LOCATION: N 5013836.4 ;E 368790.7

RECORD OF BOREHOLE: 17-27A

BORING DATE: January 25, 2017 DATUM: Geodetic

SHEET 1 OF 1

CHECKED: SAT

DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER BLOWS/0.30m STRATA PLOT 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE SHEAR STRENGTH nat V. + Q - ● rem V. ⊕ U - ○ WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp ⊢ (m) GROUND SURFACE 93.85 For soil stratigraphy refer to Record of Borehole 17-27 90.41 138 End of Borehole DCPT Refusal MIS-BHS 001 1658448.GPJ GAL-MIS.GDT 10/10/17 JM 9 10 DEPTH SCALE LOGGED: PAH Golder 1:50

RECORD OF BOREHOLE: 17-28

SHEET 1 OF 1

DATUM: Geodetic

LOCATION: N 5013987.7 ;E 368751.8

BORING DATE: January 26, 2017

SE	=THOD	SOIL PROFILE	T.			MPLE		DYNAMIC PENE RESISTANCE, E			, ,	HYDRAULIC k, ci 10 ⁻⁶	n/s		0.3 ONAL	PIEZOMETER OR
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	SHEAR STRENCU, kPa	GTH na	at V. +	Q - • U - O		CONTEN	T PERCE	┸ —— ≥ iii	STANDPIPE INSTALLATION
0		GROUND SURFACE TOPSOIL - (ML) CLAYEY SILT; dark brown; non-cohesive (CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		93.95 0.00 93.72 0.23												✓
1	Power Auger 200 mm Diam. (Hollow Stem)				1		5									Native Backfill
2	200 mn	(SM) gravelly SILTY SAND; brown,		91.82 2.13	2	SS	6									Silica Sand
	T Aole	contains cobbles and boulders; non-cohesive, wet, compact to dense			3	SS	29			ļ						Standpipe
3	DCPT Open Hole	End of Borehole DCPT Refusal		90.75 3.20												Cave
4																WL in Standpipe at Elev. 93.65 m on Jan. 30, 2017
5																
6																
7																
8																
ŭ																
9																
10																

RECORD OF BOREHOLE: 17-29

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5013007.0 ;E 367859.2 SAMPLER HAMMER, 64kg; DROP, 760mm BORING DATE: January 23, 2017

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

4			SOIL PROFILE			SA	MPL	_	CONCE	NTRAT	IONS IPE	VAPOU PM]	R ⊕	HYDRA	AULIC Co k, cm/s	ONDUCT	IVITY,	٥ـــ	PIEZOMETER
METRES		BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	VAPOL	PACE C R CONO ND = No	OMBUS CENTRA of Detect	TIBLE TIONS ed		W _F	ATER C		PERCEN W	ADDITIC	OR STANDPIPE INSTALLATION
0	L	\dashv	GROUND SURFACE	 	90.22														Flush Mount 4.
			FILL - Asphaltic concrete grinding and chunks		89.84	1 (GRAE	- 1	₽										Casing Bentonite Seal
1	Power Auger	200 mm Diam. (Hollow Stem)	TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive (ML) sandy SILT; grey, with black staining; non-cohesive, moist (CI/CH) SILTY CLAY to CLAY; dark grey to red grey with staining, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.38 0.46 89.46 0.76	3	SRAE	5	Ф Ф										Silica Sand Silica Sand Silica Sand Silica Sand Silica Sand Silica Sand
2		21	End of Borehole		88.09 2.13	4	SS	5	⊕										
3																			WL in Screen at Elev. 89.45 m on Jan. 30, 2017
4																			
5																			
6																			
7																			
8																			
9																			
10																			
	P	TH S	CALE								oldei ocia								OGGED: PAH

RECORD OF BOREHOLE: 17-30

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5013004.5 ;E 367889.2

BORING DATE: January 13, 2017

. I	QQ	SOIL PROFILE			SA	MPL	ES	HEADSPACE CONCENTRA	ORGANIC TIONS IP	VAPOU PM]	IR ⊕	HYDRA	ULIC CON	NDUCT	IVITY,		יט	
SES	ЛЕТН		TO_		ď		30m	HEADSPACE CONCENTRA ND = Not Det 20	cted 40 €	0 8	0	10		10)-4 1	10-3	ONAL	PIEZOMETER OR
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.30m	HEADSPACE VAPOUR CC [%LEL] ND =	COMBUS	TIBLE TIONS			TER CON	NTENT		NT WI	ADDITIONAL LAB. TESTING	STANDPIPE INSTALLATION
	BC		STF	(m)	_		BLC	[%LEL] ND =			0	20				80	\Box	
0		GROUND SURFACE		89.95												1		Flush Mount
		ASPHALTIC CONCRETE FILL - (SW-GW) SAND and GRAVEL;		0.00 0.10	\vdash	-		Ф								1		Casing Silica Sand
		dark grey brown (PAVEMENT		0.20	1	00		Ψ										
		STRŬCŤURE); non-cohesive, moist TOPSOIL - (SM) SILTY SAND, fine;			1	SS	18	⊕										Bentonite Seal
		black and grey; non-cohesive				-												Silica Sand
1	Stem)	(CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams,																[X
	N S	brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff			2	SS	7	Ф										l X
	Power Auger 200 mm Diam. (Hollow S	50.155.175, 17 1 <u>2,</u> 15.17 5a				-												50 Di DVO
	ower Diam.					1												50 mm Diam. PVC #10 Slot Screen
	m I				3	SS	3	⊕										Į.
2	200																	
																1		 경
																1		Silica Sand
					4	SS	2	Φ										Bentonite Seal
				87.05												1		,
3		End of Borehole		2.90												1		
																1		WL in Screen at
																1		WL in Screen at Elev. 89.36 m on Jan. 30, 2017
																1		,
																1		
4																		
5																1		
5																		
																1		
																1		
6																1		
																1		
																1		
																1		
																1		
7																1		
																1		
																1		
8																1		
																1		
																1		
																1		
9																1		
-																1		
																1		
10																1		

1:50

RECORD OF BOREHOLE: 17-31

SHEET 1 OF 1

CHECKED: SAT

LOCATION: N 5013000.4 ;E 367874.4

BORING DATE: January 13, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm PENETRATION TEST HAMMER, 64kg; DROP, 760mm HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected 20 40 60 80 HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT NUMBER STANDPIPE INSTALLATION ELEV. TYPE HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected BLOWS/0. WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE 90.07 Flush Mount FILL - (GP) sandy GRAVEL, angular; 0.00 GRAB Casing Silica Sand grey, contains asphalt fragments; non-cohesive, moist 89.77 CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff Bentonite Seal Silica Sand SS 5 ⊕ 2 Power Auger 50 mm Diam. PVC #10 Slot Screen 3 SS 6 ⊕ 2 Silica Sand 2 ⊕ SS Bentonite Seal End of Borehole WL in Screen at Elev. 89.44 m on Jan. 30, 2017 1658448.GPJ GAL-MIS.GDT 10/10/17 9 10 MIS-BHS 001 DEPTH SCALE LOGGED: PAH Golder

RECORD OF BOREHOLE: 17-32

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5013010.6 ;E 367910.1

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: January 13, 2017

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

Ш 	QOH.	SOIL PROFILE	1.		SA	MPL	_	CONCI	PACE OF ENTRATION Of Detected 0 40	RGANIC DNS [PF	PM]	Φ	HIDRA	k, cm/s	NDUCT	IVIIY,		NG AL	PIEZOMETER
METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH	NUMBER	TYPE	BLOWS/0.30m	HEADS	OT Detected 0 40 SPACE CO JR CONC	OMBUS	TIBLE	0		TER CO	ONTENT	PERCI		ADDITIONAL LAB. TESTING	OR STANDPIPE INSTALLATION
7	BOR		STRA	(m)	₹		BLOV	[%LEL]	ND = Noi	Detecti	ed	0	Wp 20		O 60		WI 80	F¤ Fi	
0		GROUND SURFACE		89.84													Ĭ		
U		FILL - (SM-GM) SILTY SAND and GRAVEL; brown; non-cohesive		0.00	1	GRAE	-	\oplus											
		TOPSOIL - (ML) sandy SILT; dark brown to black; non-cohesive		89.54 0.30															
	1	(CI/CH) SILTY CLAY to CLAY; grey	¹₩																
	Jac S	brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff				1													
1	er Au	cohesive, w>PL, very stiff			2	SS	7	0											
	Po																		$\bar{\Delta}$
	Power Auger																		
					3	SS	3	Φ											
2				87.7 <u>1</u>															
		End of Borehole		2.13															WL in open
																			borehole at 1.30 m depth below
																			ground surface upon completion of drilling
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			
		SCALE.						A)OOED: DA!!
DΕ	:PIH	SCALE						7 🗐 🖹	Go Asso	Idei	•							L(OGGED: PAH

RECORD OF BOREHOLE: 17-33

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5013039.4 ;E 367857.2

SAMPLER HAMMER, 64kg; DROP, 760mm

BORING DATE: January 23, 2017

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

Ш.	유	SOIL PRO				SA	MPL		CONC	SPACE (ENTRAT	IONS IPI	VAPOU PM]	IR ⊕	HYDRA	ULIC CO k, cm/s	ONDUCT	IVIIY,		NG M	PIEZOMETER
METRES	BORING METHOD	DECORPORTS:	TO IG ATAGTS		LEV.	BER	듯	BLOWS/0.30m		lot Detec 0 4 SPACE C			0	10 W) ⁻⁵ 10 ONTENT		0 ⁻³	ADDITIONAL LAB. TESTING	OR STANDPIPE
≅	SORING	DESCRIPTION	AT A GT		EPTH (m)	NUMBER	TYPE	LOWS	(%LEL	JR CON <i>ND = N</i>	CENTRA of Detect	TIONS ed		Wp	—	-OW		WI	ADD LAB.	INSTALLATION
	_	GROUND SURFACE	ν.	0				В	2	0 4	0 6	0 8	0	20) 4	0 6) {	80	+	
0	П	ASPHALTIC CONCRETE	· · · · · · · · · · · · · · · · · · ·		0.00															
		FILL - Asphaltic concrete	, blask	▓_	0.12 89.66	1 (GRAB	-	⊕											
		(ML) CLAYEY SILT; grey with staining (WEATHERED CRU cohesive, w>PL	ST);		0.33 89.38	2	GRAB	-	⊕											
	ارا	% Cohesive, w>PL ≥ (CI/CH) SILTY CLAY to CLAY	'; grev		0.61															
1	Auge	brown and red brown, fissure (WEATHERED CRUST); coh	d KA			3	SS	6	Ф											
	Power Auger	w>PL, very stiff				J	00	0	•											
	⁻ ,	E E D			88.47															
		(CI/CH-ML and SM) SILTY C CLAYEY SILT and SILTY SA	ND; grev		1.52															
2		brown (WEATHERED CRUS cohesive, w>PL, very stiff	T);			4	SS	3	⊕											
2	Ш	End of Borehole			87.86 2.13															
3																				
4																				
5																				
6																				
_																				
7																				
8																				
9																				
10																				
DE	ртн	SCALE							À										10	GGED: PAH
	50									G Ass	older	•								ECKED: SAT

RECORD OF BOREHOLE: 17-34

SHEET 1 OF 1 DATUM: Geodetic

LOCATION: N 5012981.8 ;E 367911.1 SAMPLER HAMMER, 64kg; DROP, 760mm BORING DATE: January 13, 2017

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

UND SURFACE SOIL - (ML) sandy SILT; dark n; non-cohesive 3H) SILTY CLAY to CLAY; grey n, contains silty sand seams, red (WEATHERED CRUST); sive, w>PL, very stiff	STRATA PLOT	ELEV. DEPTH (m) 89.99 0.00 89.69 0.30	2	SRAB	BLOWS/0.30m	ND = Not 200 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	ACE COMBUS CONCENTRA D = Not Detec	60 80 STIBLE ATIONS	10° WA 1 20	TER CONTE	NT PERCI	10°3 ENT WI 80	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
SOIL - (ML) sandy SILT; dark n; non-cohesive :H) SILTY CLAY to CLAY; grey n, contains silty sand seams, red (WEATHERED CRUST); sive, w>PL, very stiff		0.00 89.69 0.30	2	SS	6	Φ								
n; non-cohesive H) SILTY CLAY to CLAY; grey n, contains silty sand seams, red (WEATHERED CRUST); sive, w>PL, very stiff		89.69 0.30 87.86	2	SS	6	Φ								
of Borehole				SS	3	Φ								WI in open
of Borehole		2.13												WI in onen
														WL in open borehole at 1.06 m depth below ground surface upon completion of drilling
	1													
													Golder	

RECORD OF BOREHOLE: 17-35

SHEET 1 OF 1 BORING DATE: January 13, 2017 DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

LOCATION: N 5012965.0 ;E 367856.7

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

SA	IVII	LLIN	R HAMMER, 64kg; DROP, 760mm															SINAI	VIIVIEK,	64kg; DROP, 760mm
щ	do	3	SOIL PROFILE			SA	MPL	ES	HEAD	SPACE (SENTRAT	ORGANIC TIONS [PI ted 10 6	VAPOU PM]	IR ⊕	HYDRA	AULIC C k, cm/s	ONDUC	ΓΙVITY,		اق	DIEZOMETED
DEPTH SCALE METRES	BORING METHOD			STRATA PLOT		ď		30m	ND = I	Not Detec	ted 10 6	0 8	0	10			0-4 1	O-3	ADDITIONAL LAB. TESTING	PIEZOMETER OR
AETH 8	NG		DESCRIPTION	IA PI	ELEV.	NUMBER	TYPE	BLOWS/0.30m	HEAD	SPACE (COMBUS	TIBLE		w	ATER C	ONTENT	PERCE		1 <u>E</u> E	STANDPIPE INSTALLATION
DEF	ORII			IRAI	DEPTH (m)	Ž	-	NO.	VAPO	UR CON _] <i>ND</i> = <i>N</i>	CENTRA ot Detect	TIONS ed			· —	—⊖ ^W		WI	LAB L	iiio i/ LEZ (IIoi)
	В	-		S	()			B	:	20 4	10 6	0 8	0	2				30 T		
— о	-	- 1	GROUND SURFACE ASPHALTIC CONCRETE		90.45		<u> </u>												\vdash	
-		ſ	FILL - (SP-GP) SAND and GRAVEL, angular; grey (PAVEMENT	\bowtie	0.06 90.11	1	GRAE	-	⊕											7
_		- 1\	angular; grey (PAVEMENT \STRUCTURE); non-cohesive, moist /		0.34		1													=
F			TOPSOIL - (ML) sandy SILT; dark		89.84 0.61															=
F	er	No No	\brown; non-cohesive / (SM) SILTY SAND; grey brown, contains		0.01		ł													-
_ 1	r Aug	운	clayey silt seams; non-cohesive, wet, loose		1	2	SS	7	Φ											-
_	Power Auger		(CI/CH) SII TY CLAY to CLAY: grev		89.23 1.22															-
_		m C	(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED																	-
-			CRUST); cohesive, w>PL, very stiff																	
_						3	SS	5	⊕											_
_ 2 -		\perp			88.32															=
ļ.			End of Borehole		2.13															=
ļ.																				‡
F																				=
- - - 3																				=
L °																				3
ţ																				-
-																				-
-																				=
- 4																				4
F																				=
E																				3
_																				-
_																				-
— 5 -																				-
ļ.																				-
-																				=
-																				-
-																				=
— 6 -																				-
E																				=
																				-
ļ.																				=
_ _ 7																				_
F																				=
E																				=
E]
Ŀ]
— 8 -																				=
ļ.																				‡
ļ.																				‡
F																				= = = = = = = = = = = = = = = = = = = =
- 9																				=
_ 9]
ļ.																				=
ļ.																				-
ļ.																				=
- - 10																				4
					•		•	•		A.	•					•	•		'	
		H SC	CALE					(G	oldei ocia	r								OGGED: PAH
1:	50								V	Ass	ocia	tes							CHE	ECKED: SAT

MIS-BHS 001 1658448.GPJ GAL-MIS.GDT 10/10/17 JM



PHASE II ESA - PROPOSED RESIDENTIAL DEVELOPMENT RIVERSIDE SOUTH LANDS, OTTAWA, ONTARIO

APPENDIX B

Record of Test Pits



RECORD OF BOREHOLE: TP 17-01

LOCATION: N 5013074.7 ;E 367831.7 BORING DATE: July 21, 2017 DATUM: Geodetic

_		ı			_														
	BORING METHOD	SOIL PROFILE	T	1	SA	MPL	_	CONC	SPACE (ENTRAT Vot Detec	IONS [PF	PM]	IR ⊕		k, cm/s				NG AF	PIEZOMETER
METRES	MEI		STRATA PLOT	ELEV.	ËR	ш	BLOWS/0.30m		2	4 (B L	10				0 ⁻³	ADDITIONAL LAB. TESTING	OR STANDPIPE
ĭ	RING	DESCRIPTION	RATA	DEPTH	NUMBER	TYPE)/S//(VAPO	SPACE (UR CON] <i>ND = N</i>	CENTRA	TIONS			ATER C	ONTENT OW	PERCE	NT WI	ADDI AB. 1	INSTALLATION
	BO		STF	(m)	_		BLC	-	-			0	2				30	'-'	
0		GROUND SURFACE																	
	5	TOPSOIL/FILL - (SM) SILTY SAND, fine to coarse, trace gravel; dark brown, contains organic matter, rootlets;		0.00	1	GRAE		en en											
100	Excavator	contains organic matter, rootlets; non-cohesive, moist	XXX	0.30															
ľ	ŭ	FILL - (SW) gravelly SAND, fine to coarse, angular; black, contains asphalt;		0.52	İ														
t		\\non-cohesive, moist	WX	0.75															
1		(SM) SILTY SAND, fine, trace clay; grey brown; non-cohesive																	
		(CL/Cl) SILTY CLAY, trace sand; grey brown, highly fissured (WEATHERED CRUST); cohesive, w>PL																	
		CRUST); cohesive, w>PL																	
		End of Test Pit																	
1																			
ĺ																			
																1		1	

Golder Associates

DEPTH SCALE 1:50

MIS-BHS 001 1658448-7000.GPJ GAL-MIS.GDT 10/10/17 JEM

LOGGED: RI CHECKED: AT

SHEET 1 OF 1

RECORD OF BOREHOLE: TP 17-02

LOCATION: N 5013079.8 ;E 367848.4 BORING DATE: July 21, 2017

SHEET 1 OF 1 DATUM: Geodetic

HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected 2 4 6 8 HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT BLOWS/0.30m 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE TOPSOIL/FILL - (SM) gravelly SILTY 0.00 SAND; dark brown, contains organic matter, rootlets; non-cohesive, moist FILL - (SW) gravelly SAND, fine to coarse; dark brown to black, contains contains and properties. 0.13 1 GRAB - ⊕ asphalt; non-cohesive 0.65 (CL/Cl) SILTY CLAY, trace to some sand; grey brown, highly fissured (WEATHERED CRUST); cohesive, w>PL End of Test Pit 2 1658448-7000.GPJ GAL-MIS.GDT 10/10/17 JEM 8 9 10 MIS-BHS 001

Golder

DEPTH SCALE 1:50

LOGGED: RI CHECKED: AT

RECORD OF BOREHOLE: TP 17-03

LOCATION: N 5013066.6 ;E 367826.6 BORING DATE: July 21, 2017 DATUM: Geodetic

SHEET 1 OF 1

HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM]

ND = Not Detected
2 4 6 8 HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT BLOWS/0.30m 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE ASPHALTIC CONCRETE 0.07 FILL - (SW) gravelly SAND, fine to coarse; dark brown to black, contains asphalt, mud, concrete, brick, plastic; 1 GRAB -Ф \non-cohesive, moist (SM) SILTY SAND, fine, trace clay; grey 0.68 brown; non-cohesive, moist to wet (CL/CI) SILTY CLAY, trace sand; grey brown, highly fissured, thin laminations of silty sand (WEATHERED CRUST); cohesive, w>PL End of Test Pit 2 1658448-7000.GPJ GAL-MIS.GDT 10/10/17 JEM 8 9 10 MIS-BHS 001 LOGGED: RI

DEPTH SCALE 1:50

Golder CHECKED: AT

LOCATION: N 5013055.5 ;E 367846.2

RECORD OF BOREHOLE: TP 17-04

BORING DATE: July 21, 2017

SHEET 1 OF 1

DATUM: Geodetic

HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM]

ND = Not Detected
2 4 6 8 HYDRAULIC CONDUCTIVITY, k, cm/s SAMPLES SOIL PROFILE BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT BLOWS/0.30m 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE ASPHALTIC CONCRETE 0.00 FILL - (SW) gravelly SAND, fine to 0.14 1 GRAB coarse, angular; dark brown to black, contains asphalt; non-cohesive, moist 0.40 (ML/SM) sandy SILT, trace silty sand and clay; grey to grey brown, thin laminations of silty clay; non-cohesive, moist 0.75 (CL/Cl) SILTY CLAY, trace to some sand; grey brown, highly fissured, thin laminations of silty sand; cohesive, 1.15 End of Test Pit 2 1658448-7000.GPJ GAL-MIS.GDT 10/10/17 JEM 9 10 MIS-BHS 001 DEPTH SCALE LOGGED: RI Golder 1:50 CHECKED: AT

RECORD OF BOREHOLE: TP 17-05

LOCATION: N 5013001.8 ;E 367882.1 BORING DATE: July 21, 2017 DATUM: Geodetic

H	연	SOIL PROFILE			SA	AMPL		CONC	ENTRA	ORGANIC	C VAPOL PM]	JR ⊕	HYDRA	AULIC C k, cm/s	ONDUC	ΓΙVITY,		I'L I'G	PIEZOMETER
DEPTH SCALE METRES	BORING METHOD		STRATA PLOT		监	 	BLOWS/0.30m		1	4	1	8				1	0 ⁻³	ADDITIONAL LAB. TESTING	OR STANDPIPE
EPTH	SING	DESCRIPTION	ATA F	ELEV. DEPTH	NUMBER	TYPE	MS/0	VAPO	UR CON	COMBUS ICENTRA	TIONS		l		ONTENT W			AB. TI	INSTALLATION
□	BOI		STR	(m)	Ž		BLO			lot Detect 40 6		30		p			WI 80	"	
— 0		GROUND SURFACE																	
-		ASPHALTIC CONCRETE FILL - (SM) gravelly SILTY SAND; dark	XX	0.00															
-		brown; non-cohesive, moist		0.20	ł														
				0.50	1														
-		with black staining, contains organic matter; cohesive, w~PL																	
- 1		(SM) SILTY SAND, ine, trace clay; grey; non-cohesive, moist			1	GRA	8 -	Φ											-
		(CL/CI) SILTY CLAY, trace sand; grey brown, highly fissured, thin laminations																	
	Excavator	brown, highly fissured, thin laminations to thin beds of silty sand (WEATHERED CRUST); cohesive, w>PL																	
	M	CRUST); cohesive, w>PL																	
- 2																			_
					2	GRA	8 -	Φ											
					Ļ			_											
- 3	\vdash	End of Test Pit	1222	3.00	3	GRA	-	⊕											-
- 4																			
- 5																			-
- 6																			_
Ū																			
- 7																			_
- 8																			_
,																			
																	1		
- 9																			-
- 10																			_
10																			
		ı		1				A.	A	1						1	1		
DE	PTH S	SCALE					(G	olde	r							LC	OGGED: RI

DEPTH SCALI 1:50

MIS-BHS 001 1658448-7000.GPJ GAL-MIS.GDT 10/10/17 JEM

CHECKED: AT

SHEET 1 OF 1

RECORD OF BOREHOLE: TP 17-06 PROJECT: 1658448-7000 SHEET 1 OF 1 LOCATION: N 5013014.5 ;E 367869.6 BORING DATE: July 21, 2017 DATUM: Geodetic HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM]

ND = Not Detected
2 4 6 8 HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected WATER CONTENT PERCENT BLOWS/0. DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE FILL - (SW) gravelly SAND, angular; 0.00 dark brown to black; non-cohesive, moist 0.15 FILL - (SW) gravelly SAND, fine to coarse; brown; non-cohesive, wet TOPSOIL - (SM/ML) SILTY SAND TO sandy SILT, trace clay; dark brown, 0.35 0.45 0.65 contains organic matter; cohesive, w>PL Ф GRAB (SM) SILTY SAND, fine, trace clay; brown to grey brown; non-cohesive, (CL/CI) SILTY CLAY, trace to some sand; grey to grey brown, highly fissured, thin laminations to thin beds of silty sand (WEATHERED CRUST); cohesive, w>PL 2 GRAB Ф End of Test Pit 3.00

1658448-7000.GPJ GAL-MIS.GDT 10/10/17 JEM

MIS-BHS 001

9

Golder

10

RECORD OF BOREHOLE: TP 17-07

LOCATION: N 5012987.9 ;E 367870.3 BORING DATE: July 21, 2017 DATUM: Geodetic

	۵	SOIL PROFILE			SA	MPL	.ES	HEADSPAC CONCENTR	ORGANIC	VAPOU	R	HYDRA	AULIC C	ONDUC	ΓΙVITY,			
DEPTH SCALE METRES	BORING METHOD		то.				_	CONCENTR ND = Not De 2	ATIONS [PI rected 4 (10	k, cm/s) ⁻⁶ 1		Q ⁻⁴ 1	Q ⁻³	ADDITIONAL LAB. TESTING	PIEZOMETER OR
PTH 8	NG N	DESCRIPTION	۹. I.	ELEV.	NUMBER	TYPE	BLOWS/0.30m	HEADSPAC	E COMBUS	TIBLE		W	ATER C	ONTENT		NT	3. TES	STANDPIPE INSTALLATION
DEF	BORI		TRA	DEPTH (m)	Ž	-	SLOW	VAPOUR CO [%LEL] ND =	Not Detect	ed		Wp				WI	LAB	
		GROUND SURFACE	S				В	20	40 6	0 80)	2	0 4	10 6	80 8	30		
_ 0		ASPHALTIC CONCRETE	***	0.06														
-		FILL - (SW) gravelly SAND, sub-angular; brown (PAVEMENT STRUCTURE)	▓															-
-		TOPSOIL/FILL - (ML) sandy SILT, trace		0.36 0.45														=
_		organic matter; non-cohesive, moist		0.73														-
- - 1		(SM) SILTY SAND, fine, trace clay; grey to grey brown; non-cohesive, moist						⊕										_
-		(CL/Cl) SILTY CLAY trace to some		Ì		GRAE	-	Ψ										- -
_	ator	sand; grey brown, highly fissured, pockets of thin laminations to thin beds of silty sand (WEATHERED CRUST);																-
-	Excavator	cohesive, w>PL																-
_				}	2	GRAE	-	⊕										- -
_ 2																		-
_																		-
-																		
-																		- -
_ 	Ш				3	GRAE		Φ										<u>-</u>
-		End of Test Pit	Ī	3.10														-
-																		=
- -																		-
- - 4																		_
-																		-
-																		-
-																		-
-																		-
 5																		-
-																		-
-																		=
-																		=
6 																		_
-																		- -
-																		-
-																		-
- - - 7																		
-																		Ξ
-																		-
-																		-
-																		=
— 8 -																		-
-																		-
-																		-
-																		-
9																		
-																		=
- -																		=
-																		- -
- 10																		_
DF	РТН	SCALE															10	GGED: RI
1:									Golder Socia	tes								CKED: AT
	-							I	JULI(u CO								

MIS-BHS 001 1658448-7000.GPJ GAL-MIS.GDT 10/10/17 JEM

SHEET 1 OF 1

RECORD OF BOREHOLE: TP 17-08

SHEET 1 OF 1 LOCATION: N 5012986.5 ;E 367906.5 BORING DATE: July 21, 2017 DATUM: Geodetic HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected 2 4 6 8 HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT BLOWS/0.30m 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp -(m) GROUND SURFACE TOPSOIL - (CL) SILTY CLAY, trace sand; dark brown, contains organic matter, rootlets; cohesive, w~PL to 0.00 0.30 (CL/CI) SILTY CLAY, trace sand; grey brown, highly fissured (WEATHERED CRUST); cohesive, w>PL 1 GRAB - ⊕ End of Test Pit 1.10 2 1658448-7000.GPJ GAL-MIS.GDT 10/10/17 JEM 9 10

DEPTH SCALE 1:50

MIS-BHS 001

LOGGED: RI Golder CHECKED: AT

LOCATION: N 5013008.9 ;E 367924.4

RECORD OF BOREHOLE: TP 17-09

BORING DATE: July 21, 2017

HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected 2 4 6 8 HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT BLOWS/0.30m 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp ⊢ (m) GROUND SURFACE TOPSOIL - (CL) SILTY CLAY, trace 0.00 sand; dark brown, contains organic matter, rootlets; cohesive, w>PL to 0.25 (CL/CI) SILTY CLAY, trace sand; grey brown, highly fissured, thin laminations to thin beds of silty sand (WEATHERED CRUST); cohesive, w>PL 1 GRAB 2 GRAB - ⊕ 2 3 GRAB -End of Test Pit 3.00 1658448-7000.GPJ GAL-MIS.GDT 10/10/17 JEM 9 10 MIS-BHS 001 DEPTH SCALE LOGGED: RI Golder

1:50

CHECKED: AT

SHEET 1 OF 1

DATUM: Geodetic

LOCATION: N 5013034.1 ;E 367896.8

RECORD OF BOREHOLE: TP 17-10

SHEET 1 OF 1 BORING DATE: July 21, 2017 DATUM: Geodetic

HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected 2 4 6 8 HYDRAULIC CONDUCTIVITY, k, cm/s SOIL PROFILE SAMPLES BORING METHOD DEPTH SCALE METRES ADDITIONAL LAB. TESTING PIEZOMETER STRATA PLOT BLOWS/0.30m 10⁻⁵ NUMBER STANDPIPE INSTALLATION ELEV. TYPE HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected WATER CONTENT PERCENT DESCRIPTION DEPTH -OW Wp ⊢ (m) GROUND SURFACE TOPSOIL - (CL/CI) SILTY CLAY, trace 0.00 to some sand; dark brown, contains organic matter, rootlets; cohesive, w>PL (CL/CI) SILTY CLAY, trace to some sand; grey brown, highly fissured (WEATHERED CRUST); cohesive, w>PL 0.30 1 GRAB - 🕀 End of Test Pit 1.00 2 1658448-7000.GPJ GAL-MIS.GDT 10/10/17 JEM 8 9 10 DEPTH SCALE LOGGED: RI Golder

1:50

MIS-BHS 001

CHECKED: AT



PHASE II ESA - PROPOSED RESIDENTIAL DEVELOPMENT RIVERSIDE SOUTH LANDS, OTTAWA, ONTARIO

APPENDIX C

Laboratory Certificates of Analysis





CLIENT NAME: GOLDER ASSOCIATES LTD 1931 ROBERTSON ROAD OTTAWA, ON K2H5B7 (613) 592-9600

ATTENTION TO: Alyssa Troke

PROJECT: 1658448 - River Rd Phase 2 ESA

AGAT WORK ORDER: 17Z180001

SOIL ANALYSIS REVIEWED BY: Elizabeth Polakowska, MSc (Animal Sci), PhD (Agri Sci), Inorganic Lab

Supervisor

TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor

DATE REPORTED: Feb 10, 2017

PAGES (INCLUDING COVER): 12

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

NOTES .	

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Page 1 of 12

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



Certificate of Analysis

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

ATTENTION TO: Alyssa Troke

SAMPLED BY:

MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

5835 COOPERS AVENUE

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

O. Reg. 153(511) - Metals (Including Hydrides) (Soil)

DATE RECEIVED: 2017-01-2	0				DATE REPORTED: 2017-02
	S	SAMPLE DES	CRIPTION:	BH 17-32 SA2	
		SAM	PLE TYPE:	Soil	
		DATE	SAMPLED:	2017-01-13	
Parameter	Unit	G/S	RDL	8139183	
Antimony	μg/g	7.5	0.8	<0.8	
rsenic	μg/g	18	1	4	
Boron	μg/g	120	5	7	
3arium	μg/g	390	2	303	
Beryllium	μg/g	4	0.5	1.0	
Cadmium	μg/g	1.2	0.5	<0.5	
Chromium	μg/g	160	2	83	
Cobalt	μg/g	22	0.5	20.3	
Copper	μg/g	140	1	36	
Lead	μg/g	120	1	10	
Molybdenum	μg/g	6.9	0.5	<0.5	
Nickel	μg/g	100	1	48	
Selenium	μg/g	2.4	0.4	<0.4	
Silver	μg/g	20	0.2	<0.2	
Γhallium	μg/g	1	0.4	<0.4	
Jranium	μg/g	23	0.5	0.8	
Vanadium	μg/g	86	1	76	
Zinc	μg/g	340	5	107	

Comments:

RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil - Residential/Parkland/Institutional Property Use - Coarse Textured Soils

Certified By:

Elizabeth Rolohowsha



CLIENT NAME: GOLDER ASSOCIATES LTD

Certificate of Analysis

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

ATTENTION TO: Alyssa Troke

SAMPLED BY:

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

O. Reg. 153(511) - ORPs (Soil) - EC/SAR

				<u> </u>	5(011) 011	· (· (· · · ·)	
DATE RECEIVED: 2017-01-20							DATE REPORTED: 2017-02-10
	S	AMPLE DES	CRIPTION:	BH 17-30 SA2	BH 17-31 SA2	BH 17-32 SA2	
		SAM	PLE TYPE:	Soil	Soil	Soil	
		DATES	SAMPLED:	2017-01-13	2017-01-13	2017-01-13	
Parameter	Unit	G/S	RDL	8139178	8139179	8139183	
Electrical Conductivity	mS/cm	0.7	0.005	2.38	2.42	0.958	
Sodium Adsorption Ratio	NA	5	NA	47.8	42.5	3.69	

Comments:

SAMPLING SITE:

RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil - Residential/Parkland/Institutional Property Use - Coarse Textured Soils

8139178-8139183 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil).

Certified By:

Elizabeth Rolakowska



Certificate of Analysis

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

ATTENTION TO: Alyssa Troke

SAMPLED BY:

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

O. Reg. 153(511) - PAHs (Soil)

				01 1(0g. 100(0)	., ., (50)	
DATE RECEIVED: 2017-01-20						DATE REPORTED: 2017-02-10
	;	SAMPLE DES	CRIPTION:	BH 17-32 SA2		
		SAMI	PLE TYPE:	Soil		
		DATE S	SAMPLED:	2017-01-13		
Parameter	Unit	G/S	RDL	8139183		
Naphthalene	μg/g	0.6	0.05	<0.05		
Acenaphthylene	μg/g	0.15	0.05	<0.05		
Acenaphthene	μg/g	7.9	0.05	<0.05		
Fluorene	μg/g	62	0.05	<0.05		
Phenanthrene	μg/g	6.2	0.05	<0.05		
Anthracene	μg/g	0.67	0.05	<0.05		
Fluoranthene	μg/g	0.69	0.05	<0.05		
Pyrene	μg/g	78	0.05	<0.05		
Benz(a)anthracene	μg/g	0.5	0.05	<0.05		
Chrysene	μg/g	7	0.05	<0.05		
Benzo(b)fluoranthene	μg/g	0.78	0.05	<0.05		
Benzo(k)fluoranthene	μg/g	0.78	0.05	<0.05		
Benzo(a)pyrene	μg/g	0.3	0.05	<0.05		
Indeno(1,2,3-cd)pyrene	μg/g	0.38	0.05	<0.05		
Dibenz(a,h)anthracene	μg/g	0.1	0.05	<0.05		
Benzo(g,h,i)perylene	μg/g	6.6	0.05	<0.05		
2-and 1-methyl Naphthalene	μg/g	0.99	0.05	<0.05		
Surrogate	Unit	Acceptab	le Limits			
Chrysene-d12	%	50-1		84		

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil -

Residential/Parkland/Institutional Property Use - Coarse Textured Soils

8139183 Results are based on the dry weight of the soil.

Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&(j)Fluoranthene isomers because the isomers co-elute on the GC column.

Certified By:



CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

Certificate of Analysis

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

ATTENTION TO: Alyssa Troke

SAMPLED BY:

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

O. Reg. 153(511) - PHCs F1 - F4 (Soil)

DATE RECEIVED: 2017-01-20 DATE REPORTED: 2017-02-10 SAMPLE DESCRIPTION: BH 17-30 SA2 BH 17-31 SA2 SAMPLE TYPE: Soil Soil DATE SAMPLED: 2017-01-13 2017-01-13 **RDL** 8139178 **Parameter** Unit G/S 8139179 Benzene 0.21 0.02 < 0.02 < 0.02 μg/g Toluene 2.3 0.08 < 0.08 < 0.08 µg/g 2 < 0.05 Ethylbenzene μg/g 0.05 < 0.05 3.1 Xylene Mixture 0.05 < 0.05 < 0.05 μg/g F1 (C6 to C10) 55 5 <5 <5 μg/g <5 F1 (C6 to C10) minus BTEX 55 <5 μg/g F2 (C10 to C16) 98 10 <10 <10 μg/g F3 (C16 to C34) μg/g 300 50 <50 <50 F4 (C34 to C50) 2800 50 <50 μg/g <50 Gravimetric Heavy Hydrocarbons 2800 50 NA NA μg/g Moisture Content % 0.1 24.1 30.2 Surrogate Unit **Acceptable Limits** 122 60-140 96 Terphenyl

Comments:

RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil - Residential/Parkland/Institutional Property Use - Coarse Textured Soils

8139178-8139179 Results are based on sample dry weight.

The C6-C10 fraction is calculated using Toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons > C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6 - C50 results are corrected for BTEX contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 + nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Quality Control Data is available upon request.

Certified By:



CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

Certificate of Analysis

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

ATTENTION TO: Alyssa Troke

SAMPLED BY:

TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

5835 COOPERS AVENUE

MISSISSAUGA, ONTARIO CANADA L4Z 1Y2

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Soil)

				· · · · · · · · · · · · · · · · · · ·	•	
DATE RECEIVED: 2017-01-20						DATE REPORTED: 2017-02-10
		SAMPLE DESC	CRIPTION:	BH 17-32 SA2		
		SAME	PLE TYPE:	Soil		
		DATE S	SAMPLED:	2017-01-13		
Parameter	Unit	G/S	RDL	8139183		
Benzene	μg/g	0.21	0.02	<0.02		
Toluene	μg/g	2.3	0.08	<0.08		
Ethylbenzene	μg/g	2	0.05	<0.05		
Xylene Mixture	μg/g	3.1	0.05	<0.05		
F1 (C6 to C10)	μg/g	55	5	<5		
F1 (C6 to C10) minus BTEX	μg/g	55	5	<5		
F2 (C10 to C16)	μg/g	98	10	<10		
F2 (C10 to C16) minus Naphthalene	μg/g		10	<10		
F3 (C16 to C34)	μg/g	300	50	<50		
F3 (C16 to C34) minus PAHs	μg/g		50	<50		
F4 (C34 to C50)	μg/g	2800	50	<50		
Gravimetric Heavy Hydrocarbons	μg/g	2800	50	NA		
Moisture Content	%		0.1	29.0		
Surrogate	Unit	Acceptab	le Limits			
Terphenyl	%	60-1	40	94		

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil -

Residential/Parkland/Institutional Property Use - Coarse Textured Soils

8139183 Results are based on sample dry weight.

The C6-C10 fraction is calculated using toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons > C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6 - C50 results are corrected for BTEX and PAH contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 + nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Certified By:

Jung



Guideline Violation

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
8139178	BH 17-30 SA2	ON T3 S RPI CT	O. Reg. 153(511) - ORPs (Soil) - EC/SAR	Electrical Conductivity	mS/cm	0.7	2.38
8139178	BH 17-30 SA2	ON T3 S RPI CT	O. Reg. 153(511) - ORPs (Soil) - EC/SAR	Sodium Adsorption Ratio	NA	5	47.8
8139179	BH 17-31 SA2	ON T3 S RPI CT	O. Reg. 153(511) - ORPs (Soil) - EC/SAR	Electrical Conductivity	mS/cm	0.7	2.42
8139179	BH 17-31 SA2	ON T3 S RPI CT	O. Reg. 153(511) - ORPs (Soil) - EC/SAR	Sodium Adsorption Ratio	NA	5	42.5
8139183	BH 17-32 SA2	ON T3 S RPI CT	O. Reg. 153(511) - ORPs (Soil) - EC/SAR	Electrical Conductivity	mS/cm	0.7	0.958



Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD

PROJECT: 1658448 - River Rd Phase 2 ESA

ATTENTION TO: Alyssa Troke

SAMPLED BY:

	Soil Analysis														
RPT Date: Feb 10, 2017			С	UPLICATI	Ē		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits	Recovery		ptable nits	Recovery		ptable nits
		Ia		•			value	Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals (Inclu	ding Hydrides) (Soil)													
Antimony	8146881		<0.8	<0.8	NA	< 0.8	130%	70%	130%	85%	80%	120%	86%	70%	130%
Arsenic	8146881		5	5	0.0%	< 1	113%	70%	130%	101%	80%	120%	101%	70%	130%
Boron	8146881		6	6	NA	< 5	84%	70%	130%	101%	80%	120%	101%	70%	130%
Barium	8146881		80	77	3.8%	< 2	100%	70%	130%	103%	80%	120%	98%	70%	130%
Beryllium	8146881		<0.5	<0.5	NA	< 0.5	95%	70%	130%	105%	80%	120%	101%	70%	130%
Cadmium	8146881		<0.5	<0.5	NA	< 0.5	110%	70%	130%	103%	80%	120%	101%	70%	130%
Chromium	8146881		11	11	0.0%	< 2	93%	70%	130%	105%	80%	120%	99%	70%	130%
Cobalt	8146881		4.0	4.0	0.0%	< 0.5	99%	70%	130%	104%	80%	120%	101%	70%	130%
Copper	8146881		19	19	0.0%	< 1	97%	70%	130%	108%	80%	120%	102%	70%	130%
Lead	8146881		166	175	5.3%	< 1	110%	70%	130%	107%	80%	120%	98%	70%	130%
Molybdenum	8146881		<0.5	<0.5	NA	< 0.5	109%	70%	130%	99%	80%	120%	103%	70%	130%
Nickel	8146881		9	9	0.0%	< 1	98%	70%	130%	104%	80%	120%	99%	70%	130%
Selenium	8146881		0.6	0.5	NA	< 0.4	88%	70%	130%	102%	80%	120%	99%	70%	130%
Silver	8146881		< 0.2	< 0.2	NA	< 0.2	94%	70%	130%	105%	80%	120%	103%	70%	130%
Thallium	8146881		<0.4	<0.4	NA	< 0.4	101%	70%	130%	105%	80%	120%	101%	70%	130%
Uranium	8146881		<0.5	<0.5	NA	< 0.5	104%	70%	130%	97%	80%	120%	95%	70%	130%
Vanadium	8146881		20	20	0.0%	< 1	101%	70%	130%	104%	80%	120%	102%	70%	130%
Zinc	8146881		129	130	0.8%	< 5	104%	70%	130%	108%	80%	120%	102%	70%	130%
Comments:															
O. Reg. 153(511) - ORPs (Soil)	- EC/SAR														
Electrical Conductivity	8170448		0.331	0.333	0.6%	< 0.005	93%	90%	110%	NA			NA		
Sodium Adsorption Ratio	8139660		3.82	3.75	1.8%	NA	NA			NA			NA		

Comments: NA signifies Not Applicable.

SAMPLING SITE:

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

O. Reg. 153(511) - ORPs (Soil) - EC/SAR

Electrical Conductivity 8169778 0.141 0.137 2.9% < 0.005 93% 90% 110% NΑ NA Sodium Adsorption Ratio 8169778 0.172 0.179 4.0% NA NA NA NA

Comments: NA signifies Not Applicable.

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

Certified By:

Elizabeth Rotokowska

AGAT QUALITY ASSURANCE REPORT (V1)

Page 8 of 12



Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD

PROJECT: 1658448 - River Rd Phase 2 ESA

ATTENTION TO: Alyssa Troke

SAMPLING SITE: SAMPLED BY:

			Trac	e Org	gani	cs An	nalysi	is							
RPT Date: Feb 10, 2017			D	UPLICATE	 [REFEREN	NCE MA	TERIAL	METHOD	BLAN	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery	Lie	ptable nits	Recovery	Lin	eptable mits
		ld					Value	Lower	Upper	,	Lower	Upper		Lower	Upper
O. Reg. 153(511) - PHCs F1 - F4	(Soil)														
Benzene	8143214		< 0.02	< 0.02	NA	< 0.02	98%	60%	130%	100%	60%	130%	102%	60%	130%
Toluene	8143214		< 0.08	< 0.08	NA	< 0.08	86%	60%	130%	85%	60%	130%	92%	60%	130%
Ethylbenzene	8143214		< 0.05	< 0.05	NA	< 0.05	77%	60%	130%	80%	60%	130%	92%	60%	130%
Xylene Mixture	8143214		< 0.05	< 0.05	NA	< 0.05	75%	60%	130%	77%	60%	130%	80%	60%	130%
F1 (C6 to C10)	8143214		< 5	< 5	NA	< 5	74%	60%	130%	87%	85%	115%	77%	70%	130%
F2 (C10 to C16)	8144542		< 10	< 10	NA	< 10	101%	60%	130%	80%	80%	120%	98%	70%	130%
F3 (C16 to C34)	8144542		< 50	< 50	NA	< 50	105%	60%	130%	82%	80%	120%	87%	70%	130%
F4 (C34 to C50)	8144542		< 50	< 50	NA	< 50	103%	60%	130%	95%	80%	120%	93%	70%	130%
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	8120231		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	112%	50%	140%	90%	50%	140%
Acenaphthylene	8120231		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	103%	50%	140%	87%	50%	140%
Acenaphthene	8120231		< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	104%	50%	140%	88%	50%	140%
Fluorene	8120231		< 0.05	< 0.05	NA	< 0.05	94%	50%	140%	100%	50%	140%	89%	50%	140%
Phenanthrene	8120231		< 0.05	< 0.05	NA	< 0.05	87%	50%	140%	92%	50%	140%	91%	50%	140%
Anthracene	8120231		< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	111%	50%	140%	86%	50%	140%
Fluoranthene	8120231		< 0.05	< 0.05	NA	< 0.05	97%	50%	140%	94%	50%	140%	103%	50%	140%
Pyrene	8120231		< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	90%	50%	140%	104%	50%	140%
Benz(a)anthracene	8120231		< 0.05	< 0.05	NA	< 0.05	100%	50%	140%	62%	50%	140%	115%	50%	140%
Chrysene	8120231		< 0.05	< 0.05	NA	< 0.05	74%	50%	140%	76%	50%	140%	105%	50%	140%
Benzo(b)fluoranthene	8120231		< 0.05	< 0.05	NA	< 0.05	87%	50%	140%	117%	50%	140%	89%	50%	140%
Benzo(k)fluoranthene	8120231		< 0.05	< 0.05	NA	< 0.05	109%	50%	140%	108%	50%	140%	77%	50%	140%
Benzo(a)pyrene	8120231		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	115%	50%	140%	100%	50%	140%
Indeno(1,2,3-cd)pyrene	8120231		< 0.05	< 0.05	NA	< 0.05	106%	50%	140%	97%	50%	140%	104%	50%	140%
Dibenz(a,h)anthracene	8120231		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	90%	50%	140%	100%	50%	140%
Benzo(g,h,i)perylene	8120231		< 0.05	< 0.05	NA	< 0.05	106%	50%	140%	118%	50%	140%	111%	50%	140%
2-and 1-methyl Naphthalene	8120231		< 0.05	< 0.05	NA	< 0.05	104%	50%	140%	107%	50%	140%	88%	50%	140%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:

Jeurg

AGAT QUALITY ASSURANCE REPORT (V1)

Page 9 of 12

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD AGAT WORK ORDER: 17Z180001
PROJECT: 1658448 - River Rd Phase 2 ESA ATTENTION TO: Alyssa Troke

SAMPLING SITE: SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis	·		'
Antimony	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Chromium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Copper	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Lead	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Nickel	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Selenium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Silver	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Thallium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Uranium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Zinc	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

PROJECT: 1658448 - River Rd Phase 2 ESA

SAMPLING SITE:

AGAT WORK ORDER: 17Z180001

ATTENTION TO: Alyssa Troke

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis			
Naphthalene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Acenaphthylene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Acenaphthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Fluorene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Phenanthrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Anthracene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Fluoranthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Pyrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benz(a)anthracene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Chrysene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
2-and 1-methyl Naphthalene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Chrysene-d12	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Toluene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Ethylbenzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Xylene Mixture	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009		GC/FID
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method	GC / FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method	GC / FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method	GC / FID
F2 (C10 to C16) minus Naphthalene	VOL-91-5009	CCME Tier 1 Method	GC / FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method	GC / FID
F3 (C16 to C34) minus PAHs	VOL-91-5009	CCME Tier 1 Method	GC / FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	GRAVIMETRIC ANALYSIS



5835 Coopers Avenue Mississauga, Ontario L4Z 1Y2 **Laboratory Use Only**

Work Order #: 177 180 001

Ph: 905.712.5100 Fax: 905.712.5122 webearth.agatlabs.com

Report Inform Company: Contact:	mation:	Associates			sample, plea	Regulatory Require (Please check all applicable baxes)	ements:	□ N		gula	itory Req	uireme		c	rrival ustoc	y Sea	l Inta			7 Yes	*	73 □No	1 6ª
Phone: 613-592-9600 Fax: Reports to be sent to: 1. Email: Atvoke Ogother. com 2. Email: Khulmes Ogolder. com Project Information:					☑Coarse ☐Fine	Table					Prov. Water Quality Objectives (PWQO) Other Indicate One				Turnaround Time (TAT) Required: Regular TAT								
Project Information Project: Site Location: Sampled By: AGAT Quote #:		48- 80 5	River Po:	Rd. P	have 11 E	Is this submission Record of Site Cond	ition?			fica	Guideline te of Ana		-4			Ple	ease	provid	de pr	or not	fication	ı for rus	
Invoice Information Company: Contact: Address: Email:		uctation number is not prov	rided, client will be l		analysis.	Legend B Biota GW Ground Water O Oil P Paint S Soil SD Sediment SW Surface Water	Field Filtered - Metals, Hg, CrVI (Please Circle)	Metals and Inorganics	can	Hydride Forming Metals	ORPs: □B-HWS □C: □CN: □Cre* □EC □FOC □NO\$/NO\$ □Total N □Hg □PH □SAR	00	□ VOC □ BTEX □ THM	CCME Fractions 1 to 4 /87EX		henols		Organochlorine Pesticides	TCLP Metals/Inorganics	Jse			
Sample Ide	entification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y/N		-	Hyariae	ORPs:	Nutrien I No.3	Volatiles:	CCME	PAHs	Chlorophenols	PCBs	Organo	TCLP M	Sewer Use	SAD		
BH17-30 BH17-31 BH17-32	SAR	Jan-13/17		3 3 3	5 5	elatem un	1000 T		X		- N			X X	×					>	X		
											100										101		
						142																	
Samples Relinquished by (Pri	To Ke all	rolato	r a	Date Jan. 2 Date Date	0/1 2 Time	Samples, Received by (Print Samples Received by	Name and San):	W		1		Dar Dar	b	21/	7	14 9	34	50	N°:	Pa	ge/	of _	



CLIENT NAME: GOLDER ASSOCIATES LTD 1931 ROBERTSON ROAD OTTAWA, ON K2H5B7 (613) 592-9600

ATTENTION TO: Alyssa Troke

PROJECT: 1658448 Riverside South Ph. 2

AGAT WORK ORDER: 17Z182021

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Coordinator

TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor

DATE REPORTED: Feb 06, 2017

PAGES (INCLUDING COVER): 15

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

NOTES .	

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Page 1 of 15

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

Certificate of Analysis

AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

ATTENTION TO: Alyssa Troke

SAMPLED BY: Alyssa Troke

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

O. Reg. 153(511) - All Metals (Soil)

				O. INeg.	155(511) - F	iii ivietais (c	JUII)		
DATE RECEIVED: 2017-01-27									DATE REPORTED: 2017-02-06
		SAMPLE DES	CRIPTION:	BH17-29 SA2	BH17-33 SA2	FP1 SA1	FP2 SA2	BH17-8 SA1	
		SAMI	PLE TYPE:	Soil	Soil	Soil	Soil	Soil	
		DATE S	SAMPLED:	2017-01-23	2017-01-23	2017-01-23	2017-01-23	2017-01-23	
Parameter	Unit	G/S	RDL	8153709	8153711	8153714	8153717	8153721	
Antimony	μg/g	7.5	0.8	<0.8	<0.8	<0.8	<0.8	<0.8	
Arsenic	μg/g	18	1	1	2	2	5	3	
Barium	μg/g	390	2	48	123	59	57	61	
Beryllium	μg/g	4	0.5	<0.5	0.6	<0.5	<0.5	<0.5	
Boron	μg/g	120	5	<5	<5	<5	7	7	
Boron (Hot Water Soluble)	μg/g	1.5	0.10	<0.10	0.14	0.71	0.13	0.15	
Cadmium	μg/g	1.2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Chromium	μg/g	160	2	19	42	17	13	10	
Cobalt	μg/g	22	0.5	5.3	10.1	4.2	6.9	4.7	
Copper	μg/g	140	1	5	21	11	11	11	
Lead	μg/g	120	1	3	5	12	28	8	
Molybdenum	μg/g	6.9	0.5	<0.5	<0.5	0.7	3.3	1.3	
Nickel	μg/g	100	1	11	24	9	13	11	
Selenium	μg/g	2.4	0.4	<0.4	0.5	0.5	<0.4	<0.4	
Silver	μg/g	20	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Γhallium	μg/g	1	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	
Jranium	μg/g	23	0.5	0.9	0.6	8.0	0.6	<0.5	
/anadium	μg/g	86	1	33	53	25	32	37	
Zinc	μg/g	340	5	25	42	51	20	29	
Chromium VI	μg/g	8	0.2	<0.2	<0.2	<0.2	<0.2	<0.2	
Mercury	μg/g	0.27	0.10	<0.10	<0.10	<0.10	<0.10	<0.10	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil - Residential/Parkland/Institutional Property Use - Coarse Textured Soils

Certified By:

Amanjot Bhela



AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

ATTENTION TO: Alyssa Troke

SAMPLED BY: Alyssa Troke

MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

5835 COOPERS AVENUE

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

O. Reg. 153(511) - PAHs (Soil)

				. 11 . 69. 133(311	1) 17(113 (0	OII)		
DATE RECEIVED: 2017-01-27								DATE REPORTED: 2017-02-06
		SAMPLE DESCRI	PTION: BH17-29	SA2 BH17-33 SA2	2 FP1 SA1	FP2 SA2	BH17-8 SA1	
		SAMPLE	TYPE: Soil	Soil	Soil	Soil	Soil	
		DATE SAM	MPLED: 2017-01	-23 2017-01-23	2017-01-23	2017-01-23	2017-01-23	
Parameter	Unit	G/S	RDL 815370	9 8153711	8153714	8153717	8153721	
Naphthalene	μg/g	0.6	0.05 < 0.05	<0.05	<0.05	<0.05	<0.05	
Acenaphthylene	μg/g	0.15	0.05 < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
Acenaphthene	μg/g	7.9	0.05 < 0.05	<0.05	< 0.05	< 0.05	< 0.05	
Fluorene	μg/g	62	0.05 < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
Phenanthrene	μg/g	6.2	0.05 < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
Anthracene	μg/g	0.67	0.05 < 0.05	<0.05	< 0.05	< 0.05	< 0.05	
Fluoranthene	μg/g	0.69	0.05 < 0.05	<0.05	0.10	< 0.05	< 0.05	
Pyrene	μg/g	78	0.05 < 0.05	< 0.05	0.09	< 0.05	< 0.05	
Benz(a)anthracene	μg/g	0.5	0.05 < 0.05	< 0.05	0.05	< 0.05	< 0.05	
Chrysene	μg/g	7	0.05 < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
Benzo(b)fluoranthene	μg/g	0.78	0.05 < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
Benzo(k)fluoranthene	μg/g	0.78	0.05 < 0.05	<0.05	< 0.05	< 0.05	< 0.05	
Benzo(a)pyrene	μg/g	0.3	0.05 < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
Indeno(1,2,3-cd)pyrene	μg/g	0.38	0.05 < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
Dibenz(a,h)anthracene	μg/g	0.1	0.05 < 0.05	< 0.05	< 0.05	< 0.05	< 0.05	
Benzo(g,h,i)perylene	μg/g	6.6	0.05 < 0.05	<0.05	< 0.05	< 0.05	< 0.05	
2-and 1-methyl Naphthalene	μg/g	0.99	0.05 < 0.05	<0.05	< 0.05	< 0.05	< 0.05	
Moisture Content	%		0.1 13.6	20.8	26.0	6.6	6.4	
Surrogate	Unit	Acceptable L	imits					
Chrysene-d12	%	50-140	57	62	52	101	81	

Comments:

RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil -

Residential/Parkland/Institutional Property Use - Coarse Textured Soils

8153709-8153721 Results are based on the dry weight of the soil.

Note: The result for Benzo(b)Fluoranthene is the total of the Benzo(b)&(j)Fluoranthene isomers because the isomers co-elute on the GC column.



AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

5835 COOPERS AVENUE

CLIENT NAME: GOLDER ASSOCIATES LTD SAMPLING SITE:

ATTENTION TO: Alyssa Troke

SAMPLED BY: Alyssa Troke

O. Reg. 153(511)	- PHCs F1 - F4	(with PAHs) (Soil)
------------------	----------------	--------------------

						DATE REPORTED: 2017-02-06
	SAMPLE DESC	RIPTION:	FP1 SA1	FP2 SA2	BH17-8 SA1	
	SAMP	LE TYPE:	Soil	Soil	Soil	
	DATE S	AMPLED:	2017-01-23	2017-01-23	2017-01-23	
Unit	G/S	RDL	8153714	8153717	8153721	
μg/g	0.21	0.02	<0.02	<0.02	<0.02	
μg/g	2.3	0.08	<0.08	<0.08	<0.08	
μg/g	2	0.05	< 0.05	< 0.05	< 0.05	
μg/g	3.1	0.05	< 0.05	< 0.05	< 0.05	
μg/g	55	5	<5	<5	<5	
μg/g	55	5	<5	<5	<5	
μg/g	98	10	<10	<10	<10	
μg/g		10	<10	<10	<10	
μg/g	300	50	58	920	1100	
μg/g		50	58	920	1100	
μg/g	2800	50	<50	1800	1500	
μg/g	2800	50	NA	NA	NA	
%		0.1	26.0	6.6	6.4	
Unit	Acceptabl	e Limits				
%	60-1	40	120	120	83	
	ha/a ha/a ha/a ha/a ha/a ha/a ha/a ha/a	SAMP DATE S Unit G / S Up/g 0.21 µg/g 2.3 µg/g 2 µg/g 3.1 µg/g 55 µg/g 55 µg/g 98 µg/g 300 µg/g µg/g 2800 µg/g 2800 % Unit Acceptable	μg/g 0.21 0.02 μg/g 2.3 0.08 μg/g 2 0.05 μg/g 3.1 0.05 μg/g 55 5 μg/g 98 10 μg/g 10 μg/g μg/g 50 μg/g μg/g 2800 50 μg/g 2800 50 % 0.1 Unit Acceptable Limits	SAMPLE TYPE: Soil DATE SAMPLED: 2017-01-23 Unit G / S RDL 8153714 μg/g 0.21 0.02 <0.02	SAMPLE TYPE: Soil Soil	SAMPLE TYPE: Soil Soil Soil DATE SAMPLED: 2017-01-23 2017-01-23 2017-01-23 Unit G / S RDL 8153714 8153717 8153721 μg/g 0.21 0.02 <0.02

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil -

Residential/Parkland/Institutional Property Use - Coarse Textured Soils

8153714-8153721 Results are based on sample dry weight.

The C6-C10 fraction is calculated using toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons > C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6 - C50 results are corrected for BTEX and PAH contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 + nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Certified By:



AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

ATTENTION TO: Alyssa Troke

SAMPLED BY: Alyssa Troke

http://www.agatlabs.com

5835 COOPERS AVENUE

MISSISSAUGA, ONTARIO CANADA L4Z 1Y2

> TEL (905)712-5100 FAX (905)712-5122

CLIENT NAME: GOLDER ASSOCIATES LTD SAMPLING SITE:

O Reg. 153/511) - PHCs F1 - F1 (with PAHs) (Soil)

DATE RECEIVED: 2017-01-27						DATE REPORTED: 2017-02-06
		SAMPLE DESC	CRIPTION:	BH17-29 SA2	BH17-33 SA2	
		SAMI	PLE TYPE:	Soil	Soil	
		DATE S	SAMPLED:	2017-01-23	2017-01-23	
Parameter	Unit	G/S	RDL	8153709	8153711	
F1 (C6 to C10)	μg/g	55	5	<5	<5	
F1 (C6 to C10) minus BTEX	μg/g	55	5	<5	<5	
F2 (C10 to C16)	μg/g	98	10	<10	<10	
F2 (C10 to C16) minus Naphthalene	μg/g		10	<10	<10	
F3 (C16 to C34)	μg/g	300	50	<50	<50	
F3 (C16 to C34) minus PAHs	μg/g		50	<50	<50	
F4 (C34 to C50)	μg/g	2800	50	<50	<50	
Gravimetric Heavy Hydrocarbons	μg/g	2800	50	NA	NA	
Moisture Content	%		0.1	13.6	20.8	
Surrogate	Unit	Acceptab	le Limits			
Terphenyl	%	60-1	40	90	91	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil -

Residential/Parkland/Institutional Property Use - Coarse Textured Soils

8153709-8153711 Results are based on sample dry weight.

The C6-C10 fraction is calculated using toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6 - C50 results are corrected for BTEX and PAH contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 + nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Certified By:



AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

5835 COOPERS AVENUE

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

ATTENTION TO: Alyssa Troke SAMPLED BY: Alyssa Troke

				O. Re	g. 153(511) - V	OCs (Soil)
DATE RECEIVED: 2017-01-27						DATE REPORTED: 2017-02-06
			CRIPTION: PLE TYPE: SAMPLED:	BH17-29 SA2 Soil 2017-01-23	BH17-33 SA2 Soil 2017-01-23	
Parameter	Unit	G/S	RDL	8153709	8153711	
Dichlorodifluoromethane	μg/g	16	0.05	<0.05	<0.05	
Vinyl Chloride	ug/g	0.02	0.02	< 0.02	<0.02	
Bromomethane	ug/g	0.05	0.05	<0.05	< 0.05	
Trichlorofluoromethane	ug/g	4	0.05	<0.05	< 0.05	
Acetone	ug/g	16	0.50	<0.50	<0.50	
1,1-Dichloroethylene	ug/g	0.05	0.05	< 0.05	<0.05	
Methylene Chloride	ug/g	0.1	0.05	< 0.05	<0.05	
Trans- 1,2-Dichloroethylene	ug/g	0.084	0.05	<0.05	< 0.05	
Methyl tert-butyl Ether	ug/g	0.75	0.05	< 0.05	<0.05	
1,1-Dichloroethane	ug/g	3.5	0.02	< 0.02	<0.02	
Methyl Ethyl Ketone	ug/g	16	0.50	<0.50	<0.50	
Cis- 1,2-Dichloroethylene	ug/g	3.4	0.02	< 0.02	<0.02	
Chloroform	ug/g	0.05	0.04	<0.04	<0.04	
1,2-Dichloroethane	ug/g	0.05	0.03	< 0.03	< 0.03	
1,1,1-Trichloroethane	ug/g	0.38	0.05	< 0.05	<0.05	
Carbon Tetrachloride	ug/g	0.05	0.05	< 0.05	<0.05	
Benzene	ug/g	0.21	0.02	< 0.02	<0.02	
1,2-Dichloropropane	ug/g	0.05	0.03	<0.03	< 0.03	
Trichloroethylene	ug/g	0.061	0.03	<0.03	< 0.03	
Bromodichloromethane	ug/g	13	0.05	< 0.05	<0.05	
Methyl Isobutyl Ketone	ug/g	1.7	0.50	<0.50	<0.50	
1,1,2-Trichloroethane	ug/g	0.05	0.04	<0.04	<0.04	
Toluene	ug/g	2.3	0.05	< 0.05	<0.05	
Dibromochloromethane	ug/g	9.4	0.05	< 0.05	<0.05	
Ethylene Dibromide	ug/g	0.05	0.04	<0.04	<0.04	
Tetrachloroethylene	ug/g	0.28	0.05	<0.05	<0.05	
1,1,1,2-Tetrachloroethane	ug/g	0.058	0.04	<0.04	<0.04	
Chlorobenzene	ug/g	2.4	0.05	<0.05	<0.05	
Ethylbenzene	ug/g	2	0.05	<0.05	<0.05	
m & p-Xylene	ug/g		0.05	<0.05	< 0.05	

Certified By:



AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

ATTENTION TO: Alyssa Troke SAMPLED BY:Alyssa Troke

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

O. Reg. 153(511) - VOCs (Soil)

				O. Re	g. 153(511) -	- voes (3011)
DATE RECEIVED: 2017-01-27						DATE REPORTED: 2017-02-06
	S.	AMPLE DES	CRIPTION:	BH17-29 SA2	BH17-33 SA2	
		SAM	PLE TYPE:	Soil	Soil	
		DATE	SAMPLED:	2017-01-23	2017-01-23	
Parameter	Unit	G/S	RDL	8153709	8153711	
Bromoform	ug/g	0.27	0.05	< 0.05	<0.05	
Styrene	ug/g	0.7	0.05	< 0.05	<0.05	
1,1,2,2-Tetrachloroethane	ug/g	0.05	0.05	< 0.05	<0.05	
o-Xylene	ug/g		0.05	< 0.05	<0.05	
1,3-Dichlorobenzene	ug/g	4.8	0.05	< 0.05	<0.05	
1,4-Dichlorobenzene	ug/g	0.083	0.05	< 0.05	<0.05	
1,2-Dichlorobenzene	ug/g	3.4	0.05	< 0.05	<0.05	
Xylene Mixture	ug/g	3.1	0.05	< 0.05	<0.05	
1,3-Dichloropropene	μg/g	0.05	0.04	<0.04	<0.04	
n-Hexane	μg/g	2.8	0.05	< 0.05	<0.05	
Surrogate	Unit	Acceptab	le Limits			
Toluene-d8	% Recovery	50-	140	119	85	
4-Bromofluorobenzene	% Recovery	50-	140	82	88	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil - Residential/Parkland/Institutional Property Use - Coarse Textured Soils

8153709-8153711 The sample was analysed using the high level technique. The sample was extracted using methanol, a small amount of the methanol extract was diluted in water and the purge & trap GC/MS analysis was performed. Results are based on the dry weight of the soil.



Guideline Violation

AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
8153717	FP2 SA2	ON T3 S RPI CT	O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Soil)	F3 (C16 to C34)	μg/g	300	920
8153721	BH17-8 SA1	ON T3 S RPI CT	O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Soil)	F3 (C16 to C34)	μg/g	300	1100



Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD PROJECT: 1658448 Riverside South Ph. 2

SAMPLING SITE:

AGAT WORK ORDER: 17Z182021 ATTENTION TO: Alyssa Troke SAMPLED BY:Alyssa Troke

Soil Analysis																	
RPT Date: Feb 06, 2017			D	UPLICATI	E		REFERE	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	MATRIX SPIKE			
PARAMETER	Batch Sam	ole	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Measured Limits		Recovery	1 :-	ptable nits	Recovery		ptable
							value	Lower	Upper		Lower	Upper		Lower	Upper		
O. Reg. 153(511) - All Metals (Soi	I)																
Antimony	8153088		<0.8	<0.8	NA	< 0.8	104%	70%	130%	102%	80%	120%	99%	70%	130%		
Arsenic	8153088		4	4	NA	< 1	102%	70%	130%	93%	80%	120%	92%	70%	130%		
Barium	8153088		63	69	9.1%	< 2	94%	70%	130%	101%	80%	120%	112%	70%	130%		
Beryllium	8153088		0.7	0.7	NA	< 0.5	94%	70%	130%	91%	80%	120%	94%	70%	130%		
Boron	8153088		<5	<5	NA	< 5	70%	70%	130%	92%	80%	120%	82%	70%	130%		
Boron (Hot Water Soluble)	8157245		0.84	0.81	3.6%	< 0.10	122%	60%	140%	102%	70%	130%	99%	60%	140%		
Cadmium	8153088		<0.5	<0.5	NA	< 0.5	98%	70%	130%	100%	80%	120%	98%	70%	130%		
Chromium	8153088		22	23	4.4%	< 2	94%	70%	130%	103%	80%	120%	98%	70%	130%		
Cobalt	8153088		12.2	12.4	1.6%	< 0.5	96%	70%	130%	98%	80%	120%	100%	70%	130%		
Copper	8153088		21	21	0.0%	< 1	87%	70%	130%	97%	80%	120%	95%	70%	130%		
Lead	8153088		15	16	6.5%	< 1	105%	70%	130%	99%	80%	120%	95%	70%	130%		
Molybdenum	8153088		<0.5	0.5	NA	< 0.5	103%	70%	130%	103%	80%	120%	101%	70%	130%		
Nickel	8153088		21	21	0.0%	< 1	102%	70%	130%	101%	80%	120%	102%	70%	130%		
Selenium	8153088		0.6	0.5	NA	< 0.4	86%	70%	130%	95%	80%	120%	83%	70%	130%		
Silver	8153088		<0.2	<0.2	NA	< 0.2	87%	70%	130%	103%	80%	120%	95%	70%	130%		
Thallium	8153088		<0.4	<0.4	NA	< 0.4	120%	70%	130%	110%	80%	120%	107%	70%	130%		
Uranium	8153088		0.7	0.7	NA	< 0.5	106%	70%	130%	101%	80%	120%	102%	70%	130%		
Vanadium	8153088		31	32	3.2%	< 1	104%	70%	130%	103%	80%	120%	104%	70%	130%		
Zinc	8153088		63	64	1.6%	< 5	89%	70%	130%	100%	80%	120%	95%	70%	130%		
Chromium VI	8153721 815372	!1 ·	<0.2	<0.2	NA	< 0.2	95%	70%	130%	101%	80%	120%	95%	70%	130%		
Mercury	8153088	<	<0.10	<0.10	NA	< 0.10	108%	70%	130%	96%	80%	120%	99%	70%	130%		

Comments: NA signifies Not Applicable.

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

Certified By:

Amanjot Bhela

AGAT QUALITY ASSURANCE REPORT (V1)

Page 9 of 15

Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD PROJECT: 1658448 Riverside South Ph. 2

SAMPLING SITE:

AGAT WORK ORDER: 17Z182021 ATTENTION TO: Alyssa Troke SAMPLED BY:Alyssa Troke

			Trac	e Orç	ganio	cs Ar	alys	is							
RPT Date: Feb 06, 2017				UPLICATI	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MATRIX SPIKE		KE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Lin	ptable nits	Recovery	Lir	ptable nits	Recovery	Lir	ptable nits
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - VOCs (Soil)															4.4007
Dichlorodifluoromethane	8153711		< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	105%	50%	140%	96%	50%	140%
Vinyl Chloride Bromomethane	8153711		< 0.02	< 0.02	NA	< 0.02	106%	50%	140%	113%	50%	140%	84%	50%	140%
Trichlorofluoromethane	8153711 8153711		< 0.05 < 0.05	< 0.05	NA NA	< 0.05 < 0.05	111% 118%	50% 50%	140% 140%	103% 96%	50% 50%	140% 140%	77% 70%	50% 50%	140% 140%
Acetone	8153711		< 0.05	< 0.05 < 0.50	NA NA	< 0.05	108%		140%	96% 94%	50%	140%	70% 87%	50%	140%
Acetone	0133711	0133711	< 0.50	< 0.50	INA	< 0.50	10070	30 /0	14070	3470	30 /0	14070	07 70	30 70	14070
1,1-Dichloroethylene	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	104%	50%	140%	86%	60%	130%	83%	50%	140%
Methylene Chloride	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	114%	60%	130%	118%	50%	140%
Trans- 1,2-Dichloroethylene	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	80%	50%	140%	88%	60%	130%	88%	50%	140%
Methyl tert-butyl Ether	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	79%	50%	140%	86%	60%	130%	88%	50%	140%
1,1-Dichloroethane	8153711	8153711	< 0.02	< 0.02	NA	< 0.02	90%	50%	140%	93%	60%	130%	87%	50%	140%
Methyl Ethyl Ketone	8153711	8153711	< 0.50	< 0.50	NA	< 0.50	106%	50%	140%	89%	50%	140%	104%	50%	140%
Cis- 1,2-Dichloroethylene	8153711		< 0.02	< 0.02	NA	< 0.02	90%	50%	140%	104%	60%	130%	103%	50%	140%
Chloroform	8153711		< 0.04	< 0.04	NA	< 0.04	96%	50%	140%	77%	60%	130%	101%	50%	140%
1.2-Dichloroethane	8153711		< 0.03	< 0.03	NA	< 0.03	107%	50%	140%	117%	60%	130%	118%	50%	140%
1,1,1-Trichloroethane	8153711		< 0.05	< 0.05	NA	< 0.05	107%	50%	140%	114%	60%	130%	121%	50%	140%
Carbon Tetrachloride	8153711	Q152711	< 0.05	< 0.05	NA	< 0.05	106%	50%	140%	91%	60%	130%	108%	50%	140%
Benzene	8153711		< 0.02	< 0.03	NA	< 0.02	123%	50%	140%	116%	60%	130%	100%	50%	140%
1,2-Dichloropropane	8153711		< 0.02	< 0.02	NA	< 0.02	127%	50%	140%	104%	60%	130%	120%	50%	140%
Trichloroethylene	8153711		< 0.03	< 0.03	NA	< 0.03	121%	50%	140%	110%	60%	130%	120%	50%	140%
Bromodichloromethane	8153711		< 0.05	< 0.05	NA	< 0.05	121%	50%	140%	94%	60%	130%	103%	50%	140%
Methyl Isobutyl Ketone	8153711		< 0.50	< 0.50	NA	< 0.50	97%	50%	140%	105%	50%	140%	103%	50%	140%
1,1,2-Trichloroethane	8153711	8153711	< 0.04	< 0.04	NA	< 0.04	124%	50%	140%	121%	60%	130%	117%	50%	140%
Toluene	8153711		< 0.05	< 0.05	NA	< 0.05	115%	50%	140%	108%	60%	130%	100%	50%	140%
Dibromochloromethane	8153711		< 0.05	< 0.05	NA	< 0.05	90%	50%	140%	99%	60%	130%	79%	50%	140%
Ethylene Dibromide	8153711	8153711	< 0.04	< 0.04	NA	< 0.04	107%	50%	140%	112%	60%	130%	94%	50%	140%
Tetrachloroethylene	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	119%	50%	140%	115%	60%	130%	102%	50%	140%
1,1,1,2-Tetrachloroethane	8153711	8153711	< 0.04	< 0.04	NA	< 0.04	97%	50%	140%	109%	60%	130%	90%	50%	140%
Chlorobenzene	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	99%	50%	140%	113%	60%	130%	99%	50%	140%
Ethylbenzene	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	89%	50%	140%	105%	60%	130%	93%	50%	140%
m & p-Xylene	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	85%	50%	140%	101%	60%	130%	88%	50%	140%
Bromoform	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	90%	50%	140%	109%	60%	130%	86%	50%	140%
Styrene	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	101%	60%	130%	86%	50%	140%
1,1,2,2-Tetrachloroethane	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	108%	60%	130%	91%	50%	140%
o-Xylene	8153711		< 0.05	< 0.05	NA	< 0.05	83%		140%	103%	60%		88%	50%	140%
1,3-Dichlorobenzene	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	98%	50%	140%	118%	60%	130%	94%	50%	140%
1,4-Dichlorobenzene	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	90%	50%	140%	115%	60%	130%	95%	50%	140%
1,2-Dichlorobenzene	8153711		< 0.05	< 0.05	NA	< 0.05	82%		140%	91%		130%	79%		140%
1,3-Dichloropropene	8153711		< 0.04	< 0.04	NA	< 0.04	110%		140%	96%	60%	130%	102%	50%	
n-Hexane	8153711		< 0.05	< 0.05	NA	< 0.05	124%		140%	117%		130%	109%		140%
- 1001111				3.00			,5	, , ,	, 0	, ,	- 3 , 3	0 , 0		- 3 , 3	, 0

AGAT QUALITY ASSURANCE REPORT (V1)

Page 10 of 15

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD

PROJECT: 1658448 Riverside South Ph. 2

SAMPLING SITE:

AGAT WORK ORDER: 17Z182021

ATTENTION TO: Alyssa Troke

SAMPLED BY:Alyssa Troke

	Trace Organics Analysis (Continued)																		
RPT Date: Feb 06, 2017				UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLAN	K SPIKE	MAT	RIX SPI	IKE				
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured							Recovery	1 1 1	ptable mits	Recovery		eptable mits
		ld					value	Value Lower	Upper	,	Lower	Upper	,	Lower	Upper				
O. Reg. 153(511) - PHCs F1 - F4	4 (with PAHs)	(Soil)																	
F2 (C10 to C16)	8156569		< 10	< 10	NA	< 10	98%	60%	130%	93%	80%	120%	73%	70%	130%				
F3 (C16 to C34)	8156569		< 50	< 50	NA	< 50	103%	60%	130%	90%	80%	120%	82%	70%	130%				
F4 (C34 to C50)	8156569		< 50	< 50	NA	< 50	96%	60%	130%	103%	80%	120%	80%	70%	130%				
O. Reg. 153(511) - PAHs (Soil)																			
Naphthalene	8146264		< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	79%	50%	140%	73%	50%	140%				
Acenaphthylene	8146264		< 0.05	< 0.05	NA	< 0.05	100%	50%	140%	89%	50%	140%	77%	50%	140%				
Acenaphthene	8146264		< 0.05	< 0.05	NA	< 0.05	97%	50%	140%	87%	50%	140%	76%	50%	140%				
Fluorene	8146264		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	86%	50%	140%	75%	50%	140%				
Phenanthrene	8146264		< 0.05	< 0.05	NA	< 0.05	99%	50%	140%	92%	50%	140%	80%	50%	140%				
Anthracene	8146264		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	99%	50%	140%	88%	50%	140%				
Fluoranthene	8146264		< 0.05	< 0.05	NA	< 0.05	107%	50%	140%	101%	50%	140%	87%	50%	140%				
Pyrene	8146264		< 0.05	< 0.05	NA	< 0.05	108%	50%	140%	101%	50%	140%	86%	50%	140%				
Benz(a)anthracene	8146264		< 0.05	< 0.05	NA	< 0.05	114%	50%	140%	106%	50%	140%	97%	50%	140%				
Chrysene	8146264		< 0.05	< 0.05	NA	< 0.05	105%	50%	140%	95%	50%	140%	80%	50%	140%				
Benzo(b)fluoranthene	8146264		< 0.05	< 0.05	NA	< 0.05	113%	50%	140%	104%	50%	140%	104%	50%	140%				
Benzo(k)fluoranthene	8146264		< 0.05	< 0.05	NA	< 0.05	94%	50%	140%	92%	50%	140%	84%	50%	140%				
Benzo(a)pyrene	8146264		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	98%	50%	140%	99%	50%	140%				
Indeno(1,2,3-cd)pyrene	8146264		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	97%	50%	140%	79%	50%	140%				
Dibenz(a,h)anthracene	8146264		< 0.05	< 0.05	NA	< 0.05	103%	50%	140%	100%	50%	140%	80%	50%	140%				
Benzo(g,h,i)perylene	8146264		< 0.05	< 0.05	NA	< 0.05	94%	50%	140%	92%	50%	140%	73%	50%	140%				
2-and 1-methyl Naphthalene	8146264		< 0.05	< 0.05	NA	< 0.05	107%	50%	140%	85%	50%	140%	74%	50%	140%				
O. Reg. 153(511) - PHCs F1 - F4	4 (with PAHs)	(Soil)																	
Benzene	8157867		< 0.02	< 0.02	NA	< 0.02	105%	60%	130%	96%	60%	130%	119%	60%	130%				
Toluene	8157867		< 0.08	< 0.08	NA	< 0.08	98%	60%	130%	91%	60%	130%	114%	60%	130%				
Ethylbenzene	8157867		< 0.05	< 0.05	NA	< 0.05	95%	60%	130%	91%	60%	130%	110%	60%	130%				
Xylene Mixture	8157867		< 0.05	< 0.05	NA	< 0.05	97%	60%	130%	98%	60%	130%	114%	60%	130%				
F1 (C6 to C10)	8157867		< 5	< 5	NA	< 5	83%	60%	130%	89%	85%	115%	85%	70%	130%				

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:

Jew

AGAT QUALITY ASSURANCE REPORT (V1)

Page 11 of 15

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

PROJECT: 1658448 Riverside South Ph. 2

SAMPLING SITE:

AGAT WORK ORDER: 17Z182021

ATTENTION TO: Alyssa Troke

SAMPLED BY:Alyssa Troke

	_	,
AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
1		
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER
MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
	MET-93-6103	MET-93-6103 EPA SW-846 3050B & 6020A MET-93-6104 EPA SW-846 3050B & 6020A MET-93-6103 EPA SW-846 3050B & 6020A

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

PROJECT: 1658448 Riverside South Ph. 2

SAMPLING SITE:

AGAT WORK ORDER: 17Z182021

ATTENTION TO: Alyssa Troke

SAMPLED BY:Alyssa Troke

SAMPLING SITE.		SAIVIPLED BT.A	iyssa iioke
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis	'		
Naphthalene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Acenaphthylene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Acenaphthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Fluorene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Phenanthrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Anthracene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Fluoranthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Pyrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benz(a)anthracene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Chrysene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzo(b)fluoranthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Dibenz(a,h)anthracene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
2-and 1-methyl Naphthalene	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Moisture Content	ORG-91-5106	EPA SW-846 3541 & 8270	BALANCE
Chrysene-d12	ORG-91-5106	EPA SW846 3541 & 8270	GC/MS
Benzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Toluene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Ethylbenzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
Xylene Mixture	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method	GC / FID
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method	GC / FID
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method	GC / FID
F2 (C10 to C16) minus Naphthalene	VOL-91-5009	CCME Tier 1 Method	GC / FID
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method	GC / FID
F3 (C16 to C34) minus PAHs	VOL-91-5009	CCME Tier 1 Method	GC / FID
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method	GC / FID
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	GRAVIMETRIC ANALYSIS
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009		GC/FID
Dichlorodifluoromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Acetone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trans- 1,2-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl tert-butyl Ether	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1-Dichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Cis- 1,2-Dichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chloroform	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

PROJECT: 1658448 Riverside South Ph. 2

SAMPLING SITE:

AGAT WORK ORDER: 17Z182021

ATTENTION TO: Alyssa Troke

SAMPLED BY:Alyssa Troke

O/ (WII EII TO OIT E.		O/ (IVII EED D1./)	Iyood ITOKO
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Benzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Toluene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Styrene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Xylene Mixture	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
1,3-Dichloropropene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
n-Hexane	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5002	EPA SW-846 5035 & 8260	(P&T)GC/MS



5835 Coopers Avenue Mississauga, Ontario L4Z 1Y2 **Laboratory Use Only**

Work Order #:

Ph: 905.712.5100 Fax: 905.712.5122

Chain of Custody F	Record	If this is a Dr	inking Water	sample, please	use Drinking Water Chain of Cu	stody Form (pot	table wat	er inten	ded fo	r human c	onsumptio	n)	Ar	rival [*]	empe	eratu	res:	7	8 18		184
Report Information: Company: Golder					Regulatory Requirements: No Regulatory Requirement (Please check all applicable boxes)							nt	Custody Seal Intact: Yes No Notes:								
Address: 1931 Rol					Table Indicate One	Table 1 Sanitary				gulation ! ME	558			rna: gula					(to 7 Busin		s
Phone: (013 - 592) Reports to be sent to: 1. Email: (013 - 592)	-9600 olderkon	Fax:			Res/Park Agriculture Soil Texture (Check One) Coarse	□Storm egion Indicate				ov. Water jectives (ner			Ru		AT (R 3 Bus Days	ines	rcharges	Apply)	! Business Days		1 Business
2. Email: Kholmes(9.				Fine Is this submission f			1000 B		Indicate C	e on				OR D	ate R	equire	d (Ru	sh Surchar	ges May	Apply):
Project: 165844 Site Location: Sampled By:	8- River	rside Sa	outh T	2h. 2	Record of Site Cond			ertini		of Ana	No			я					r notification		sh TAT ry holidays
AGAT Quote #: Please note: If quotation number is not provided, client will be billed full price for analysis.				Sample Matrix Legend	g CrVI		Hilmstado		(Check	(Check Applicable)											
Invoice Information: Company: Contact: Address: Email:		Bill	To Same: Y	es No 🗆	B Biota GW Ground Water O Oil P Paint S Soil SD Sediment SW Surface Water	Field Filtered - Metals, Hg, (Please Circle)	norganics	Metal Scan (Kog., IS3 Ail Hydride Forming Metals	Client Custom Metals	ORPs: □B-HWS □CI □CN: □Cr ⁶⁺ □EC □FOC □NO ₂ /NO ₂ □Total N □ Hg □ pH □ SAR	IO DINH, C	S: NVOC BTEX THM	ABNS		Chlorophenols		Organochlorine Pesticides	TCLP Metals/Inorganics	JSe		
Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y/N	Metals	Metal S Hydride	Client	ORPs: Cre [Nutrien I No.	Volatiles:	ABNS	PAHs	Chlorop	PCBs	Organo	TCLP M	sewer use		ne iva
BH17-89 SA2 BH17-33 SA2 FPI SAI	Jan. 231	7 -	3	S				X X				X	\ \	X	89						
FP2 SA2												S		X							
BH17-8 SA1																					
						palles.							n n								
						3=57.441															
Samples Relinquished By (Print Name and Sign): A SSAT V K Samplet Britinguished By Whint Name and Sign): 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	itor	0	Jan 2	Timbe .	Samples Received By (Print N	varne and Sign):	M	V.	7		7/C	re .			ime	95			Page	of	



CLIENT NAME: GOLDER ASSOCIATES LTD 1931 ROBERTSON ROAD OTTAWA, ON K2H5B7 (613) 592-9600

ATTENTION TO: Alyssa Troke

PROJECT: 1658448 - Claridge Ph II

AGAT WORK ORDER: 17Z182712

TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor

WATER ANALYSIS REVIEWED BY: Mike Muneswar, BSc (Chem), Senior Inorganic Analyst

DATE REPORTED: Feb 07, 2017

PAGES (INCLUDING COVER): 17

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

*NOTES	

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Page 1 of 17

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



AGAT WORK ORDER: 17Z182712 PROJECT: 1658448 - Claridge Ph II 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

ATTENTION TO: Alyssa Troke

SAMPLED BY:

O/ (WII EII VO OITE.					O/MINI EED DT.
				O. Reg	. 153(511) - PAHs (Water)
DATE RECEIVED: 2017-01-31					DATE REPORTED: 2017-02-07
		SAMPLE DES	CRIPTION:	MW #17-29	
		SAMI	PLE TYPE:	Water	
		DATE S	SAMPLED:	2017-01-30	
Parameter	Unit	G/S	RDL	8158895	
Naphthalene	μg/L	1400	0.20	<0.20	
Acenaphthylene	μg/L	1.8	0.20	<0.20	
Acenaphthene	μg/L	600	0.20	<0.20	
Fluorene	μg/L	400	0.20	<0.20	
Phenanthrene	μg/L	580	0.10	<0.10	
Anthracene	μg/L	2.4	0.10	<0.10	
Fluoranthene	μg/L	130	0.20	<0.20	
Pyrene	μg/L	68	0.20	<0.20	
Benz(a)anthracene	μg/L	4.7	0.20	<0.20	
Chrysene	μg/L	1	0.10	<0.10	
Benzo(b)fluoranthene	μg/L	0.75	0.10	<0.10	
Benzo(k)fluoranthene	μg/L	0.4	0.10	<0.10	
Benzo(a)pyrene	μg/L	0.81	0.01	<0.01	
Indeno(1,2,3-cd)pyrene	μg/L	0.2	0.20	<0.20	
Dibenz(a,h)anthracene	μg/L	0.52	0.20	<0.20	
Benzo(g,h,i)perylene	μg/L	0.2	0.20	<0.20	
2-and 1-methyl Naphthalene	μg/L	1800	0.20	<0.20	
Surrogate	Unit	Acceptab	le Limits		
Chrysene-d12	%	50-1	140	54	

Comments:

RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Non-Potable Ground Water - All

Types of Property Uses - Coarse Textured Soils

8158895 Note: The result for Benzo(b)Flouranthene is the total of the Benzo(b)&(j)Flouranthene isomers because the isomers co-elute on the GC column.



AGAT WORK ORDER: 17Z182712 PROJECT: 1658448 - Claridge Ph II 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

ATTENTION TO: Alyssa Troke

SAMPLED BY:

				O. Reg. 15	3(511) - PHCs	s F1 - F4 (Water)
DATE RECEIVED: 2017-01-31						DATE REPORTED: 2017-02-07
	;	SAMPLE DESC	RIPTION:	MW #17-30	MW #17-31	
		SAMPL	LE TYPE:	Water	Water	
		DATE SA	AMPLED:	2017-01-30	2017-01-30	
Parameter	Unit	G/S	RDL	8158931	8158942	
Benzene	μg/L	44	0.20	<0.20	<0.20	
Toluene	μg/L	18000	0.20	<0.20	<0.20	
Ethylbenzene	μg/L	2300	0.10	<0.10	<0.10	
Xylene Mixture	μg/L	4200	0.20	<0.20	<0.20	
F1 (C6 to C10)	μg/L	750	25	<25	<25	
F1 (C6 to C10) minus BTEX	μg/L	750	25	<25	<25	
F2 (C10 to C16)	μg/L	150	100	<100	<100	
F3 (C16 to C34)	μg/L	500	100	<100	480	
F4 (C34 to C50)	μg/L	500	100	<100	600	
Gravimetric Heavy Hydrocarbons	μg/L	500	500	NA	NA	
Surrogate	Unit	Acceptable	Limits			
Terphenyl	%	60-14	ł0	72	75	





AGAT WORK ORDER: 17Z182712 PROJECT: 1658448 - Claridge Ph II

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

8158931

ATTENTION TO: Alyssa Troke

SAMPLED BY:

O. Reg. 153(511) - PHCs F1 - F4 (Water)

DATE RECEIVED: 2017-01-31 DATE REPORTED: 2017-02-07

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Non-Potable Ground Water - All Types of Property Uses - Coarse Textured Soils

The C6-C10 fraction is calculated using Toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons > C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6-C50 results are corrected for BTEX contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor. nC10, nC16 and nC34 response factors are within 10% of their average. C50 response factor is within 70% of nC10 + nC16 nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153/04, results are considered valid without determining the PAH contribution if not requested by the client.

NA = Not Applicable

8158942 Some sediment was observed in the sample. Whole bottle extraction was performed.

The C6-C10 fraction is calculated using Toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34,

Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons >C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6-C50 results are corrected for BTEX contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor. nC10, nC16 and nC34 response factors are within 10% of their average. C50 response factor is within 70% of nC10 + nC16 nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153/04, results are considered valid without determining the PAH contribution if not requested by the client.

NA = Not Applicable



AGAT WORK ORDER: 17Z182712 PROJECT: 1658448 - Claridge Ph II 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE: SAMPLED BY:

DATE RECEIVED: 2017-01-31			DATE REPORTED: 2017-02-07
	SAMPLE DESCRIPTION:	MW #17-29	

						3
		SAMPLE DESCRI	IPTION:	MW #17-29		
		SAMPLE	TYPE:	Water		
		DATE SAM	MPLED:	2017-01-30		
Parameter	Unit	G/S	RDL	8158895		
F1 (C6 to C10)	μg/L	750	25	<25		
F1 (C6 to C10) minus BTEX	μg/L	750	25	<25		
F2 (C10 to C16)	μg/L	150	100	<100		
F2 (C10 to C16) minus Naphthalene	μg/L		100	<100		
F3 (C16 to C34)	μg/L	500	100	<100		
F3 (C16 to C34) minus PAHs	μg/L		100	<100		
F4 (C34 to C50)	μg/L	500	100	<100		
Gravimetric Heavy Hydrocarbons	μg/L	500	500	NA		
Surrogate	Unit	Acceptable L	_imits			
Terphenyl	%	60-140		69		

O. Reg. 153(511) - PHCs F1 - F4 (with PAHs) (Water)

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Non-Potable Ground Water - All

Types of Property Uses - Coarse Textured Soils

8158895 The C6-C10 fraction is calculated using Toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and nC34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16 - C50 and are only determined if the chromatogram of the C34 - C50 Hydrocarbons indicated that hydrocarbons > C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6-C50 results are corrected for BTEX and PAH contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Certified By:



AGAT WORK ORDER: 17Z182712 PROJECT: 1658448 - Claridge Ph II 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

ATTENTION TO: Alyssa Troke

SAMPLED BY:

				O. Reg.	153(511) - VOCs (Water)
DATE RECEIVED: 2017-01-31					DATE REPORTED: 2017-02-0
	;	SAMPLE DESC	RIPTION:	MW #17-29	
		SAMP	LE TYPE:	Water	
		DATE S	AMPLED:	2017-01-30	
Parameter	Unit	G/S	RDL	8158895	
Dichlorodifluoromethane	μg/L	4400	0.80	<0.80	
/inyl Chloride	μg/L	0.5	0.50	<0.50	
Bromomethane	μg/L	5.6	0.80	<0.80	
Trichlorofluoromethane	μg/L	2500	1.60	<1.60	
Acetone	μg/L	130000	4.0	<4.0	
1,1-Dichloroethylene	μg/L	1.6	1.20	<1.20	
Methylene Chloride	μg/L	610	1.20	<1.20	
rans- 1,2-Dichloroethylene	μg/L	1.6	0.80	<0.80	
Methyl tert-butyl ether	μg/L	190	0.80	<0.80	
1,1-Dichloroethane	μg/L	320	1.20	<1.20	
Methyl Ethyl Ketone	μg/L	470000	4.0	<4.0	
cis- 1,2-Dichloroethylene	μg/L	1.6	0.80	<0.80	
Chloroform	μg/L	2.4	0.80	<0.80	
1,2-Dichloroethane	μg/L	1.6	0.80	<0.80	
1,1,1-Trichloroethane	μg/L	640	1.20	<1.20	
Carbon Tetrachloride	μg/L	0.79	0.79	<0.79	
Benzene	μg/L	44	0.80	<0.80	
1,2-Dichloropropane	μg/L	16	0.80	<0.80	
Trichloroethylene	μg/L	1.6	0.80	<0.80	
Bromodichloromethane	μg/L	85000	0.80	<0.80	
Methyl Isobutyl Ketone	μg/L	140000	4.0	<4.0	
1,1,2-Trichloroethane	μg/L	4.7	0.80	<0.80	
Toluene	μg/L	18000	0.80	<0.80	
Dibromochloromethane	μg/L	82000	0.40	<0.40	
Ethylene Dibromide	μg/L	0.25	0.25	<0.25	
Tetrachloroethylene	μg/L	1.6	0.80	<0.80	
1,1,1,2-Tetrachloroethane	μg/L	3.3	0.40	<0.40	
Chlorobenzene	μg/L	630	0.40	<0.40	
Ethylbenzene	μg/L	2300	0.40	<0.40	
m & p-Xylene	μg/L		0.80	<0.80	





AGAT WORK ORDER: 17Z182712 PROJECT: 1658448 - Claridge Ph II 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE: SAMPLED BY:

				O. Reg	. 153(511) - VOCs (Water)
DATE RECEIVED: 2017-01-31					DATE REPORTED: 2017-02-07
	SAMPLE DESCRIPTION:			MW #17-29	
		SAME	PLE TYPE:	Water	
		DATE S	SAMPLED:	2017-01-30	
Parameter	Unit	G/S	RDL	8158895	
Bromoform	μg/L	380	0.40	<0.40	
Styrene	μg/L	1300	0.40	< 0.40	
1,1,2,2-Tetrachloroethane	μg/L	3.2	0.40	< 0.40	
o-Xylene	μg/L		0.40	<0.40	
1,3-Dichlorobenzene	μg/L	9600	0.40	< 0.40	
1,4-Dichlorobenzene	μg/L	8	0.40	<0.40	
1,2-Dichlorobenzene	μg/L	4600	0.40	<0.40	
1,3-Dichloropropene	μg/L	5.2	1.20	<1.20	
Xylene Mixture	μg/L	4200	0.80	<0.80	
n-Hexane	μg/L	51	0.80	<0.80	
Surrogate	Unit	Acceptab	le Limits		
Toluene-d8	% Recovery	50-1	40	107	
4-Bromofluorobenzene	% Recovery	50-1	40	97	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Non-Potable Ground Water - All

Types of Property Uses - Coarse Textured Soils

8158895 Dilution factor=4

The sample was diluted because it was foamy. The reporting detection limit has been corrected for the dilution factor used.





AGAT WORK ORDER: 17Z182712

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

PROJECT: 1658448 - Claridge Ph II

ATTENTION TO: Alyssa Troke

SAMPLED BY:

				Inorgar	c Chemistry (Water)	
DATE RECEIVED: 2017-01-3	1					DATE REPORTED: 2017-02
	S	SAMPLE DESC	CRIPTION:	MW #17-30		
		SAME	PLE TYPE:	Water		
		DATE S	SAMPLED:	2017-01-30		
Parameter	Unit	G/S	RDL	8158931		
Iron	μg/L		10.0	78.9		
Sodium	μg/L	2300000	10000	1760000		
Chloride	μg/L	2300000	10000	4200000		
Sulphate	μg/L		10000	264000		
Resistivity	ohms.cm			81		

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Non-Potable Ground Water - All

Types of Property Uses - Coarse Textured Soils

8158931 Elevated RDLs indicate the degree of sample dilutions prior to analysis in order to keep the analytes within the calibration range of the instruments and to reduce matrix interferences.





AGAT WORK ORDER: 17Z182712 PROJECT: 1658448 - Claridge Ph II 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE: SAMPLED BY:

				O. Reg.	153(511) - All Metals (Water)
DATE RECEIVED: 2017-01-31					DATE REPORTED: 2017-02-07
	;	SAMPLE DESC	CRIPTION:	MW #17-29	
		SAMI	PLE TYPE:	Water	
		DATE S	SAMPLED:	2017-01-30	
Parameter	Unit	G/S	RDL	8158895	
Antimony	μg/L	20000	1.0	<1.0	
Arsenic	μg/L	1900	1.0	1.2	
Barium	μg/L	29000	2.0	956	
Beryllium	μg/L	67	0.5	<0.5	
Boron	μg/L	45000	10.0	<10.0	
Cadmium	μg/L	2.7	0.2	<0.2	
Chromium	μg/L	810	2.0	5.1	
Cobalt	μg/L	66	0.5	24.1	
Copper	μg/L	87	1.0	9.0	
Lead	μg/L	25	0.5	<0.5	
Molybdenum	μg/L	9200	0.5	3.7	
Nickel	μg/L	490	1.0	21.6	
Selenium	μg/L	63	1.0	<1.0	
Silver	μg/L	1.5	0.2	<0.2	
Thallium	μg/L	510	0.3	< 0.3	
Uranium	μg/L	420	0.5	9.0	
Vanadium	μg/L	250	0.4	0.7	
Zinc	μg/L	1100	5.0	17.6	
Mercury	μg/L	0.29	0.02	< 0.02	
Chromium VI	μg/L	140	5	<5	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Non-Potable Ground Water - All Types of Property Uses - Coarse Textured Soils

Certified By:

Mile Munemon



Guideline Violation

AGAT WORK ORDER: 17Z182712 PROJECT: 1658448 - Claridge Ph II 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
8158931	MW #17-30	ON T3 NPGW CT	Inorganic Chemistry (Water)	Chloride	μg/L	2300000	4200000
8158942	MW #17-31	ON T3 NPGW CT	O. Reg. 153(511) - PHCs F1 - F4 (Water)	F4 (C34 to C50)	μg/L	500	600

Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD

PROJECT: 1658448 - Claridge Ph II

ATTENTION TO: Alyssa Troke

AGAT WORK ORDER: 17Z182712

SAMPLING SITE: SAMPLED BY:

			irac	e Or	ganio	cs Ar	nalysi	S							
RPT Date: Feb 07, 2017				UPLICATI	E		REFEREN	ICE MA	TERIAL	METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Lir	eptable mits	Recovery	Lir	ptable nits	Recovery	Lir	ptable nits
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - VOCs (Water)															
Dichlorodifluoromethane	8157927		< 0.20	< 0.20	NA	< 0.20	96%	50%	140%	104%	50%	140%	85%	50%	140%
Vinyl Chloride	8157927		< 0.17	< 0.17	NA	< 0.17	105%	50%	140%	116%	50%	140%	83%	50%	140%
Bromomethane	8157927		< 0.20	< 0.20	NA	< 0.20	85%	50%	140%	104%	50%	140%	107%	50%	140%
Trichlorofluoromethane	8157927		< 0.40	< 0.40	NA	< 0.40	108%	50%	140%	118%	50%	140%	93%	50%	140%
Acetone	8157927		< 1.0	< 1.0	NA	< 1.0	107%	50%	140%	97%	50%	140%	111%	50%	140%
1,1-Dichloroethylene	8157927		< 0.30	< 0.30	NA	< 0.30	109%	50%	140%	90%	60%	130%	83%	50%	140%
Methylene Chloride	8157927		< 0.30	< 0.30	NA	< 0.30	104%	50%	140%	92%	60%	130%	105%	50%	140%
trans- 1,2-Dichloroethylene	8157927		< 0.20	< 0.20	NA	< 0.20	105%	50%	140%	109%	60%	130%	101%	50%	140%
Methyl tert-butyl ether	8157927		< 0.20	< 0.20	NA	< 0.20	112%	50%	140%	97%	60%	130%	102%	50%	140%
1,1-Dichloroethane	8157927		< 0.30	< 0.30	NA	< 0.30	115%	50%	140%	105%	60%	130%	108%	50%	140%
Methyl Ethyl Ketone	8157927		< 1.0	< 1.0	NA	< 1.0	75%	50%	140%	88%	50%	140%	111%	50%	140%
cis- 1,2-Dichloroethylene	8157927		< 0.20	< 0.20	NA	< 0.20	115%	50%	140%	83%	60%	130%	95%	50%	140%
Chloroform	8157927		< 0.20	< 0.20	NA	< 0.20	120%	50%	140%	83%	60%	130%	90%	50%	140%
1,2-Dichloroethane	8157927		< 0.20	< 0.20	NA	< 0.20	120%	50%	140%	98%	60%	130%	116%	50%	140%
1,1,1-Trichloroethane	8157927		< 0.30	< 0.30	NA	< 0.30	111%	50%	140%	83%	60%	130%	81%	50%	140%
Carbon Tetrachloride	8157927		< 0.20	< 0.20	NA	< 0.20	112%	50%	140%	90%	60%	130%	73%	50%	140%
Benzene	8157927		< 0.20	< 0.20	NA	< 0.20	113%	50%	140%	73%	60%	130%	77%	50%	140%
1,2-Dichloropropane	8157927		< 0.20	< 0.20	NA	< 0.20	92%	50%	140%	88%	60%	130%	84%	50%	140%
Trichloroethylene	8157927		< 0.20	< 0.20	NA	< 0.20	102%	50%	140%	91%	60%	130%	91%	50%	140%
Bromodichloromethane	8157927		< 0.20	< 0.20	NA	< 0.20	120%	50%	140%	82%	60%	130%	115%	50%	140%
Methyl Isobutyl Ketone	8157927		< 1.0	< 1.0	NA	< 1.0	81%	50%	140%	72%	50%	140%	116%	50%	140%
•															140%
1,1,2-Trichloroethane	8157927		< 0.20	< 0.20	NA	< 0.20	93%	50%	140%	71%	60%	130%	118%	50%	
Toluene	8157927		< 0.20	< 0.20	NA	< 0.20	99%	50% 50%	140%	74% 74%	60% 60%	130% 130%	85% 103%	50% 50%	140%
Dibromochloromethane Ethylene Dibromide	8157927 8157927		< 0.10 < 0.10	< 0.10 < 0.10	NA NA	< 0.10 < 0.10	93% 86%	50%	140% 140%	88%	60%	130%	112%	50%	140% 140%
•															
Tetrachloroethylene	8157927		< 0.20	< 0.20	NA	< 0.20	106%	50%	140%	79%	60%	130%	74%	50%	140%
1,1,1,2-Tetrachloroethane	8157927		< 0.10	< 0.10	NA	< 0.10	105%	50%	140%	71%	60%	130%	104%	50%	140%
Chlorobenzene	8157927		< 0.10	< 0.10	NA	< 0.10	98%	50%	140%	74%	60%	130%	95%	50%	140%
Ethylbenzene	8157927		< 0.10	< 0.10	NA	< 0.10	97%	50%	140%	72%	60%	130%	78%	50%	140%
m & p-Xylene	8157927		< 0.20	< 0.20	NA	< 0.20	108%	50%	140%	81%	60%	130%	90%	50%	140%
Bromoform	8157927		< 0.10	< 0.10	NA	< 0.10	114%	50%	140%	82%	60%	130%	87%	50%	140%
Styrene	8157927		< 0.10	< 0.10	NA	< 0.10	91%	50%	140%	81%	60%	130%	94%	50%	140%
1,1,2,2-Tetrachloroethane	8157927		< 0.10	< 0.10	NA	< 0.10	98%	50%		84%	60%	130%	88%	50%	140%
o-Xylene	8157927		< 0.10	< 0.10	NA	< 0.10	112%	50%	140%	84%	60%	130%	101%	50%	140%
1,3-Dichlorobenzene	8157927		< 0.10	< 0.10	NA	< 0.10	88%	50%	140%	89%	60%	130%	99%	50%	140%
1,4-Dichlorobenzene	8157927		< 0.10	< 0.10	NA	< 0.10	102%	50%	140%	83%	60%	130%	112%	50%	140%
1,2-Dichlorobenzene	8157927		< 0.10	< 0.10	NA	< 0.10	93%	50%	140%	72%	60%	130%	111%	50%	140%
1,3-Dichloropropene	8157927		< 0.30	< 0.30	NA	< 0.30	85%	50%	140%	89%	60%	130%	88%	50%	140%
n-Hexane	8157927		< 0.20	< 0.20	NA	< 0.20	99%	50%	140%	103%	60%	130%	82%	50%	140%

AGAT QUALITY ASSURANCE REPORT (V1)

Page 11 of 17

AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z182712 PROJECT: 1658448 - Claridge Ph II ATTENTION TO: Alyssa Troke

SAMPLING SITE: SAMPLED BY:

	٦	Γrace	Orga	anics	Ana	alysis	(Cor	ntin	ued)					
RPT Date: Feb 07, 2017				UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	IKE
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable	Recovery		ptable	Recovery	Lie	eptable mits
		lu	·				value	Lower	Upper		Lower	Upper		Lower	Uppe
O. Reg. 153(511) - PHCs F1 - F4	(with PAHs)	(Water)													
F1 (C6 to C10)	8162197	,	< 25	< 25	NA	< 25	88%	60%	140%	90%	60%	140%	91%	60%	140%
F2 (C10 to C16)		TW	< 100	< 100	NA	< 100	98%	60%	140%	69%	60%	140%	68%	60%	140%
F3 (C16 to C34)		TW	< 100	< 100	NA	< 100	98%	60%	140%	87%	60%	140%	90%	60%	140%
F4 (C34 to C50)		TW	< 100	< 100	NA	< 100	84%	60%	140%	83%	60%	140%	89%	60%	140%
O. Reg. 153(511) - PAHs (Water)														
Naphthalene		TW	< 0.20	< 0.20	NA	< 0.20	87%	50%	140%	98%	50%	140%	103%	50%	140%
Acenaphthylene		TW	< 0.20	< 0.20	NA	< 0.20	112%	50%	140%	91%	50%	140%	87%	50%	140%
Acenaphthene		TW	< 0.20	< 0.20	NA	< 0.20	114%	50%	140%	91%	50%	140%	96%	50%	140%
Fluorene		TW	< 0.20	< 0.20	NA	< 0.20	86%	50%	140%	91%	50%	140%	103%	50%	140%
Phenanthrene		TW	< 0.10	< 0.10	NA	< 0.10	74%	50%	140%	91%	50%	140%	99%	50%	140%
Anthracene		TW	< 0.10	< 0.10	NA	< 0.10	109%	50%	140%	97%	50%	140%	81%	50%	140%
Fluoranthene		TW	< 0.20	< 0.20	NA	< 0.20	96%	50%	140%	96%	50%	140%	104%	50%	140%
Pyrene		TW	< 0.20	< 0.20	NA	< 0.20	98%	50%	140%	94%	50%	140%	99%	50%	140%
Benz(a)anthracene		TW	< 0.20	< 0.20	NA	< 0.20	78%	50%	140%	107%	50%	140%	96%	50%	140%
Chrysene		TW	< 0.10	< 0.10	NA	< 0.10	102%	50%	140%	101%	50%	140%	87%	50%	140%
Benzo(b)fluoranthene		TW	< 0.10	< 0.10	NA	< 0.10	107%	50%	140%	100%	50%	140%	106%	50%	140%
Benzo(k)fluoranthene		TW	< 0.10	< 0.10	NA	< 0.10	88%	50%	140%	104%	50%	140%	103%	50%	140%
Benzo(a)pyrene		TW	< 0.01	< 0.01	NA	< 0.01	88%	50%	140%	104%	50%	140%	72%	50%	140%
Indeno(1,2,3-cd)pyrene		TW	< 0.20	< 0.20	NA	< 0.20	63%	50%	140%	84%	50%	140%	76%	50%	140%
Dibenz(a,h)anthracene		TW	< 0.20	< 0.20	NA	< 0.20	93%	50%	140%	71%	50%	140%	82%	50%	140%
Benzo(g,h,i)perylene		TW	< 0.20	< 0.20	NA	< 0.20	93%	50%	140%	88%	50%	140%	90%	50%	140%
2-and 1-methyl Naphthalene		TW	< 0.20	< 0.20	NA	< 0.20	114%	50%	140%	87%	50%	140%	93%	50%	140%
O. Reg. 153(511) - PHCs F1 - F4	(Water)														
Benzene	8162197		< 0.20	< 0.20	NA	< 0.20	91%	50%	140%	84%	60%	130%	89%	50%	140%
Toluene	8162197		< 0.20	< 0.20	NA	< 0.20	88%	50%	140%	89%	60%	130%	92%	50%	140%
Ethylbenzene	8162197		< 0.10	< 0.10	NA	< 0.10	85%	50%	140%	88%	60%	130%	93%	50%	140%
Xylene Mixture	8162197		< 0.20	< 0.20	NA	< 0.20	83%	50%	140%	93%	60%	130%	94%	50%	140%
F1 (C6 to C10)	8162197		< 25	< 25	NA	< 25	88%	60%	140%	90%	60%	140%	91%	60%	140%

Comments: Tap water analysis has been performed as QC sample testing for duplicate and matrix spike due to insufficient sample volume. When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:

AGAT QUALITY ASSURANCE REPORT (V1)

Page 12 of 17



Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD

PROJECT: 1658448 - Claridge Ph II

ATTENTION TO: Alyssa Troke

AGAT WORK ORDER: 17Z182712

SAMPLING SITE: SAMPLED BY:

	Water Analysis														
RPT Date: Feb 07, 2017			D	UPLICATE	=		REFEREN	REFERENCE MATERIAL		METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits	Recovery		ptable nits	Recovery		ptable nits
		Id	·				value	Lower	Upper	•	Lower	Upper	·	Lower	Upper
O. Reg. 153(511) - All Metals (Wat	ter)														
Antimony	8158895 8	3158895	< 1.0	<1.0	NA	< 1.0	95%	70%	130%	101%	80%	120%	104%	70%	130%
Arsenic	8158895 8	3158895	1.2	1.4	NA	< 1.0	98%	70%	130%	97%	80%	120%	99%	70%	130%
Barium	8158895 8	3158895	956	929	2.9%	< 2.0	100%	70%	130%	101%	80%	120%	100%	70%	130%
Beryllium	8158895 8	3158895	< 0.5	< 0.5	NA	< 0.5	94%	70%	130%	95%	80%	120%	97%	70%	130%
Boron	8158895 8	3158895	< 10.0	<10.0	NA	< 10.0	100%	70%	130%	98%	80%	120%	100%	70%	130%
Cadmium	8158895 8	3158895	< 0.2	<0.2	NA	< 0.2	100%	70%	130%	100%	80%	120%	99%	70%	130%
Chromium	8158895 8	3158895	5.1	4.7	NA	< 2.0	100%	70%	130%	105%	80%	120%	104%	70%	130%
Cobalt	8158895 8	3158895	24.1	25.6	6.0%	< 0.5	98%	70%	130%	92%	80%	120%	90%	70%	130%
Copper	8158895 8	3158895	9.0	10.1	11.5%	< 1.0	101%	70%	130%	103%	80%	120%	102%	70%	130%
Lead	8158895 8	3158895	< 0.5	<0.5	NA	< 0.5	100%	70%	130%	102%	80%	120%	99%	70%	130%
Molybdenum	8158895 8	3158895	3.7	3.8	2.7%	< 0.5	96%	70%	130%	95%	80%	120%	94%	70%	130%
Nickel	8158895 8	3158895	21.6	22.0	1.8%	< 1.0	91%	70%	130%	92%	80%	120%	90%	70%	130%
Selenium	8158895 8	3158895	< 1.0	< 1.0	NA	< 1.0	97%	70%	130%	98%	80%	120%	104%	70%	130%
Silver	8158895 8	3158895	< 0.2	< 0.2	NA	< 0.2	101%	70%	130%	109%	80%	120%	108%	70%	130%
Thallium	8158895 8	3158895	< 0.3	<0.3	NA	< 0.3	103%	70%	130%	104%	80%	120%	102%	70%	130%
Uranium	8158895 8	3158895	9.0	8.5	5.7%	< 0.5	99%	70%	130%	102%	80%	120%	101%	70%	130%
Vanadium	8158895 8	3158895	0.7	<0.4	NA	< 0.4	101%	70%	130%	103%	80%	120%	102%	70%	130%
Zinc	8158895 8	3158895	17.6	18.8	NA	< 5.0	101%	70%	130%	100%	80%	120%	103%	70%	130%
Mercury	8164927		< 0.02	< 0.02	NA	< 0.02	102%	70%	130%	102%	80%	120%	94%	70%	130%
Chromium VI	8157927		<5	<5	NA	< 5	100%	70%	130%	98%	80%	120%	97%	70%	130%
Inorganic Chemistry (Water)															
Iron	8158895 8	3158895	<10.0	<10.0	NA	< 10.0	101%	90%	110%	98%	90%	110%	97%	70%	130%
Sodium	8161305		12400	12300	0.8%	< 500	98%	70%	130%	98%	80%	120%	101%	70%	130%
Chloride	8162091		278000	274000	1.4%	< 100	94%	70%	130%	102%	70%	130%	101%	70%	130%
Sulphate	8162091		143000	142000	0.7%	< 100	99%	90%	110%	101%	90%	110%	103%	80%	120%

Comments: NA signifies Not Applicable.

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

Certified By:

Mile Muneman

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

ATTENTION TO: Alyssa Troke

SAMPLING SITE.		SAMPLED BY.	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Trace Organics Analysis	<u>'</u>		
Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Acenaphthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluorene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Phenanthrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benz(a)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(b)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(k)fluoranthene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(a)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Indeno(1,2,3-cd)pyrene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Dibenz(a,h)anthracene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzo(g,h,i)perylene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
2-and 1-methyl Naphthalene	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Chrysene-d12	ORG-91-5105	EPA SW-846 3510 & 8270	GC/MS
Benzene	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
Toluene	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
Ethylbenzene	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
Xylene Mixture	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
F1 (C6 to C10)	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5010	MOE PHC-E3421	(P&T)GC/FID
F2 (C10 to C16)	VOL-91-5010	MOE PHC-E3421	GC/FID
F3 (C16 to C34)	VOL-91-5010	MOE PHC-E3421	GC/FID
F4 (C34 to C50)	VOL-91-5010	MOE PHC-E3421	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	MOE PHC-E3421	BALANCE
Terphenyl	VOL-91-5010		GC/FID
F1 (C6 to C10)	VOL-91-5010	MOE PHC E3421	(P&T)GC/FID
F1 (C6 to C10) minus BTEX	VOL-91-5010	MOE PHC E3421	(P&T)GC/FID
F2 (C10 to C16)	VOL-91-5010	MOE PHC E3421	GC/FID
F2 (C10 to C16) minus Naphthalene	VOL-91-5010	MOE PHC E3421	GC/FID
F3 (C16 to C34)	VOL-91-5010	MOE PHC E3421	GC/FID
F3 (C16 to C34) minus PAHs	VOL-91-5010	MOE PHC E3421	GC/FID
F4 (C34 to C50)	VOL -91- 5010	MOE PHC- E3421	GC/FID
Gravimetric Heavy Hydrocarbons	VOL-91-5010	MOE PHC E3421	BALANCE
Dichlorodifluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Vinyl Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromomethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichlorofluoromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Acetone	VOL-91-5001 VOL-91-5001	EPA SW-846 5030 & 8260 EPA SW-846 5030 & 8260	(P&T)GC/MS (P&T)GC/MS
1,1-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methylene Chloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
trans- 1,2-Dichloroethylene	VOL-91-5001 VOL-91-5001	EPA SW-846 5030 & 8260 EPA SW-846 5030 & 8260	(P&T)GC/MS (P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001 VOL-91-5001	EPA SW-846 5030 & 8260 EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1-Dichloroethane			
'	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Ethyl Ketone	VOL-91-5001	EPA SW 846 5030 & 8260	(P&T)GC/MS
cis- 1,2-Dichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

ATTENTION TO: Alyssa Troke

SAIVIF LING SITE.		SAMPLED BT.	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Chloroform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Carbon Tetrachloride	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Benzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichloropropane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Trichloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromodichloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl Isobutyl Ketone	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2-Trichloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Dibromochloromethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylene Dibromide	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Tetrachloroethylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,1,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Chlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Ethylbenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
m & p-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Bromoform	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Styrene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,1,2,2-Tetrachloroethane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
o-Xylene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,4-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,2-Dichlorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
1,3-Dichloropropene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Xylene Mixture	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
n-Hexane	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
Toluene-d8	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS
4-Bromofluorobenzene	VOL-91-5001	EPA SW-846 5030 & 8260	(P&T)GC/MS

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

ATTENTION TO: Alyssa Troke

Or titil Elito Off E.		O/ (IVII EED D1.	
PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
Iron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Sodium	MET-93-6105	EPA SW-846 6010C & 200.7	ICP/OES
Chloride	INOR-93-6004	SM 4110 B	ION CHROMATOGRAPH
Sulphate	INOR 1004	SM 4110 B	ION CHROMATOGRAPH
Resistivity		SM 2510 B	EC METER
Antimony	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Arsenic	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Barium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Boron	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cadmium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Chromium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Cobalt	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Copper	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Lead	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Molybdenum	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Nickel	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Selenium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Silver	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Thallium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Uranium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Vanadium	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Zinc	MET-93-6103	EPA SW-846 6020A & 200.8	ICP-MS
Mercury	MET-93-6100	EPA SW-846 7470 & 245.1	CVAAS
Chromium VI	INOR-93-6034	SM 3500-Cr B	SPECTROPHOTOMETER



5835 Coopers Avenue Mississauga. Ontario L4Z 1Y2 **Laboratory Use Only**

Ph: 905.712.5100 Fax: 905.712.5122 webearth.agatlabs.com

	W ater sample, please	use Drinking Water Chain of Custody Form ((potable water intended	1 for human consumption)	Arrival Temperatures: 25 24 13 0
Report Information: Company: Contact: Ausso Trake / Keuth Hol	- 12	Regulatory Requirements:		atory Requirement	Custody Seal Intact: Yes No Notes:
Contact: Address: Phone: Reports to be sent to: 1. Email: Kholmes & golden . com	OHama	Regulation 153/04 Table	nitary	Regulation 558 CCME Prov. Water Quality Objectives (PWQO) Other Indicate One	Turnaround Time (TAT) Required: Regular TAT
Project: 1658448 - Classinge PH. II Site Location: Sampled By:	-	Is this submission for a Record of Site Condition? ☐ Yes 🛣 No	Certifica ✓ Yes		Please provide prior notification for rush TAT *TAT is exclusive of weekends and statutory holidays For 'Same Day' analysis, please contact your AGAT CPM
AGAT Quote #: PO: Please note: If quotation number is not provided, client will be billed for Invoice Information: Bill To Sa Company: Contact: Address: Email:	price for analysis.	Sample Matrix Legend B Biota GW Ground Water O Oil P Paint S Soil SD Sediment SW Surface Water	Field Filtered - Metals, Hg. Co. Metals and inorganics All Metals (153 Metals (excl. Hydrides) 9 Hydride Metals	#8 #8 BIS	Volatiles: RVoC □BTEX □THM CCME Fractions 1 to 4 / BTEX ABNs PAHS PCBS: □ Total □ Aroclors Organochlorine Pesticides TCLP: □ M&I □ VOCS □ ABNS □ B(a)P □ PCBS Sewer Use Recollande, Schwing
Sample Identification Date Time Sampled Sample	# of San		Metals a	ORPS: C Cret C D pH Cl Full Met Regulati	Volatiles: @we CCME Fraction ABNs ABNs PAHS PCBS: □Total Organochlorine TCLP: □ M&l □ \ Sewer Use Rewshy Rewshy Abhach
MW#17-29 30/01/17 143 MW#17-30 30/01/17 133 MW#17-31 30/01/17 1519	0 7 6	W.	7		
Samples Relinquished By (Print Name and Skroj). Samples Relinquished By (Print Name and Sign). Date Samples Relinquished By (Print Name and Sign). Date Documers 80: 07/728 (513-012)	Time 16	Samples Received By (Print Name and Sign): Samples Received By (Print Name and Sign):		Date Date	Page of No: T 041608



CLIENT NAME: GOLDER ASSOCIATES LTD 1931 ROBERTSON ROAD OTTAWA, ON K2H5B7 (613) 592-9600

ATTENTION TO: Alyssa Troke

PROJECT: 1658448

AGAT WORK ORDER: 17Z185120

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Coordinator

DATE REPORTED: Feb 14, 2017

PAGES (INCLUDING COVER): 5

VERSION*: 1

Should you require any information regarding this analysis please contact your client services representative at (905) 712-5100

NOTES
l

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

*NOTE O

Page 1 of 5

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

Certificate of Analysis

AGAT WORK ORDER: 17Z185120

PROJECT: 1658448

ATTENTION TO: Alyssa Troke

SAMPLED BY:

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

\cap	Raa	153/511)	- ORPs	(Soil)	- EC & SAR
v.	nteu.	10000111	- OILE 3	(JUII)	

DATE RECEIVED: 2017-02-07	DATE REPORTED: 2017-02-14

SAMPLE DESCRIPTION: B	H17-8 SA7		
SAMPLE TYPE:	Soil		
DATE SAMPLED: 2	2017-01-23		
Parameter Unit G/S RDL	8174832		
Electrical Conductivity mS/cm 0.7 0.005	0.303		
Sodium Adsorption Ratio NA 5 NA	0.254		

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil -

Residential/Parkland/Institutional Property Use - Coarse Textured Soils

8174832 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil).

Certified By:

Amanjot Bhela



Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z185120

PROJECT: 1658448

ATTENTION TO: Alyssa Troke

SAMPLING SITE: SAMPLED BY:

	Soil Analysis														
RPT Date: Feb 14, 2017			С	UPLICAT	E		REFEREN	ICE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	RIX SPI	KE
PARAMETER	Sample		Method Blank	Measured	Acceptable Limits Re		Recovery	Acceptable Limits		Recovery	Lin	ptable nits			
				Value	Lower	Upper	,	Lower	Upper	,	Lower Upper				

O. Reg. 153(511) - ORPs (Soil) - EC & SAR

Electrical Conductivity 8182368 91% 1.10 < 0.005 90% 110% NA 1.11 0.9% NA 8174708 Sodium Adsorption Ratio 8.15 NA 8.03 1.5% NA NA NA

Comments: NA signifies Not Applicable.

Certified By:

Amanjot Bhela



Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

PROJECT: 1658448

AGAT WORK ORDER: 17Z185120

ATTENTION TO: Alyssa Troke

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INUR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES



Laboratory Use Only

Laborate Page 1		s Ball tra	Mississauga, Ontario L4Z 1Y2 005.712.5100 Fax: 905.712.5122 webearth.agatlabs.com	Work Order #: 17485120 Cooler Quantity: 2 Ne Arrival Temperatures: 4 2 14 1 1 3 8
Chain of Custody Record If this is a Drinking Water sample, please Report Information: Company: Company	Regulatory Requ	irements:	water intended for human consumption) No Regulatory Requiremen	T-3.01
Address: 1931 Roberton Road, Ottern	Regulation 153/04 Table 3 Indicate One	Sewer Use	Regulation 558	Turnaround Time (TAT) Required: Regular TAT
Phone: 613-590-9600 Fax: Reports to be sent to: 1. Email: atroke agalder.com 2. Email: Chaines agalder.com		Storm Region	Prov. Water Quality Objectives (PWQO) Other	Rush TAT (Rush Surcharges Appty) 3 Business
Project Information: Project: Site Location: Sampled By:	Is this submission Record of Site Co		Report Guideline on Certificate of Analysis Yes \[\begin{array}{c} \text{No} \end{array}	OR Date Required (Rush Surcharges May Apply): Please provide prior notification for rush TAT *TAT is exclusive of weekends and statutory holidays
AGAT Quote #: PO: Please note: If quotation number is not provided, client will be billed full price for analysis Invoice Information: Bill To Same: Yes No Company: Company: Contact: Address: Email:	Sample Matrix Legend B Biota GW Ground Water O Oil P Paint S Soil SD Sediment SW Surface Water	eld Filtered - Metals, Hg, CrVI (Please Circle)	an strong datals stom Metals stom Metals Der Doy, No. DHG DH DSAR DHG DH DSAR DN, DTRN DNO. DNO, NO. DNO. DNO, NO.	ls 1 to 4 Inorganics

					-11	i i i	a a	Sc	e G		at 🗆	es:	F		ď		00	Me	ຼິ	DO		130	
Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y/N	Metals ar	Metal	Hydride F	ORPs:	Nutrie No.	Volatiles:	CCME	PAHS	Chloroph	PCBs	Organoch	TCLP Mei	Sewer Us	S II	0	H	
BH17-8 SA7	Jan-23/1	7 —	1	5	THE RESERVE OF THE SECOND	14%									74				>			=,/	
			23			==0Ti							m		Ü								
																							0
			-						ou i													-	
												Ш											
															101								4
						11 1100									11								_
									0.0				- 1										

10.050-

Page ____



CLIENT NAME: GOLDER ASSOCIATES LTD 1931 ROBERTSON ROAD OTTAWA, ON K2H5B7 (613) 592-9600

ATTENTION TO: Alyssa Troke; Keith Holmes

PROJECT: 1658448 Claridge TP

AGAT WORK ORDER: 17Z240912

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Coordinator

TRACE ORGANICS REVIEWED BY: Oksana Gushyla, Trace Organics Lab Supervisor

DATE REPORTED: Aug 02, 2017

PAGES (INCLUDING COVER): 10

VERSION*: 1

<u> </u>				
Should you require any	v intormation regar	ding this analysis pleas	e contact vour client service	es representative at (905) 712-5100

NOTES .	

All samples will be disposed of within 30 days following analysis. Please contact the lab if you require additional sample storage time.

AGAT Laboratories (V1)

Page 1 of 10

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)

Western Enviro-Agricultural Laboratory Association (WEALA) Environmental Services Association of Alberta (ESAA) AGAT Laboratories is accredited to ISO/IEC 17025 by the Canadian Association for Laboratory Accreditation Inc. (CALA) and/or Standards Council of Canada (SCC) for specific tests listed on the scope of accreditation. AGAT Laboratories (Mississauga) is also accredited by the Canadian Association for Laboratory Accreditation Inc. (CALA) for specific drinking water tests. Accreditations are location and parameter specific. A complete listing of parameters for each location is available from www.cala.ca and/or www.scc.ca. The tests in this report may not necessarily be included in the scope of accreditation.



AGAT WORK ORDER: 17Z240912 PROJECT: 1658448 Claridge TP 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLED BY:

	O. Reg. 153(511) - ORPs (Soil)														
DATE RECEIVED: 2017-07-24		DATE REPORTED: 2017-08-02													
		SAMPLE DES	CRIPTION:	TP17-4 SA1	TP17-5 SA3	TP17-5 SA13	TP17-6 SA1	TP17-7 SA2	TP17-8 SA1	TP17-9 SA3	TP17-10 SA1				
		SAM	PLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil				
		DATE	SAMPLED:	2017-07-21	2017-07-21	2017-07-21	2017-07-21	2017-07-21	2017-07-21	2017-07-21	2017-07-21				
Parameter	Unit	G/S	RDL	8582433	8582437	8582441	8582449	8582452	8582456	8582464	8582504				
Electrical Conductivity	mS/cm	0.7	0.005	0.146	0.861	0.809	0.251	1.49	0.311	0.043	0.143				
Sodium Adsorption Ratio	NA	5	NA	0.174	2.91	2.86	0.289	27.2	2.35	0.203	0.816				

Comments:

RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil -

Residential/Parkland/Institutional Property Use - Coarse Textured Soils

Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

8582433-8582504 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil).

Certified By:

Amanjot Bhela



AGAT WORK ORDER: 17Z240912 PROJECT: 1658448 Claridge TP 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLED BY:

O. Reg. 153(5	511) - PHCs F	1 - F4 (Soil)
---------------	---------------	---------------

DATE RECEIVED: 2017-07-24								I	DATE REPORTE	D: 2017-08-02	
		SAMPLE DES	CRIPTION:	TP17-3 SA1	TP17-4 SA1	TP17-5 SA3	TP17-5 SA13	TP17-6 SA1	TP17-7 SA2	FB2 SA1	FB2 SA2
		SAMI	PLE TYPE:	Soil	Soil	Soil	Soil	Soil	Soil	Soil	Soil
		DATES	DATE SAMPLED: 2		2017-07-21	2017-07-21	2017-07-21	2017-07-21	2017-07-21	2017-07-21	2017-07-21
Parameter	Unit	G/S	RDL	8582423	8582433	8582437	8582441	8582449	8582452	8582513	8582523
Benzene	μg/g	0.21	0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Toluene	μg/g	2.3	0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Ethylbenzene	μg/g	2	0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Xylene Mixture	μg/g	3.1	0.05	< 0.05	< 0.05	< 0.05	< 0.05	<0.05	< 0.05	< 0.05	< 0.05
F1 (C6 to C10)	μg/g	55	5	<5	<5	<5	<5	<5	<5	<5	<5
F1 (C6 to C10) minus BTEX	μg/g	55	5	<5	<5	<5	<5	<5	<5	<5	<5
F2 (C10 to C16)	μg/g	98	10	<10	<10	<10	<10	<10	<10	<10	<10
F3 (C16 to C34)	μg/g	300	50	1100	2300	<50	<50	<50	<50	2800	750
F4 (C34 to C50)	μg/g	2800	50	1800	2800	<50	<50	<50	<50	3400	1100
Gravimetric Heavy Hydrocarbons	μg/g	2800	50	NA	NA	NA	NA	NA	NA	NA	NA
Moisture Content	%		0.1	8.5	7.0	22.7	21.9	25.2	21.7	6.8	5.7
Surrogate	Unit	Acceptab	le Limits								
Terphenyl	%	60-1	140	92	87	89	96	105	91	95	84





AGAT WORK ORDER: 17Z240912 PROJECT: 1658448 Claridge TP

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE:

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLED BY:

				O. Reg. 1	53(511) - PH	lCs F1 - F4	4 (Soil)
DATE RECEIVED: 2017-07-24							DATE REPORTED: 2017-08-02
		SAMPLE DES	CRIPTION:	FB2 SA3	TP17-1 SA1	TP17-2 SA1	
		SAMI	PLE TYPE:	Soil	Soil	Soil	
		DATES	SAMPLED:	2017-07-21	2017-07-21	2017-07-21	
Parameter	Unit	G/S	RDL	8582528	8582533	8588325	
Benzene	μg/g	0.21	0.02	<0.02	<0.02	< 0.02	
Toluene	μg/g	2.3	0.08	<0.08	<0.08	<0.08	
Ethylbenzene	μg/g	2	0.05	< 0.05	< 0.05	< 0.05	
Xylene Mixture	μg/g	3.1	0.05	< 0.05	< 0.05	< 0.05	
F1 (C6 to C10)	μg/g	55	5	<5	<5	<5	
F1 (C6 to C10) minus BTEX	μg/g	55	5	<5	<5	<5	
F2 (C10 to C16)	μg/g	98	10	<10	<10	<10	
F3 (C16 to C34)	μg/g	300	50	790	560	630	
F4 (C34 to C50)	μg/g	2800	50	1200	1100	1000	
Gravimetric Heavy Hydrocarbons	μg/g	2800	50	NA	NA	NA	
Moisture Content	%		0.1	5.4	7.3	9.6	
Surrogate	Unit	Acceptab	le Limits				
Terphenyl	%	60-1	40	94	86	81	

Comments:

RDL - Reported Detection Limit; G / S - Guideline / Standard: Refers to Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition - Soil -

Residential/Parkland/Institutional Property Use - Coarse Textured Soils

Guideline values are for general reference only. The guidelines provided may or may not be relevant for the intended use. Refer directly to the applicable standard for regulatory interpretation.

8582423-8588325 Results are based on sample dry weight.

The C6-C10 fraction is calculated using Toluene response factor.

The C10 - C16, C16 - C34, and C34 - C50 fractions are calculated using the average response factor for n-C10, n-C16, and n-C34.

Gravimetric Heavy Hydrocarbons are not included in the Total C16-C50 and are only determined if the chromatogram of the C34 - C50 hydrocarbons indicates that hydrocarbons >C50 are present.

The chromatogram has returned to baseline by the retention time of nC50.

Total C6 - C50 results are corrected for BTEX contributions.

This method complies with the Reference Method for the CWS PHC and is validated for use in the laboratory.

nC6 and nC10 response factors are within 30% of Toluene response factor.

nC10, nC16 and nC34 response factors are within 10% of their average.

C50 response factor is within 70% of nC10 + nC16 + nC34 average.

Linearity is within 15%.

Extraction and holding times were met for this sample.

Fractions 1-4 are quantified with the contribution of PAHs. Under Ontario Regulation 153, results are considered valid without determining the PAH contribution if not requested by the client.

Quality Control Data is available upon request.



Guideline Violation

AGAT WORK ORDER: 17Z240912 PROJECT: 1658448 Claridge TP 5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLEID	SAMPLE TITLE	GUIDELINE	ANALYSIS PACKAGE	PARAMETER	UNIT	GUIDEVALUE	RESULT
8582423	TP17-3 SA1	ON T3 S RPI CT	O. Reg. 153(511) - PHCs F1 - F4 (Soil)	F3 (C16 to C34)	μg/g	300	1100
8582433	TP17-4 SA1	ON T3 S RPI CT	O. Reg. 153(511) - PHCs F1 - F4 (Soil)	F3 (C16 to C34)	μg/g	300	2300
8582437	TP17-5 SA3	ON T3 S RPI CT	O. Reg. 153(511) - ORPs (Soil)	Electrical Conductivity	mS/cm	0.7	0.861
8582441	TP17-5 SA13	ON T3 S RPI CT	O. Reg. 153(511) - ORPs (Soil)	Electrical Conductivity	mS/cm	0.7	0.809
8582452	TP17-7 SA2	ON T3 S RPI CT	O. Reg. 153(511) - ORPs (Soil)	Electrical Conductivity	mS/cm	0.7	1.49
8582452	TP17-7 SA2	ON T3 S RPI CT	O. Reg. 153(511) - ORPs (Soil)	Sodium Adsorption Ratio	NA	5	27.2
8582513	FB2 SA1	ON T3 S RPI CT	O. Reg. 153(511) - PHCs F1 - F4 (Soil)	F3 (C16 to C34)	μg/g	300	2800
8582513	FB2 SA1	ON T3 S RPI CT	O. Reg. 153(511) - PHCs F1 - F4 (Soil)	F4 (C34 to C50)	μg/g	2800	3400
8582523	FB2 SA2	ON T3 S RPI CT	O. Reg. 153(511) - PHCs F1 - F4 (Soil)	F3 (C16 to C34)	μg/g	300	750
8582528	FB2 SA3	ON T3 S RPI CT	O. Reg. 153(511) - PHCs F1 - F4 (Soil)	F3 (C16 to C34)	μg/g	300	790
8582533	TP17-1 SA1	ON T3 S RPI CT	O. Reg. 153(511) - PHCs F1 - F4 (Soil)	F3 (C16 to C34)	μg/g	300	560



8600321

5835 COOPERS AVENUE MISSISSAUGA, ONTARIO CANADA L4Z 1Y2 TEL (905)712-5100 FAX (905)712-5122 http://www.agatlabs.com

NA

Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z240912

NA

PROJECT: 1658448 Claridge TP

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLING SITE: SAMPLED BY:

2.30

2.41

	Soil Analysis														
RPT Date: Aug 02, 2017				UPLICAT	E		REFEREN	NCE MA	TERIAL	METHOD	BLAN	SPIKE	MAT	RIX SPI	KE
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured		ptable nits	Recovery	Acceptable Limits		Recovery	Acceptable Limits	
	Batch Id	la la					Value	Lower	Upper	1 ,		Upper	,	Lower	Upper
O. Reg. 153(511) - ORPs (Soil) Electrical Conductivity	8600321		0.192	0.203	5.6%	< 0.005	100%	90%	110%	NA			NA		

4.7%

NA

NA

Comments: NA signifies Not Applicable.

Sodium Adsorption Ratio

Certified By:

Amanjot Bhela



Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z240912

PROJECT: 1658448 Claridge TP

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLING SITE: SAMPLED BY:

SAMPLING SITE. SAMPLED BY.															
Trace Organics Analysis															
RPT Date: Aug 02, 2017			С	UPLICATI		REFERE	NCE MA	TERIAL	METHOD	BLANK	SPIKE	MAT	KE		
PARAMETER	Batch	Sample	Dup #1	Dup #2	RPD	Method Blank	Measured Value		ptable nits	Recovery	Lie	ptable nits	Recovery	منا ا	ptable nits
		ld	·	·				Lower	Upper		Lower	Upper	·	Lower	Upper
O. Reg. 153(511) - PHCs F1 - F	4 (Soil)														
Benzene	8588325	8588325	< 0.02	< 0.02	NA	< 0.02	83%	60%	130%	103%	60%	130%	106%	60%	130%
Toluene	8588325	8588325	< 0.08	< 0.08	NA	< 0.08	88%	60%	130%	102%	60%	130%	108%	60%	130%
Ethylbenzene	8588325	8588325	< 0.05	< 0.05	NA	< 0.05	84%	60%	130%	99%	60%	130%	101%	60%	130%
Xylene Mixture	8588325	8588325	< 0.05	< 0.05	NA	< 0.05	70%	60%	130%	73%	60%	130%	75%	60%	130%
F1 (C6 to C10)	8588325	8588325	< 5	< 5	NA	< 5	74%	60%	130%	87%	85%	115%	81%	70%	130%
F2 (C10 to C16)	8593002		< 10	< 10	NA	< 10	102%	60%	130%	84%	80%	120%	70%	70%	130%
F3 (C16 to C34)	8593002		< 50	< 50	NA	< 50	106%	60%	130%	91%	80%	120%	71%	70%	130%
F4 (C34 to C50)	8593002		< 50	< 50	NA	< 50	88%	60%	130%	81%	80%	120%	86%	70%	130%

Comments: When the average of the sample and duplicate results is less than 5x the RDL, the Relative Percent Difference (RPD) will be indicated as Not Applicable (NA).

Certified By:

Juz



Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD AGAT WORK ORDER: 17Z240912

PROJECT: 1658448 Claridge TP ATTENTION TO: Alyssa Troke; Keith Holmes

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE					
Soil Analysis	•	·	•					
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER					
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES					
Trace Organics Analysis								
Benzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS					
Toluene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS					
Ethylbenzene	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS					
Xylene Mixture	VOL-91-5009	EPA SW-846 5035 & 8260	P & T GC/MS					
F1 (C6 to C10)	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID					
F1 (C6 to C10) minus BTEX	VOL-91-5009	CCME Tier 1 Method	P & T GC/FID					
F2 (C10 to C16)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID					
F3 (C16 to C34)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID					
F4 (C34 to C50)	VOL-91-5009	CCME Tier 1 Method, EPA SW846 8015	GC / FID					
Gravimetric Heavy Hydrocarbons	VOL-91-5009	CCME Tier 1 Method	BALANCE					
Moisture Content	VOL-91-5009 CCME Tier 1		BALANCE					
Terphenyl	VOL-91-5009		GC/FID					

Laboratories

5835 Coopers Avenue

Laboratory Use Only

Cooler Quantity:

Mississauga, Ontario 142 172

Ph: 905.712.5100 Fax: 905.712.5122

webearth.agatlabs.com

chain of Custody Record	If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water intended for human consumption
-------------------------	---

Chain of Custody Record If this is a Drinking Water sample, please						olease u	use Drinking Water Chain of Custody Form (potable water intended for human consumption)									Arrival Temperatures: 8-1 1.3 1.0										
Report Information: Company: Golder Associateo							Regulatory Requirements: No Regulatory Requirement (Please check all applicable bases)							nt												
Contact:	Alyssa Trote/Keith Holmes 1931 Robertson Rd, Ottawa					==	Regulation 153/04 Sewer Use Regulation 558						Turnaround Time (TAT) Required:													
Address:							Table		□Sani			ССМЕ		ИE			i i				imi) Required:					
	-									Same							Regular TAT				₹ 5 t	5 to 7 Business Days				
Phone:	613-592-9600	<u> </u>	Fax:					Res/Park ☐Agriculture	□Stor	m			rov. Wate				Rus	sh TA	T (Rust	h Surc	harges A	ipply)				
Reports to be sent to:									egion			По	bjectives	(PWQ	U)			2	Busin	2000		21	Busine	.00	Ne	nd Business
1. Email:							1	☑ Coarse	Indica	te One			uioi						ays	1622		ם בו Da		.55	☐ Da	ext Business IV
2. Email:								Fine				_	Indicate	One	-	- 11		0	R Dat	te Re	equired	d (Rust	n Surc	harges	May Ap	ply):
Project Inform	nation:							Is this submission	for a		Re	port (auldelir	e or						5	Do	uno				
Project:		100	-	0			1000	ecord of Site Cond					e of An						Plea	se p	rovide	prior	notific		or rush	
Site Location:	1658448-CI	anac	30 /					Yes	do.		N	Yes		N	2			*7.	AT is e	exclu	sive o	f week	ends a	and sta	tutory h	olidays
Sampled By:						_		LA ICS LI	10		D	163	-	5. 2.7	,			For 'Sa	me D	ay' a	analys	is, ple	ase co	ontact y	our AG	AT CPM
AGAT Quote #:			PO:									O. Reg	153							T		- B				
nan quoto in	Please note: If quotation number	er is not provi		ill be billed full price	e for analysis			mple Matrix Lege	nd	C.Z.		8								-		□PCBs	oba)	IIC		
Invoice Inform	nation			Bill To Same:	Voc 🗸 No		B GW	Biota W Ground Water		五		☐ 153 Metals (excl. Hydrides)					≨					□ B(a)P				
	ilation.			Din 10 Saine.	162 🖎 110		0	Oil		Metals,		XC. H	H G C .		S	ONO3+NO2	THM	18T		4		10				
Company: Contact:			-				P	Paint		S ≥		als (e	능미		etal	1 0 L	Ă	7,		3	ides	ABNs				
Address:							S	Soil		- pe	an ice	Met	FOC		Σ	N S	BTEX	to t		3	☐ Aroclors Pesticides	N C				
Email:							SD			Fifte	orga	153 Is	S []	Jan	usto	- C	□ voc	ns 1							1,-1	-110
Linaii.							SW	Surface Water		Field Fittered -	la de	lls □	□ B-HWS	als Se	Ju/C	Its: TTP		actio		- 1	U lotal	\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\	Use			
Sample	e Identification		ate npled	Time Sampled	# of Containers	Sam		Comments Special Instruc		Y/N	Metals and Inorganics	☐ All Metals ☐ 15 ☐ Hydride Metals	ORPs:	Full Metals Scan	Regulation/Custom Metals	Nutrients	Volatiles:	CCME Fractions 1 to 4 /	ABNS	PAINS	PCBS: 🗆 lotal Organochlorine	TCLP: M&I	Sewer U	ST SE		
TP17-1 3	SALA	Trul	21/17		3	5												\times								
7P17-2			3	_							E							X								
TP17-3 S	F 122																	X								
TP17-4 51										1-100								X						$\times \times$		100
TP17-5 5	SA3			_						-111								X						$\times \times$		
TP17-5	SA13			_														\times						XX		
TP17-6	SAL			_														X						$\times \times$		
TP17-7 9	5A2			_														\times					3	$\times \times$		
TP17-8				_				NO PHCS/BTE	X								1 2	差				rk		$\times \times$		
TP17-9	SA3																T 2							$\times \times$		
TP17-10		1	r.		V	1																		XX		
Samples Relinquished By (Prin	nt Name and Sign);			Date	110	nt=		Samples Received by (Print	Name and Same	m .		- 1		_	Date		-	Tim			1					
Alussa Ti	roke lalyson		9	July	24/17	10:	30	betthe	101	De	W	W		d	47	lul	1-	1	lh	01						^
Surgices resemble and Control	60 defal	SV		Zul Ful	24/7	Neh	OD	Sangara ransanana dy frant	and any angri.						Date		9		-				Page		_ of	4
Samples Relinquished By (Prin	nt-Name and Sign):	- The		Date	7 7 1	me		Samples Received By (Print	Mame and Sign's	7			- 1		Date			Tim	e			-		4	100	



Laboratories

5835 Coopers Avenue

Laboratory Use Only

Wississauga, Untano 1.42 172 Ph: 905.712.5100 Fax: 905.712.5122

webearth.agatlabs.com

~ 1			
Ole - In-	of Ourstand	Decemb	

Chain of Custody Recor	d If this is a	Drinking Wat	tor comple p	logeo uco	Drinking Water Chain of Custody Form	(notable v	unter inte		n.agatia	-			oler Qi ival Te		y; atures	-	2		17.3		9		
Report Information: Company: Contact: Alyssa Trake / Ke: Th Holmes					Regulatory Requirements: No Regulatory Requirement									Seal I	ntact:		Yes	;	 	0	□N/A		
Company: Contact: Address: Address:		Regulation 153/04 Table 3 Indicate One Sa							Turnaround Time (TAT) Required: Regular TAT 5 to 7 Business Days														
Phone: 613-592-91000 Fax: Reports to be sent to: 1. Email: atrole agalder com 2. Email: Kholmesægelder com					Res/Park Student Student Soil Texture (Check One)	rm ate One	Objectives (PWQO)						Rush TAT (Rush Surcharges Apply) 3 Business 2 Business Days Days Days OR Date Required (Rush Surcharges May Apply):										
Project Information: Project: 1658448 - Clariclese Site Location: Sampled By:					Is this submission for a Record of Site Condition? Yes No		Report Guideline on Certificate of Analysis Yes No						Please provide prior notification for rush TAT *TAT is exclusive of weekends and statutory holidays For 'Same Day' analysis, please contact your AGAT CPM										
AGAT Quote #: Please note: If quotation number is not provided, client will be billed full price for analysis. Invoice Information: Bill To Same: Yes No Company: Contact: Address: Email:					Sample Matrix Legend B Biota GW Ground Water O Oil P Paint S Soil SD Sediment SW Surface Water	Field Filtered - Metals, Hg, CrVI		C Keek 1123 Metals (exc. nyundes) ☐ Hydride Metals ☐ CI: ☐ CIN ☐	JEC LFOC LI ISAR tals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH3 ☐ TKN ☐ NO3 ☐ NO3 ☐ NO2 ☐ NO3 + NO2	es: □voc □BTEX □THM	CCME Fractions 1 to 4/187 EX		PRHS PCBs: □ Total □ Aroclors		□ M&I □ VOCs □ ABNs □ B(a)P □ PCBs	Use					
Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix		Y/N	Metals	Hydri ORPs:	PH DH C	Regula	Nutrie ON O.	Volatiles:	CCME	ABNS	PCBs:	Organ	TOLP:	Sewer Use					
FB25A1 FB25A2 FB25A3	July 21/17		3 3 3	5 5																			
Samples Relinquished By (Print Name and Sign): Samples Relinquished By (Print Name and Sign):		Date	Tir	ne ne	Samples Received By Print Name and Sign): Samples Received By (Print Name and Sign):					S U	Jul)	y-1	Tim	e {{h	iac								
Samples Relinquished by (Print) one and Sign): Samples Relinquished By (Print Name and Sign):	λ	A C-Tul	ly 17	llelli	Samples Received By (Print Manie and Sign):					Dat	ę.	100	Tim	ic					文 147	of			

As a global, employee-owned organisation with over 50 years of experience, Golder Associates is driven by our purpose to engineer earth's development while preserving earth's integrity. We deliver solutions that help our clients achieve their sustainable development goals by providing a wide range of independent consulting, design and construction services in our specialist areas of earth, environment and energy.

For more information, visit golder.com

Africa + 27 11 254 4800
Asia + 86 21 6258 5522
Australasia + 61 3 8862 3500
Europe + 44 1628 851851
North America + 1 800 275 3281
South America + 56 2 2616 2000

solutions@golder.com www.golder.com

Golder Associates Ltd. 1931 Robertson Road Ottawa, Ontario, K2H 5B7 Canada T: +1 (613) 592 9600

Golder Associates