October 2017

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:
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REPORT

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Golder Associates

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 (m^3). 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 (m^2); 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 m^3) 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.

Table of Contents

TABLES EMBEDDED WITHIN REPORT

TABLES FOLLOWING THE TEXT OF THE REPORT

FIGURES

APPENDICES

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 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 completed at the eastern extent of fill in this location. The soil sample submitted from TP17-04 was also submitted for lateral delineation of EC and SAR impacts that were identified in the vicinity of the salt storage shed.
TP17-02	
TP17-03	
TP17-04	
TP17-05	Characterization of soil related the current presence of fuel ASTs and associated 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 soil samples was also submitted from TP17-05 for vertical delineation of EC and SAR impacts.
TP17-06	
TP17-07	
TP17-08	Lateral delineation of EC and SAR impacts that were identified in the vicinity of the salt storage shed.
TP17-09	
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	BH17-8 SA1	0 – 0.41	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

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 Stage 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
TP17-05	TP17-5 SA3	2.80 – 3.0	Silty clay to clay	PHCs F1-F4, BTEX, EC and SAR
	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
Fill Pile 2	FB2 SA1	N/A	Sand and gravel with asphalt grindings and asphalts chunks.	PHCs F1-F4 and BTEX
	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
x_2 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 (m^3). 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 (m^2); 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 m^3) 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.

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Parameter	Unit	MOE Table 3 Standards (R/P/I) [1] [2]	17-8	17-29	17-30	17-31	17-32	17-33	Fill Pile 1
			23-Jan-17	23-Jan-17	13-Jan-17	13-Jan-17	13-Jan-17	23-Jan-17	23-Jan-17
			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

Footnotes:

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(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.

Parameter	Unit	MOE Table 3 Standards (R/P/I) [1] [2]	Fill Pile 2	TP17-01	TP17-02	TP17-03	TP17-04	TP17-05	
			23-Jan-17	21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17
			FP2 SA2	TP17-1 SA1	TP17-2 SA1	TP17-3 SA1	TP17-4 SA1	TP17-5 SA3	(Duplicate of TP17-5 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

Footnotes:

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(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.

Parameter	Unit	MOE Table 3 Standards (R/P/I) (1) (2)	TP17-06	TP17-07	Fill Pile 2		
			21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17
			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

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(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.

Parameter	Unit	MOE Table 3 Standards (R/P/I) (1) (2)	17-8	17-29	17-32	17-33	Fill Pile 1	Fill Pile 2
			23-Jan-17	23-Jan-17	13-Jan-17	23-Jan-17	23-Jan-17	23-Jan-17
			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

Footnotes:

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(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

Parameter	Unit	MOE Table 3 Standards (R/P/I) (1) (2)	17-29	17-33
			23-Jan-17	23-Jan-17
			BH17-29 SA2	BH17-33 SA2
Sample Depth	m		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

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(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

Parameter	Unit	MOE Table 3 Standards (R/P/I) [1] [2]	17-8	17-8	17-29	17-30	17-31	17-32	17-33
			23-Jan-17	23-Jan-17	23-Jan-17	13-Jan-17	13-Jan-17	13-Jan-17	23-Jan-17
			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	--	--	-	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	--	--	<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	--	--	0.8	0.6
Vanadium	ug/g	86	37	--	33	--	--	76	53
Zinc	ug/g	340	29	--	25	--	--	107	42
Chromium VI	ug/g	8	<0.2	--	<0.2	--	--	--	<0.2
Mercury	ug/g	0.27	<0.10	--	<0.10	--	--	--	<0.10
Inorganics									
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	--

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(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

Parameter	Unit	MOE Table 3 Standards (R/P/I) (1) (2)	Fill Pile 1	Fill Pile 2	TP17-04	TP17-05		TP17-06
			23-Jan-17	23-Jan-17	21-Jul-17	21-Jul-17	21-Jul-17	21-Jul-17
			FP1 SA1	FP2 SA2	TP17-4 SA1	TP17-5 SA3	TP17-5 SA13 (Duplicate of TP17-5 SA3)	TP17-6 SA1
Sample Depth	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

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(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

Parameter	Unit	MOE Table 3 Standards (R/P/I) [1] [2]	TP17-07 21-Jul-17 TP17-7 SA2	TP17-08 21-Jul-17 TP17-8 SA1	TP17-09 21-Jul-17 TP17-9 SA3	TP17-10 SA1 21-Jul-17 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	--	--	--	--
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

Footnotes:

Tables should be read in conjunction with the accompanying document.

< 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

Parameter	Units	MOE Table 3 Standards (1) (2)	17-29	17-30	17-31
			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**

Footnotes:
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.

(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

Table 6b: Groundwater Analytical Results: Polycyclic Aromatic Hydrocarbons

Parameter	Units	MOE Table 3 Standards (1) (2)	17-29
			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:

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.

(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.

Parameter	Units	MOE Table 3 Standards (1) (2)	17-29
			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

Footnotes:

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

Parameter	Units	MOE Table 3 Standards (1) (2)	17-29	17-30
			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**

Footnotes:

Tables should be read in conjunction with the accompanying document.

< value = Indicates parameter not detected above laboratory method detection limit.

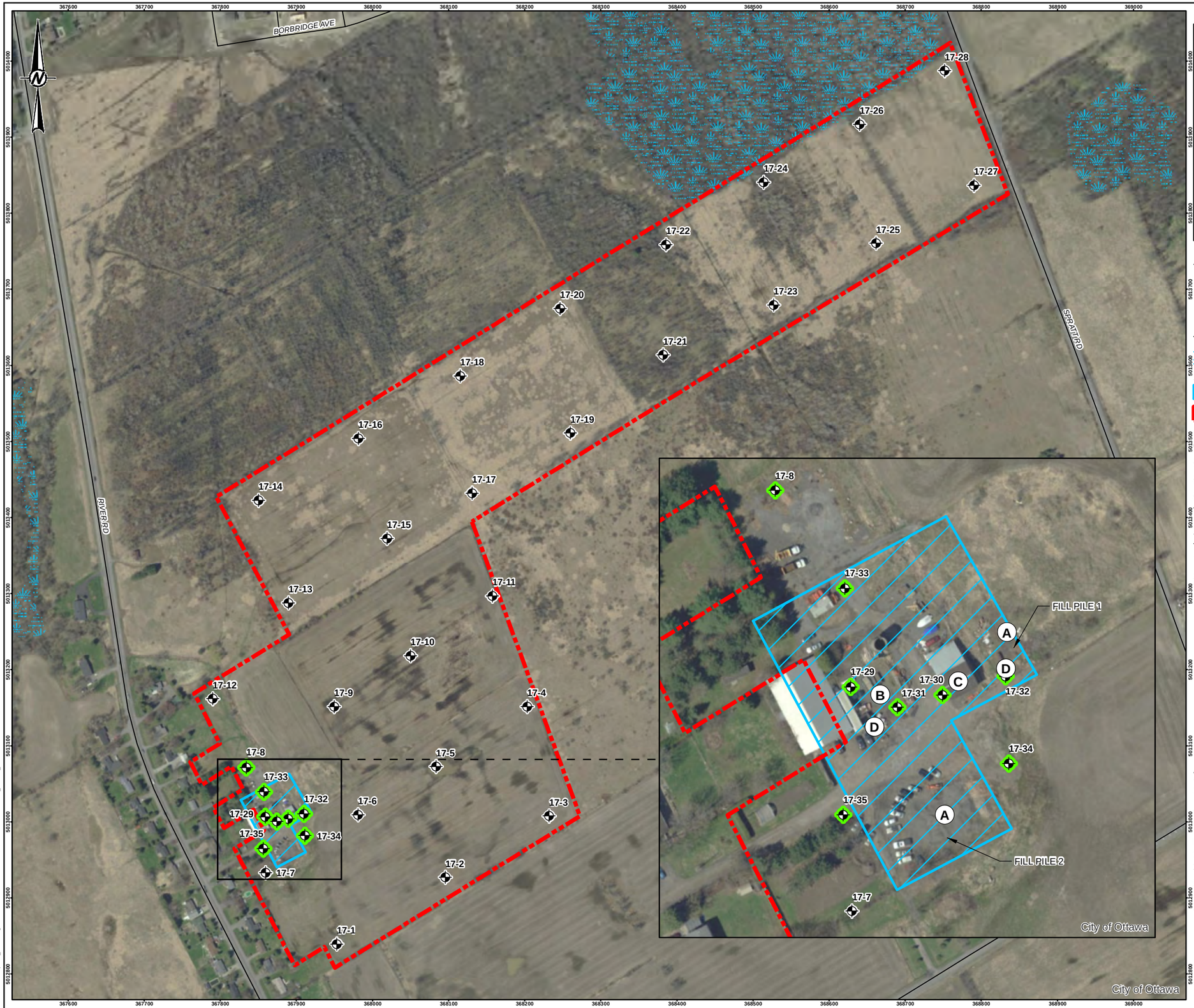
> value = Indicates parameter detected above equipment analytical range.

-- 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



KEY MAP

SCALE 1:50,000

LEGEND

- APPROXIMATE GEOTECHNICAL BOREHOLE LOCATION
- APPROXIMATE GEO-ENVIRONMENTAL BOREHOLE LOCATION
- ROADWAY
- WETLAND

AREAS OF POTENTIAL ENVIRONMENTAL CONCERN (APEC)

- ON-SITE SOIL AND GROUNDWATER (PCA #28, #30, #48, #58)
- APPROXIMATE SITE BOUNDARY

POTENTIALLY CONTAMINATING ACTIVITIES

- A #30: IMPORTATION OF FILL MATERIAL OF UNKNOWN QUALITY
- B #28: GASOLINE AND ASSOCIATED PRODUCTS STORAGE IN FIXED TANKS
- C #48: SALT BULK STORAGE
- D #58: WASTE DISPOSAL AND WASTE MANAGEMENT INCLUDING THERMAL TREATMENT

NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1658448-5000.

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28

0 50 100 200
1:5,000 METRES

CLIENT
CLARIDGE HOMES CORPORATION

PROJECT
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
RIVERSIDE SOUTH LANDS - 805 AND 905 RIVER ROAD
OTTAWA, ONTARIO

TITLE
SITE PLAN

CONSULTANT
Golder Associates

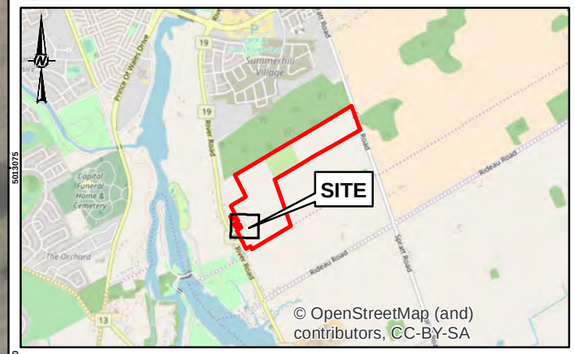
YYYY-MM-DD	2017-09-08
DESIGNED	----
PREPARED	JEM
REVIEWED	AT
APPROVED	KPH

PROJECT NO.	PHASE	REV.	FIGURE
1658448	5000	0	1

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm

Path: N:\Active\Spatial_IM\Claridge\Homes\Riverside_and\GIS\MXD\1658448\Phase5000_PhaseII_ESA\Addendum\1658448-5001-HS-0001.mxd

KEY MAP



SCALE 1:50,000

LEGEND

- APPROXIMATE TEST PIT LOCATION
- APPROXIMATE GEOTECHNICAL BOREHOLE LOCATION
- APPROXIMATE GEO-ENVIRONMENTAL BOREHOLE LOCATION
- ROADWAY
- APPROXIMATE SITE BOUNDARY

POTENTIALLY CONTAMINATING ACTIVITIES

- (A) #30: IMPORTATION OF FILL MATERIAL OF UNKNOWN QUALITY
- (B) #28: GASOLINE AND ASSOCIATED PRODUCTS STORAGE IN FIXED TANKS
- (C) #48: SALT BULK STORAGE
- (D) #58: WASTE DISPOSAL AND WASTE MANAGEMENT INCLUDING THERMAL TREATMENT

NOTE(S)

1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1658448-5000.

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28

0 10 20 40

1:750 METRES

CLIENT

CLARIDGE HOMES CORPORATION

PROJECT

PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
RIVERSIDE SOUTH LANDS - 805 AND 905 RIVER ROAD
OTTAWA, ONTARIO

TITLE

DETAILED SITE PLAN

CONSULTANT

Golder Associates

YYYY-MM-DD	2017-07-12
DESIGNED	----
PREPARED	JEM
REVIEWED	AT
APPROVED	KPH

PROJECT NO.	PHASE	REV.	FIGURE
1658448	5000	0	2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: 25mm 0

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Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	TP17-1 SA1 21-Jul-17
Petroleum Hydrocarbons			
PHC F3 (C16-C34)	ug/g	300	**560**

Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	TP17-2 SA1 21-Jul-17
Petroleum Hydrocarbons			
PHC F3 (C16-C34)	ug/g	300	**630**

Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	BH17-8 SA1 23-Jan-17
Petroleum Hydrocarbons			
PHC F3 (C16-C34)	ug/g	300	**1100**

Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	TP17-4 SA1 21-Jul-17
Petroleum Hydrocarbons			
PHC F3 (C16-C34)	ug/g	300	**2300**

Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	TP17-3 SA1 21-Jul-17
Petroleum Hydrocarbons			
PHC F3 (C16-C34)	ug/g	300	**1100**

Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	BH17-32 SA2 13-Jan-17
Inorganics			
Electrical Conductivity	mS/cm	0.7	**0.958**

Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	BH17-31 SA2 13-Jan-17
Inorganics			
Electrical Conductivity	mS/cm	0.7	**2.42**
Sodium Adsorption Ratio	--	5	**42.5**

Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	BH17-30 SA2 13-Jan-17
Inorganics			
Electrical Conductivity	mS/cm	0.7	**2.38**
Sodium Adsorption Ratio	--	5	**47.8**

Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	TP17-7 SA2 21-Jul-17
Inorganics			
Electrical Conductivity	mS/cm	0.7	**1.49**
Sodium Adsorption Ratio	--	5	**27.2**

Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	TP17-5 SA3 21-Jul-17	TP17-5 SA13 (Duplicate of TP17-05 SA3) 21-Jul-17
Inorganics				
Electrical Conductivity	mS/cm	0.7	**0.861**	**0.809**

Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	FP2 SA2 23-Jan-17	FB2 SA1 21-Jul-17	FB2 SA2 21-Jul-17	FB2 SA3 21-Jul-17
Petroleum Hydrocarbons						
PHC F3 (C16-C34)	ug/g	300	**920**	**2800**	**750**	**790**
PHC F4 (C34-C50)	ug/g	300	1800	**3400**	1100	1200

TP17-01
TP17-02
TP17-03
17-8
TP17-04
17-33
AREA OF PHC IMPACTS IN FILL
ASTs WITH GROUNDWATER IMPACTS
TP17-10
FILL PILE 1
A
D
TP17-06
17-29
B
C
17-32
TP17-09
17-6
17-31
TP17-05
17-30
D
AREA OF SALT-RELATED IMPACTS
TP17-07
TP17-08
17-34
17-35
A
PHC IMPACTED FILL (FILL PILE 2)
17-7
RIVER RD
City of Ottawa

KEY MAP

SCALE 1:50,000

LEGEND

- APPROXIMATE TEST PIT LOCATION
- APPROXIMATE GEOTECHNICAL BOREHOLE LOCATION
- APPROXIMATE GEO-ENVIRONMENTAL BOREHOLE LOCATION
- ROADWAY
- APPROXIMATE SITE BOUNDARY

POTENTIALLY CONTAMINATING ACTIVITIES

- (A) #30: IMPORTATION OF FILL MATERIAL OF UNKNOWN QUALITY
- (B) #28: GASOLINE AND ASSOCIATED PRODUCTS STORAGE IN FIXED TANKS
- (C) #48: SALT BULK STORAGE
- (D) #58: WASTE DISPOSAL AND WASTE MANAGEMENT INCLUDING THERMAL TREATMENT

NOTE(S)

1. O.REG 153 (2011) TABLE 3 STANDARDS FOR RESIDENTIAL/PARKLAND/INSTITUTIONAL PROPERTY USE FOR COARSE TEXTURED SOIL IN FULL DEPTH GENERIC SITE CONDITION STANDARDS IN A NON-POTABLE GROUND WATER CONDITION FOR SHALLOW SOILS IN A NON-POTABLE GROUND WATER CONDITION
2. GREY BACKGROUND INDICATES EXCEEDANCES
3. BOLD FONT = PARAMETER CONCENTRATION GREATER THAN REG153 (11) T3-R/P/I SOIL COARSE
4. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1658448-7000.

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28

0 10 20 40
1:750 METRES

CLIENT
CLARIDGE HOMES CORPORATION

PROJECT
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
RIVERSIDE SOUTH LANDS - 805 AND 905 RIVER ROAD
OTTAWA, ONTARIO

TITLE
SOIL EXCEEDANCES

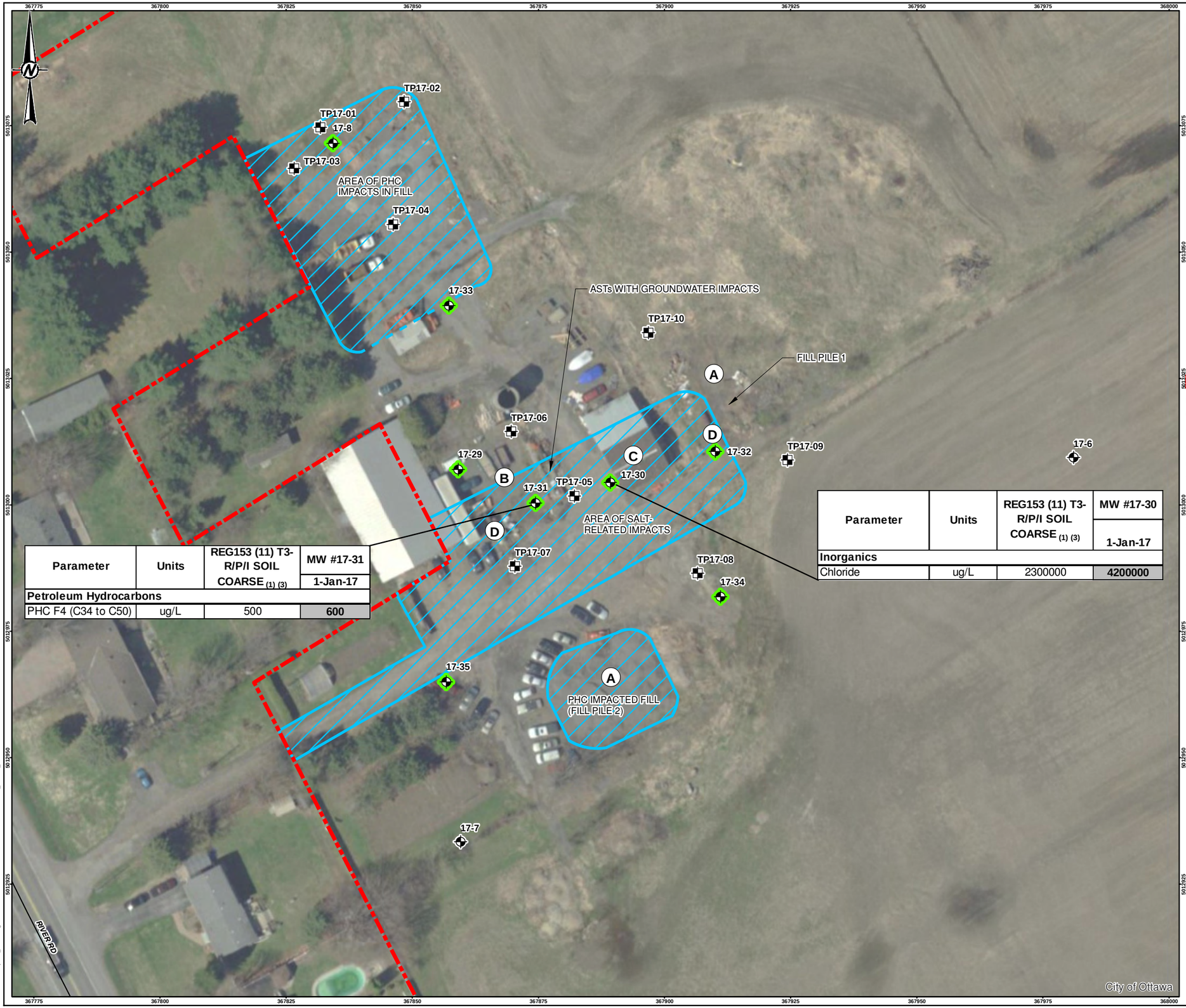
CONSULTANT
Golder Associates

YYYY-MM-DD	2017-07-12
DESIGNED	----
PREPARED	JEM
REVIEWED	AT
APPROVED	KPH

PROJECT NO.	PHASE	REV.	FIGURE
1658448	7000	0	3

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

Path: N:\Active\Spatial_IM\ClaridgeHomes\RiversideLands\GIS\MXDs\1658448\Phase5000_PhaseII_ESAAddendum\1658448-5001-HS-G003.mxd



Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	MW #17-31
			1-Jan-17
Petroleum Hydrocarbons			
PHC F4 (C34 to C50)	ug/L	500	**600**

Parameter	Units	REG153 (11) T3-R/P/I SOIL COARSE (1) (3)	MW #17-30
			1-Jan-17
Inorganics			
Chloride	ug/L	2300000	**4200000**

KEY MAP

SCALE 1:50,000

LEGEND

- APPROXIMATE TEST PIT LOCATION
- APPROXIMATE GEOTECHNICAL BOREHOLE LOCATION
- APPROXIMATE GEO-ENVIRONMENTAL BOREHOLE LOCATION
- ROADWAY
- APPROXIMATE SITE BOUNDARY

POTENTIALLY CONTAMINATING ACTIVITIES

- (A) #30: IMPORTATION OF FILL MATERIAL OF UNKNOWN QUALITY
- (B) #28: GASOLINE AND ASSOCIATED PRODUCTS STORAGE IN FIXED TANKS
- (C) #48: SALT BULK STORAGE
- (D) #58: WASTE DISPOSAL AND WASTE MANAGEMENT INCLUDING THERMAL TREATMENT

NOTE(S)

1. O.REG 153 (2011) TABLE 3 STANDARDS FOR RESIDENTIAL/PARKLAND/INSTITUTIONAL PROPERTY USE FOR COARSE TEXTURED SOIL IN FULL DEPTH GENERIC SITE CONDITION STANDARDS IN A NON-POTABLE GROUND WATER CONDITION
2. GREY BACKGROUND INDICATES EXCEEDANCES
3. BOLD FONT = PARAMETER CONCENTRATION GREATER THAN REG153 (11) T3-R/P/I SOIL COARSE
4. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1658448-5000.

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEENS PRINTER 2014
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28

0 10 20 40

1:750 METRES

CLIENT
CLARIDGE HOMES CORPORATION

PROJECT
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
RIVERSIDE SOUTH LANDS - 805 AND 905 RIVER ROAD
OTTAWA, ONTARIO

TITLE
GROUNDWATER EXCEEDANCES

CONSULTANT
Golder Associates

YYYY-MM-DD	2017-07-12
DESIGNED	----
PREPARED	JEM
REVIEWED	AT
APPROVED	KPH

PROJECT NO.	PHASE	REV.	FIGURE
1658448	5000	0	**4**

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI B

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APPENDIX A

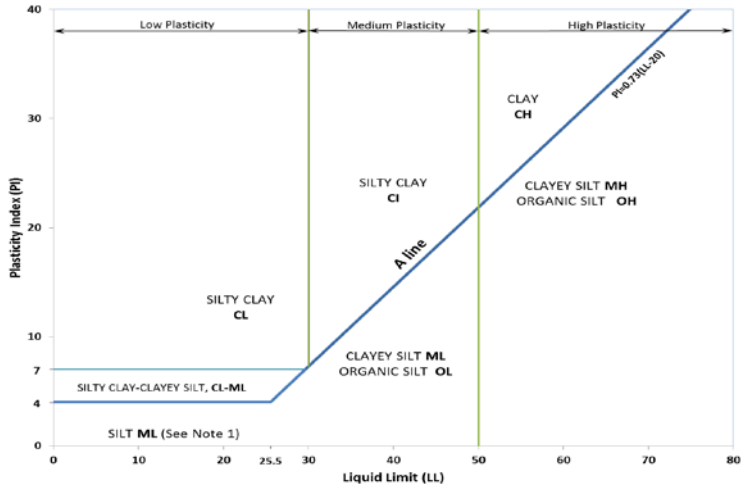
Record of Boreholes

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	$Cu = \frac{D_{60}}{D_{10}}$	$Cc = \frac{(D_{30})^2}{D_{10} x D_{60}}$	Organic Content	USCS Group Symbol	Group Name
INORGANIC (Organic Content ≤30% by mass)	COARSE-GRAINED SOILS (>50% by mass is larger than 0.075 mm)	GRAVELS (>50% by mass of coarse fraction is larger than 4.75 mm)	Gravels with ≤12% fines (by mass)	Poorly Graded	<4	≤1 or ≥3	≤30%	GP	GRAVEL
				Well Graded	≥4	1 to 3		GW	GRAVEL
			Gravels with >12% fines (by mass)	Below A Line	n/a			GM	SILTY GRAVEL
				Above A Line	n/a			GC	CLAYEY GRAVEL
		SANDS (≥50% by mass of coarse fraction is smaller than 4.75 mm)	Sands with ≤12% fines (by mass)	Poorly Graded	<6	≤1 or ≥3		SP	SAND
				Well Graded	≥6	1 to 3		SW	SAND
			Sands with >12% fines (by mass)	Below A Line	n/a			SM	SILTY SAND
				Above A Line	n/a			SC	CLAYEY SAND

Organic or Inorganic	Soil Group	Type of Soil	Laboratory Tests	Field Indicators					Organic Content	USCS Group Symbol	Primary Name
				Dilatancy	Dry Strength	Shine Test	Thread Diameter	Toughness (of 3 mm thread)			
INORGANIC (Organic Content ≤30% by mass)	FINE-GRAINED SOILS (≥50% by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PI and LL plot below A-Line on Plasticity Chart below)	Liquid Limit <50	Rapid	None	None	>6 mm	N/A (can't roll 3 mm thread)	<5%	ML	SILT
				Slow	None to Low	Dull	3mm to 6 mm	None to low	<5%	ML	CLAYEY SILT
				Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT
			Liquid Limit ≥50	Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	<5%	MH	CLAYEY SILT
				None	Medium to high	Dull to slight	1 mm to 3 mm	Medium to high	5% to 30%	OH	ORGANIC SILT
		CLAYS (PI and LL plot above A-Line on Plasticity Chart below)	Liquid Limit <30	None	Low to medium	Slight to shiny	~ 3 mm	Low to medium	0% to 30% (see Note 2)	CL	SILTY CLAY
			Liquid Limit 30 to 50	None	Medium to high	Slight to shiny	1 mm to 3 mm	Medium		CI	SILTY CLAY
			Liquid Limit ≥50	None	High	Shiny	<1 mm	High		CH	CLAY
HIGHLY ORGANIC SOILS (Organic Content >30% by mass)		Peat and mineral soil mixtures							30% to 75%	PT	SILTY PEAT, SANDY PEAT
		Predominantly peat, may contain some mineral soil, fibrous or amorphous peat							75% to 100%		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 named SILT.
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.

ABBREVIATIONS AND TERMS USED ON RECORDS OF BOREHOLES AND TEST PITS

PARTICLE SIZES OF CONSTITUENTS

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 cm^2 pushed through ground at a penetration rate of 2 cm/s. Measurements of tip resistance (q_t), 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 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

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
C	consolidation (oedometer) test
CHEM	chemical analysis (refer to text)
CID	consolidated isotropically drained triaxial test[1]
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
M	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

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

NON-COHESIVE (COHESIONLESS) SOILS

Compactness[2]

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

1. 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.

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

1. SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects; 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.

LIST OF SYMBOLS

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

I. GENERAL

π	3.1416
ln x	natural logarithm of x
$\log_{10}$	x or log x, logarithm of x to base 10
g	acceleration due to gravity
t	time

II. STRESS AND STRAIN

γ	shear strain
Δ	change in, e.g. in stress: $\Delta\sigma$
ε	linear strain
ε_v	volumetric strain
η	coefficient of viscosity
υ	Poisson's ratio
σ	total stress
σ'	effective stress ($\sigma' = \sigma - u$)
σ'_{vo}	initial effective overburden stress
$\sigma_1, \sigma_2, \sigma_3$	principal stress (major, intermediate, minor)
σ_{oct}	mean stress or octahedral stress $= (\sigma_1 + \sigma_2 + \sigma_3)/3$
τ	shear stress
u	porewater pressure
E	modulus of deformation
G	shear modulus of deformation
K	bulk modulus of compressibility

III. SOIL PROPERTIES

(a) Index Properties

$\rho(\gamma)$	bulk density (bulk unit weight)*
$\rho_d(\gamma_d)$	dry density (dry unit weight)
$\rho_w(\gamma_w)$	density (unit weight) of water
$\rho_s(\gamma_s)$	density (unit weight) of solid particles
γ'	unit weight of submerged soil ($\gamma' = \gamma - \gamma_w$)
D_R	relative density (specific gravity) of solid particles ($D_R = \rho_s / \rho_w$) (formerly G_s)
e	void ratio
n	porosity
S	degree of saturation
w	water content
w_l or LL	liquid limit
w_p or PL	plastic limit
I_p or PI	plasticity index = $(w_l - w_p)$
w_s	shrinkage limit
I_L	liquidity index = $(w - w_p) / I_p$
I_C	consistency index = $(w_l - w) / I_p$
e_{max}	void ratio in loosest state
e_{min}	void ratio in densest state
I_D	density index = $(e_{max} - e) / (e_{max} - e_{min})$ (formerly relative density)

* Density symbol is ρ. Unit weight symbol is γ where $\gamma = \rho g$ (i.e. mass density multiplied by acceleration due to gravity)

(b) Hydraulic Properties

h	hydraulic head or potential
q	rate of flow
v	velocity of flow
i	hydraulic gradient
k	hydraulic conductivity (coefficient of permeability)
j	seepage force per unit volume

(c) Consolidation (one-dimensional)

C_c	compression index (normally consolidated range)
C_r	recompression index (over-consolidated range)
C_s	swelling index
C_α	secondary compression index
m_v	coefficient of volume change
c_v	coefficient of consolidation (vertical direction)
c_h	coefficient of consolidation (horizontal direction)
T_v	time factor (vertical direction)
U	degree of consolidation
σ'_p	pre-consolidation stress
OCR	over-consolidation ratio = σ'_p / σ'_{vo}

(d) Shear Strength

τ_p, τ_r	peak and residual shear strength
ϕ'	effective angle of internal friction
δ	angle of interface friction
μ	coefficient of friction = tan δ
c′	effective cohesion
c_u, s_u	undrained shear strength ($\phi = 0$ analysis)
p	mean total stress $(\sigma_1 + \sigma_3)/2$
p′	mean effective stress $(\sigma'_1 + \sigma'_3)/2$
q	$(\sigma_1 - \sigma_3)/2$ or $(\sigma'_1 - \sigma'_3)/2$
q_u	compressive strength $(\sigma_1 - \sigma_3)$
S_t	sensitivity

Notes: 1 $\tau = c' + \sigma' \tan \phi'$

2 shear strength = (compressive strength)/2

PROJECT: 1658448

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

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

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

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DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

PROJECT: 1658448

RECORD OF BOREHOLE: 17-2

SHEET 1 OF 1

LOCATION: N 5012927.0 ;E 368096.0

BORING DATE: January 16, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.52							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (SM) SILTY SAND, fine; dark brown; non-cohesive		0.00							
		(SM) SILTY SAND, fine; brown; non-cohesive, moist		90.27 0.25 90.00							
		(CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.52	1	SS	7				
1				89.15							
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		1.37	2	SS	3				
2				88.39							
		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHRED CRUST); cohesive, w>PL, very stiff		2.13	3	SS	4				
3					4	SS	8				
				86.71							
		End of Borehole Auger Refusal		3.81							
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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PROJECT: 1658448

RECORD OF BOREHOLE: 17-2A

SHEET 1 OF 1

LOCATION: N 5012927.0 ;E 368096.0

BORING DATE: January 16, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.52									
0	DCPT, Open Hole	Probable Silty Clay to Clay		0.00									
1													
2													
3													
				86.62									
4		Probable Glacial Till		3.90						115			
5										135, 102, 153			
6													
7													
				82.60									
8		End of DCPT		7.92									
9													
10													

DEPTH SCALE

1 : 50

LOGGED: PAH

CHECKED: SAT

Golder Associates

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PROJECT: 1658448

RECORD OF BOREHOLE: 17-3

SHEET 1 OF 1

LOCATION: N 5013008.0 ;E 368232.2

BORING DATE: January 10, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

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

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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PROJECT: 1658448

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		91.01							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) CLAYEY SILT; dark brown; non-cohesive		0.00							
				90.71							
		(ML and SM) SILT, CLAYEY SILT and SILTY SAND; grey brown; non-cohesive, wet, very loose to loose		0.30							
1					1	SS	6				▽
					2	SS	3				
				89.03							
2		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		1.98							
					3	SS	4				
3					4	SS	3				
				87.73							
		(SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to very dense		3.28							
4					5	SS	21				
					6	SS	>50				
5											
					7	SS	25				
6					8	SS	19				
				84.27							
		End of Borehole Auger Refusal		6.74							WL in open borehole at 1.10 m depth below ground surface upon completion of drilling
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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PROJECT: 1658448

RECORD OF BOREHOLE: 17-5

SHEET 1 OF 1

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.40							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) CLAYEY SILT; brown; non-cohesive		0.00 90.15	1	GRAB	-				
		(ML and SM) SILT, CLAYEY SILT and SILTY SAND; grey brown; non-cohesive, wet, very loose to loose		0.25							▽
1					2	SS	4				
				89.03							
		(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				
2				88.27							
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		2.13	4	SS	3				
				87.50							
3		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		2.90	5	SS	2				
4								>96 +			
								>96 +			
					6	SS	2				
5											
								>96 +			
				84.76				>96 +			
		(CI/CH) SILTY CLAY to CLAY; grey, contains clayey silt seams; cohesive, w>PL, very stiff		5.64 84.46	7	SS	4				
6		(ML) sandy SILT, some gravel; grey (GLACIAL TILL); non-cohesive, wet, very loose to loose		5.94 84.15							
		End of Borehole		6.25							WL in open borehole at 0.80 m depth below ground surface upon completion of drilling
7											
8											
9											
10											

DEPTH SCALE

1 : 50

LOGGED: PAH

CHECKED: SAT

Golder Associates

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

PROJECT: 1658448

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.26							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) CLAYEY SILT; dark brown; non-cohesive		0.00							
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		0.15	1	SS	3				▽
1					2	SS	2				
2					3	SS	2		○		
3				87.21							
		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		3.05	4	SS	3	>96 +			
4				85.99				>96 +			
		(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, stiff		4.27	5	SS	2		○		
5				85.08							
		(SM) gravelly SILTY SAND, some gravel; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact		5.18	6	SS	16		○	MH	
6				84.16							
		End of Borehole		6.10							WL in open borehole at 1.22 m depth below ground surface upon completion of drilling
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-7

SHEET 1 OF 1

LOCATION: N 5012933.6 ;E 367859.5

BORING DATE: January 5, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.24							
0	Power Auger 200 mm Diam. (Hollow Stem)	FILL/TOPSOIL - (SM) SILTY SAND; dark brown; moist		0.00 / 89.94							
		FILL - (SP-CL/CI) Mixture of SAND and SILTY CLAY; brown to grey brown; non-cohesive, moist, loose to very loose		0.30 / 89.18	1	GRAB	-				
1		(CI/CH) SILTY CLAY to CLAY, some sand; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		1.06	2	SS	4				
2					3	SS	6				
					4	SS	2				
3					5	SS	3				
4								>96 +			
					6	SS	4				
5					7	SS	2				
		(SM) SILTY SAND, some gravel; grey, contains clayey silt seams, cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact		5.79 / 84.45							
6					8	SS	24				
7					9	SS	10				
8					10	SS	11				
		End of Borehole		8.22 / 82.02							
9											
10											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: DG
CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-8

SHEET 1 OF 1

LOCATION: N 5013071.6 ;E 367834.3

BORING DATE: January 23, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		89.77							
	Power Auger 200 mm Diam. (Hollow Stem)	FILL - (SP/GP) SAND and GRAVEL; dark grey to black, contains asphaltic concrete fragments; non-cohesive, moist		0.00	1	GRAB	-				
				89.36							
		(SM) SILTY SAND; brown; non-cohesive, moist		0.41 / 89.16	2	GRAB	-				
		(CI/CH) SILTY CLAY to CLAY; red brown to grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.61	3	SS	5				
1				88.40							
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		1.37	4	SS	5				
2					5	SS	2				
				86.87							
3		(CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams (WEATHERED CRUST); cohesive, w>PL, very stiff		2.90	6	SS	2				
				85.81				>96 +			
4		(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, stiff		3.96				+			
					7	SS	WH				
5								⊕ + +			
				83.83							
6		End of Borehole		5.94							
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

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

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		90.26							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive		0.00							
		(SM) SILTY SAND; grey brown; non-cohesive, wet		0.15 89.85 0.41	1	GRAB	-				Native Backfill
1		(CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff			2	SS	5				Bentonite Seal
2					3	SS	5				
					4	SS	2				
3					5	SS	3				Native Backfill
4				86.30					>96 +		
		(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, stiff		3.96	6	SS	WH				Silica Sand
5											
6					7	SS	WH				Standpipe
7					8	SS	WH				Silica Sand
				82.34							
8		End of Borehole		7.92							WL in Standpipe at Elev. 90.04 m on Jan. 30, 2017
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-10

SHEET 1 OF 1

LOCATION: N 5013218.5 ;E 368049.9

BORING DATE: January 16, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.56							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive		0.00 / 90.33	1	GRAB	-				
		(SM) SILTY SAND; brown; non-cohesive, moist		0.23 / 90.10							
		(CI/CH) SILTY CLAY to CLAY; grey brown to red brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.46	2	SS	6				
1				89.19							
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		1.37	3	SS	3				
2					4	SS	3				
3					5	SS	3				
				86.90							
		(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, firm to stiff		3.66				⊕ +			
4								+			
					6	SS	WH				
5								⊕ + + +			
				84.62							
6		End of Borehole		5.94							
7											
8											
9											
10											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-10A

SHEET 1 OF 1

LOCATION: N 5013218.0 ;E 368050.0

BORING DATE: January 16, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp ⊖W WI) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.56							
0	Power Auger 200 mm Diam. (Hollow Stem)	For soil stratigraphy refer to Record of Borehole 17-10		0.00							
1											
2											
3											
4					1	TP	PH				
				86.14							
		End of Borehole		4.42							
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-11

SHEET 1 OF 1

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp — W — Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.58							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) sandy SILT; dark brown; non-cohesive		0.00 90.38							
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		0.20	1	SS	6				
1											
					2	SS	2		○		
2				88.60							
		(CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		1.98	3	SS	4				
					4	SS	2		○		
3				86.77					>96 +		
		(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, stiff		3.81				+			
4					5	SS	1		○		
5				85.25				⊕	+		
		(ML) sandy SILT, some gravel; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, very dense		5.33	6	SS	69		○		
				84.64							
6		End of Borehole		5.94							
7											
8											
9											
10											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: PAH
CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-12

SHEET 1 OF 1

LOCATION: N 5013161.9 ;E 367790.1

BORING DATE: January 20, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) SHEAR STRENGTH Cu, kPa (20 40 60 80) nat V. + Q - ● rem V. ⊕ U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) WATER CONTENT PERCENT Wp W Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		89.76							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive		0.00							
		(SM) SILTY SAND; grey brown; non-cohesive, moist		0.08	1	GRAB	-				
				89.15							
		(CI/CH) SILTY CLAY to CLAY; red brown and grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.61	2	SS	5		○		
1											
					3	SS	5				
2				87.63							
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		2.13	4	SS	2		○		▽
				86.86							
3		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		2.90	5	SS	2		○		
								>96 +			
4								>96 +			
				85.49							
		(CI/CH) SILTY CLAY to CLAY; grey with black mottling; cohesive, w>PL, firm		4.27	6	SS	WH				
5								⊕ + + +			
				83.82							
6		End of Borehole		5.94							WL in open borehole at 2.35 m depth below ground surface upon completion of drilling
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-12A

SHEET 1 OF 1

LOCATION: N 5013162.0 ;E 367790.0

BORING DATE: January 23, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		89.76							
0	Power Auger 200 mm Diam. (Hollow Stem)	For soil stratigraphy refer to Record of Borehole 17-12		0.00							
1											
2											▽
3											
4											
					1	TP	PH		W	C	
5				84.73							
		End of Borehole		5.03							WL in open borehole at 2.35 m depth below ground surface upon completion of drilling
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-13

SHEET 1 OF 1

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.32							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive		0.00 / 90.09							
		(SP) SAND, some non-plastic fines; grey brown; non-cohesive, moist		0.23 / 89.59	1	GRAB	-				
1		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		0.73 / 89.10	2	SS	4				▽
		(CI/CH) SILTY CLAY to CLAY; red brown and grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		1.22 / 88.19	3	SS	4				
2		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff to stiff		2.13 / 87.20	4	SS	2				
3		(CI/CH) SILTY CLAY to CLAY; grey, contains silty fine sand seams; cohesive, w>PL, firm		3.12	5	SS	2				
4								⊕ +			
					6	SS	WH	+			
5								⊕ +			
								+			
6		End of Borehole		84.38 / 5.94				+			WL in open borehole at 1.00 m depth below ground surface upon completion of drilling
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-14

SHEET 1 OF 1

LOCATION: N 5013422.4 ;E 367850.2

BORING DATE: January 19, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		90.50							
	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive		0.00 / 90.20							
1		(SM) SILTY SAND; brown, contains clayey silt seams; non-cohesive, wet, loose		0.30 / 89.20	1	SS	8		W		▽
2		(CI/CH) SILTY CLAY to CLAY; red brown and grey brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		1.30 / 87.76	2	SS	3	>96 +; >96 +	W		
3		(CI/CH) SILTY CLAY to CLAY; grey, contains silty fine sand seams; cohesive, w>PL, firm		2.74 / 86.99	3	SS	1		W		
4		(CI/CH) SILTY CLAY to CLAY; grey with black mottling; cohesive, w>PL, firm		3.51 / 84.56	4	SS	WH	⊕ +	W		
5								⊕ +			
6		End of Borehole		5.94				+			WL in open borehole at 1.00 m depth below ground surface upon completion of drilling
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-14A

SHEET 1 OF 1

LOCATION: N 5013422.0 ;E 367850.0

BORING DATE: January 20, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3})	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.50				SHEAR STRENGTH Cu, kPa (20 40 60 80); nat V. + Q - ●; rem V. ⊕ U - ○	WATER CONTENT PERCENT (20 40 60 80); Wp — W — Wl		
0	Power Auger 200 mm Diam. (Hollow Stem)	For soil stratigraphy refer to Record of Borehole 17-14		0.00							
1											Native Backfill
2											
3											Bentonite Seal
											Silica Sand
4					1	TP	PH				Standpipe
				86.23							
		End of Borehole		4.27							
5											WL in Standpipe at Elev. 89.78 m on Jan. 30, 2017
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-15

SHEET 1 OF 1

LOCATION: N 5013372.2 ;E 368018.8

BORING DATE: January 20, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕; Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.66							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive		0.00 / 90.43	1	GRAB	-				
		(SP) SAND, fine, some non-plastic fines; brown; non-cohesive, moist		0.23 / 90.25							
		(CI/CH) SILTY CLAY to CLAY; red brown to grey brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff to stiff		0.41							
1					2	SS	4				▽
					3	SS	4				
2								⊕ + >96 +			
				87.76							
3		(CI/CH) SILTY CLAY to CLAY, some sand; grey with black mottling, contains silty fine sand seams; cohesive, w>PL, firm to stiff		2.90	4	SS	2				
4								⊕ + +			
					5	SS	WH				
5								⊕ + +			
6					6	SS	WH				
7								+ + +			
				82.89							
		End of Borehole		7.77							WL in open borehole at 1.00 m depth below ground surface upon completion of drilling
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-16

SHEET 1 OF 1

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa; nat V. +, rem V. ⊕, Q - ●, U - ○	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT; Wp, W, Wl	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.43							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) sandy SILT; dark brown; non-cohesive		0.00 / 90.18	1	GRAB	-				
		(SM) SILTY SAND; brown, contains clayey silt seams; non-cohesive, wet		0.25 / 89.67	2	GRAB	-				▽
1		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.76 / 89.21	3	SS	2				
		(CI/CH) SILTY CLAY to CLAY; red brown and grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		1.22 / 87.84	4	SS	2	>96 + >96 +			
2		(CI/CH) SILTY CLAY to CLAY; grey with black mottling; cohesive, w>PL, stiff to firm		2.59	5	SS	WH				
3											
4					6	SS	WH				
5											
		End of Borehole		84.64 / 5.79							WL in open borehole at 0.60 m depth below ground surface upon completion of drilling
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-17

SHEET 1 OF 1

LOCATION: N 5013432.3 ;E 368131.3

BORING DATE: January 17, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.44							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) CLAYEY SILT; dark brown; non-cohesive		0.00							
		(CI/CH) SILTY CLAY to CLAY; red brown and grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.15	1	SS	7				▽
1				89.07							
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND, fine; grey brown (WEATHERED CRUST); cohesive, w>PL, stiff to very stiff		1.37	2	SS	2				
2					3	SS	2				
				87.70							
		(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, firm		2.74	4	SS	WH	⊕ +			
3											
				86.48							
4		(CL/CI) SILTY CLAY to CLAY; grey with black mottling, contains clayey silt seams; cohesive, w>PL, stiff		3.96	5	SS	WH	⊕ +			
5											
				84.50							
6		End of Borehole		5.94							WL in open borehole at 0.80 m depth below ground surface upon completion of drilling
7											
8											
9											
10											

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

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

PROJECT: 1658448

RECORD OF BOREHOLE: 17-17A

SHEET 1 OF 1

LOCATION: N 5013432.0 ;E 368131.0

BORING DATE: January 17, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.44							
0	Power Auger 200 mm Diam. (Hollow Stem)	For soil stratigraphy refer to Record of Borehole 17-17		0.00							
1											
2											
3					1	TP	PH				
				86.78							
		End of Borehole		3.66							
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-18

SHEET 1 OF 1

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		90.69							
	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) sandy SILT; dark brown; non-cohesive		0.00							
				90.39							
		(CI/CH) SILTY CLAY to CLAY; red brown and grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.30	1	SS	5		W		▽
				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		1.68				⊕ + >96 +			
				87.95							
		(CI/CH) SILTY CLAY to CLAY, some sand; grey with black mottling, contains silty fine sand seams; cohesive, w>PL, firm		2.74	3	SS	2		W		
					4	SS	WH	⊕ + +	W		
				85.66							
		(CI/CH) SILTY CLAY to CLAY; grey with black mottling, contains clayey silt seams; cohesive, w>PL, stiff		5.03				⊕ + +			
					5	SS	2		W		
								⊕ + +			
				83.22							
		End of Borehole		7.47							WL in open borehole at 1.00 m depth below ground surface upon completion of drilling

DEPTH SCALE

1 : 50

LOGGED: PAH

CHECKED: SAT

Golder Associates

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-18A

SHEET 1 OF 1

LOCATION: N 5013586.9 ;E 368115.5

BORING DATE: January 19, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.69							
0	Power Auger 200 mm Diam. (Hollow Stem)	For soil stratigraphy refer to Record of Borehole 17-18		0.00							
1											Native Backfill
2											
3											Bentonite Seal
											Silica Sand
4					1	TP	PH			C	Standpipe
				86.42							
		End of Borehole		4.27							
5											WL in Standpipe at Elev. 90.39 m on Jan. 30, 2017
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-19

SHEET 1 OF 1

LOCATION: N 5013512.2 ;E 368260.2

BORING DATE: January 17, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		91.35							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) sandy SILT to CLAYEY SILT; dark brown; non-cohesive		0.00 91.15							
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		0.20	1	SS	4				▽
1					2	SS	3				
				89.37							
2		(CI/CH) SILTY CLAY to CLAY, some clayey silt seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		1.98	3	SS	3	>96 +			
					4	SS	3				
3								>96 +			
4								>96 +			
				86.78							
		(CI/CH) SILTY CLAY to CLAY; grey; cohesive, w>PL, firm		4.57	5	SS	1				
5				86.24							
		(SM) gravelly SILTY SAND; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact		5.11	6	SS	24				
6				85.25							
		End of Borehole		6.10							WL in open borehole at 1.00 m depth below ground surface upon completion of drilling
7											
8											
9											
10											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: PAH
CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-20

SHEET 1 OF 1

LOCATION: N 5013674.4 ;E 368246.4

BORING DATE: January 18, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		92.23							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive		0.00 / 91.98	1	GRAB	-				
		(SM) SILTY SAND; grey brown; non-cohesive, wet, loose		0.25 / 91.32	2	SS	11				▽
1		(SM) gravelly SILTY SAND; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact to dense		0.91	3	SS	26				
2					4	SS	50				
3					5	SS	32				
4					6	SS	25				
					7	SS	11				
5				87.05							
		(SM/GM) SILTY SAND and GRAVEL; grey; non-cohesive, wet, compact		5.18	8	SS	15				
6				86.13							
		End of Borehole		6.10							WL in open borehole at 0.61 m depth below ground surface upon completion of drilling
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-21

SHEET 1 OF 1

LOCATION: N 5013613.9 ;E 368382.0

BORING DATE: January 18, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		94.69							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive		0.00 94.46	1	GRAB	-				
		(SM) SILTY SAND, some gravel; brown; non-cohesive, moist		0.23							Native Backfill
				93.90	2	SS	>50				
1		(SM/GM) SILTY SAND and GRAVEL; grey brown, contains cobbles and boulders; non-cohesive, moist, dense to very dense		0.79	3	SS	47		○		Bentonite Seal
2					4	SS	81				▽
				91.79							
3		(SM) SILTY SAND, some gravel; grey brown; non-cohesive, wet, compact		2.90	5	SS	28		○	MH	
				91.18							
4		(ML) sandy SILT, some gravel; grey brown, contains cobbles and boudlers (GLACIAL TILL); non-cohesive, wet, compact		3.51	6	SS	17		○		
					7	SS	21				Native Backfill
5				89.51							
		(SM) gravelly SILTY SAND; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact		5.18	8	SS	12		○	MH	
6					9	SS	18				
				87.68							
7		(SM) SILTY SAND; grey; non-cohesive, wet, compact		7.01	10	SS	15		○		Standpipe
				86.77							
8		End of Borehole		7.92							WL in Standpipe at Elev. 92.15 m on Jan. 30, 2017
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-22

SHEET 1 OF 1

LOCATION: N 5013759.1 ;E 368386.0

BORING DATE: January 24, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		91.97							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) CLAYEY SILT; dark brown; non-cohesive		0.00 91.74							
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		0.23	1	SS	5				
1				90.60							
		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		1.37	2	SS	4				
2				89.99							
		(ML) sandy SILT, some gravel; grey brown, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact		1.98	3	SS	17				
3				88.92							
		(SM) SILTY SAND, some gravel; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, compact		3.05	4	SS	10				
	DCPT Open Hole			88.31							
4		Probable Glacial Till		3.66							
5											
6				85.57							
		End of Borehole End of DCPT		6.40							
7											
8											
9											
10											

DEPTH SCALE

1 : 50

LOGGED: PAH

CHECKED: SAT

Golder Associates

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-23

SHEET 1 OF 1

LOCATION: N 5013679.9 ;E 368527.7

BORING DATE: January 25, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		92.56							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) CLAYEY SILT; dark brown; non-cohesive		0.00 92.26	1	GRAB	-				
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		0.30							
1				91.34	2	SS	5				
		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		1.22							
					3	SS	4				
2											
				89.66							
3		(CI/CH) SILTY CLAY to CLAY; grey, contains clayey silt seams; cohesive, w>PL, stiff		2.90	4	SS	1				
4				88.22							
		End of Borehole Auger Refusal		4.34							
5											
6											
7											
8											
9											
10											

SHEAR STRENGTH Cu, kPa: 20 40 60 80 — nat V. + Q - ● — rem V. ⊕ U - ○

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 20 40 60 80

>96 +

>96 +

+

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

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

PROJECT: 1658448

RECORD OF BOREHOLE: 17-23A

SHEET 1 OF 1

LOCATION: N 5013679.9 ;E 368527.7

BORING DATE: January 25, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		92.56							
0	DCPT / Open Hole	For soil stratigraphy refer to Record of Borehole 17-23		0.00							
1											
2											
3											
4				88.29							
		End of Borehole DCPT Refusal		4.27							
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

LOGGED: PAH

CHECKED: SAT

Golder Associates

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-24

SHEET 1 OF 1

LOCATION: N 5013840.9 ;E 368514.0

BORING DATE: January 24, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ●, rem V. ⊕ U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp, W, Wl; 20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		92.58							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) sandy SILT; dark brown; non-cohesive		0.00 / 92.31							
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		0.27	1	SS	4				
1											
					2	SS	2		○		
				90.60							
2		(CI/CH) SILTY CLAY to CLAY; grey brown, slightly fissured (WEATHERED CRUST); cohesive, w>PL, stiff		1.98							
					3	SS	1		○		
3				89.53							
		(CI/CH) SILTY CLAY to CLAY; grey, contains silty fine sand seams; cohesive, w>PL, firm to stiff		3.05	4	SS	WH	⊕ +			
4								+			
					5	SS	WH		○		
5								+			
6				86.33	6	SS	3				
		(ML) sandy SILT, some gravel; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, very loose		6.25 / 86.03							
		End of Borehole Auger Refusal		6.55							
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-24A

SHEET 1 OF 1

LOCATION: N 5013841.0 ;E 368514.0

BORING DATE: January 24, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		92.58							
0	Power Auger 200 mm Diam. (Hollow Stem)	For soil stratigraphy refer to Record of Borehole 17-24		0.00							Native Backfill
1											
2											Bentonite Seal
3					1	TP	PH		W	C	Standpipe
				89.07							
		End of Borehole		3.51							
4											WL in Standpipe at Elev. 91.78 m on Jan. 30, 2017
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-25

SHEET 1 OF 1

LOCATION: N 5013760.8 ;E 368661.4

BORING DATE: January 25, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
0		GROUND SURFACE		93.17							
	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) sandy SILT; dark brown; non-cohesive		0.00 92.92							▽
		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		0.25	1	SS	6				
1				91.95							
		(CI/CH) SILTY CLAY to CLAY; grey brown, contains clayey silt seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		1.22	2	SS	5				
2					3	SS	5				
3					4	SS	2				
				89.33				>96 +			
		(ML) sandy SILT, some gravel; grey, contains cobbles and boulders (GLACIAL TILL); non-cohesive, wet, very dense		3.84 88.98	5	SS	>50				
4		End of Borehole Auger Refusal		4.19							WL in open borehole at 0.30 m depth below ground surface upon completion of drilling
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-26

SHEET 1 OF 1

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		93.09							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) CLAYEY SILT; dark brown; non-cohesive		0.00 92.86	1	GRAB	-				
		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff to stiff		0.23							
1					2	SS	5				
					3	SS	4				
2								⊕	+		
									+		
3				90.04							
		(CI/CH) SILTY CLAY to CLAY; grey, contains clayey silt seams; cohesive, w>PL, stiff		3.05	4	SS	1				
				89.28				+			
4		(SP) SAND; grey brown; non-cohesive, wet, compact		3.81	5	SS	11				
				88.52							
5		(SM) gravelly SILTY SAND; brown, contains cobbles and boulders; non-cohesive, wet, compact to very dense		4.57	6	SS	>50				
				87.57							
		End of Borehole Auger Refusal		5.52							WL in open borehole at 0.50 m depth below ground surface upon completion of drilling
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-27

SHEET 1 OF 2

LOCATION: N 5013836.4 ;E 368790.7

BORING DATE: January 25-26, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		93.85							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (CL) SILTY CLAY; dark brown; cohesive		0.00 93.65							
		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.20	1	SS	6				
1											
					2	SS	4				
				92.02							
2		(SM) gravelly SILTY SAND; brown, contains cobbles and boulders; non-cohesive, wet, loose		1.83							Native Backfill
					3	SS	8			MH	
	Rotary Drill NW Tricone				4	RC	DD				
3				90.57							
		Borehole continued on RECORD OF DRILLHOLE 17-27		3.28							
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

LOGGED: PAH

CHECKED: SAT

Golder Associates

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

PROJECT: 1658448

RECORD OF DRILLHOLE: 17-27

SHEET 2 OF 2

LOCATION: N 5013836.4 ;E 368790.7

DRILLING DATE: January 25-26, 2017

DATUM: Geodetic

INCLINATION: -90° AZIMUTH: ---

DRILL RIG: CME 850

DRILLING CONTRACTOR: CCC

JN - Joint; FLT - Fault; SHR- Shear; VN - Vein; CJ - Conjugate
BD- Bedding; FO- Foliation; CO- Contact; OR- Orthogonal; CL - Cleavage
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 list of abbreviations & symbols.

DEPTH SCALE METRES	DRILLING RECORD	DESCRIPTION	SYMBOLIC LOG	ELEV. / DEPTH (m)	RUN No.	COLOUR % RETURN / FLUSH	RECOVERY: TOTAL CORE %	RECOVERY: SOLID CORE %	R.Q.D. %	FRACT. INDEX PER 0.25 m	DISCONTINUITY DATA: B Angle	DISCONTINUITY DATA: DIP w.r.t. CORE AXIS	DISCONTINUITY DATA: TYPE AND SURFACE DESCRIPTION	Jcon	Jr	Ja	HYDRAULIC CONDUCTIVITY K, cm/sec	Diametral Point Load Index (MPa)	RMC -Q' AVG.	
		BEDROCK SURFACE		90.57																
4	Rotary Drill / NW Tricone	Fresh, thinly to medium bedded, grey, fine grained LIMESTONE BEDROCK		3.28	1	100														Native Backfill
5	Rotary Drill / NQ Core				2	100														Bentonite Seal / Silica Sand
6	Rotary Drill / NQ Core				3	100														Standpipe
				87.24																
		End of Drillhole		6.61																WL in Standpipe at Elev. 93.05 m on Jan. 30, 2017
7																				
8																				
9																				
10																				
11																				
12																				
13																				

DEPTH SCALE

1 : 50

LOGGED: PAH

CHECKED: SAT

Golder Associates

MIS-RCK 004 1658448.GPJ GAL-MISS.GDT 10/10/17 JM

PROJECT: 1658448

RECORD OF BOREHOLE: 17-27A

SHEET 1 OF 1

LOCATION: N 5013836.4 ;E 368790.7

BORING DATE: January 25, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m (20 40 60 80) / SHEAR STRENGTH Cu, kPa (nat V. + Q - ● / rem V. ⊕ U - ○) (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT (Wp W Wl) (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		93.85							
0	Power Auger 200 mm Diam. (Hollow Stem)	For soil stratigraphy refer to Record of Borehole 17-27		0.00							
1											
2											
3				90.41					138		
		End of Borehole DCPT Refusal		3.44							
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-28

SHEET 1 OF 1

LOCATION: N 5013987.7 ;E 368751.8

BORING DATE: January 26, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	DYNAMIC PENETRATION RESISTANCE, BLOWS/0.3m; SHEAR STRENGTH Cu, kPa (nat V. +, rem V. ⊕, Q - ●, U - ○)	HYDRAULIC CONDUCTIVITY, k, cm/s; WATER CONTENT PERCENT (Wp, W, Wl)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		93.95							
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) CLAYEY SILT; dark brown; non-cohesive		0.00 93.72							
		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.23							
1					1	SS	5				Native Backfill
					2	SS	6				Silica Sand
2				91.82							
	DCPT Open Hole	(SM) gravelly SILTY SAND; brown, contains cobbles and boulders; non-cohesive, wet, compact to dense		2.13	3	SS	29				Standpipe Cave
3				90.75							
		End of Borehole DCPT Refusal		3.20							WL in Standpipe at Elev. 93.65 m on Jan. 30, 2017
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: PAH
CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-29

SHEET 1 OF 1

LOCATION: N 5013007.0 ;E 367859.2

BORING DATE: January 23, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ⊕ *ND = Not Detected* 20 40 60 80 / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] □ *ND = Not Detected* 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} / WATER CONTENT PERCENT Wp W Wl 20 40 60 80	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.22						
0	Power Auger 200 mm Diam. (Hollow Stem)	FILL - Asphaltic concrete grinding and chunks		0.00	1	GRAB	-	⊕		Flush Mount Casing
				89.84						
		TOPSOIL - (SM) SILTY SAND; dark brown; non-cohesive		0.38						Bentonite Seal
				0.46	2	GRAB	-	⊕		Silica Sand
		(ML) sandy SILT; grey, with black staining; non-cohesive, moist		89.46						
1				0.76				⊕		
		(CI/CH) SILTY CLAY to CLAY; dark grey to red grey with staining, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff			3	SS	5	⊕		50 mm Diam. PVC #10 Slot Screen
					4	SS	5	⊕		
2				88.09						
		End of Borehole		2.13						WL in Screen at Elev. 89.45 m on Jan. 30, 2017
3										
4										
5										
6										
7										
8										
9										
10										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-30

SHEET 1 OF 1

LOCATION: N 5013004.5 ;E 367889.2

BORING DATE: January 13, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ⊕ *ND = Not Detected* (20 40 60 80) / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] □ *ND = Not Detected* (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp — W — Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		89.95						
0	Power Auger 200 mm Diam. (Hollow Stem)	ASPHALTIC CONCRETE		0.00						Flush Mount Casing
		FILL - (SW-GW) SAND and GRAVEL; dark grey brown (PAVEMENT STRUCTURE); non-cohesive, moist		0.10						Silica Sand
		TOPSOIL - (SM) SILTY SAND, fine; black and grey; non-cohesive		0.20						Bentonite Seal
				0.34	1	SS	18	⊕		Silica Sand
1		(CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff			2	SS	7	⊕		
					3	SS	3	⊕		50 mm Diam. PVC #10 Slot Screen
2					4	SS	2	⊕		Silica Sand
				87.05						Bentonite Seal
3		End of Borehole		2.90						WL in Screen at Elev. 89.36 m on Jan. 30, 2017
4										
5										
6										
7										
8										
9										
10										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-31

SHEET 1 OF 1

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

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected) 20 40 60 80 / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] □ (ND = Not Detected) 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} / WATER CONTENT PERCENT Wp — W — Wl 20 40 60 80	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.07						
0	Power Auger 200 mm Diam. (Hollow Stem)	FILL - (GP) sandy GRAVEL, angular; grey, contains asphalt fragments; non-cohesive, moist		0.00	1	GRAB	-	⊕		Flush Mount Casing; Silica Sand
				89.77						
		(CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.30						Bentonite Seal
1					2	SS	5	⊕		Silica Sand
					3	SS	6	⊕		50 mm Diam. PVC #10 Slot Screen
2					4	SS	2	⊕		Silica Sand
				87.17						Bentonite Seal
3		End of Borehole		2.90						WL in Screen at Elev. 89.44 m on Jan. 30, 2017
4										
5										
6										
7										
8										
9										
10										

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: PAH
CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-32

SHEET 1 OF 1

LOCATION: N 5013010.6 ;E 367910.1

BORING DATE: January 13, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (20 40 60 80) ⊕ / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected (20 40 60 80) □	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp — W — Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		89.84							
0	Power Auger 200 mm Diam. (Hollow Stem)	FILL - (SM-GM) SILTY SAND and GRAVEL; brown; non-cohesive		0.00	1	GRAB	-	⊕			
		TOPSOIL - (ML) sandy SILT; dark brown to black; non-cohesive		0.08 89.54 0.30							
1		(CI/CH) SILTY CLAY to CLAY; grey brown, contains silty fine sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff			2	SS	7	⊕			▽
					3	SS	3	⊕			
2				87.71							
		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											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-33

SHEET 1 OF 1

LOCATION: N 5013039.4 ;E 367857.2

BORING DATE: January 23, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ⊕ *ND = Not Detected* 20 40 60 80 / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] □ *ND = Not Detected* 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} / WATER CONTENT PERCENT Wp — W — Wl 20 40 60 80	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		89.99						
0	Power Auger 200 mm Diam. (Hollow Stem)	ASPHALTIC CONCRETE		0.00						
		FILL - Asphaltic concrete		0.12 89.66	1	GRAB	-	⊕		
		(ML) CLAYEY SILT; grey with black staining (WEATHERED CRUST); cohesive, w>PL		0.33 89.38	2	GRAB	-	⊕		
1		(CI/CH) SILTY CLAY to CLAY; grey brown and red brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.61	3	SS	6	⊕		
				88.47						
2		(CI/CH-ML and SM) SILTY CLAY, CLAYEY SILT and SILTY SAND; grey brown (WEATHERED CRUST); cohesive, w>PL, very stiff		1.52 87.86	4	SS	3	⊕		
		End of Borehole		2.13						
3										
4										
5										
6										
7										
8										
9										
10										

DEPTH SCALE
1 : 50

Golder Associates

LOGGED: PAH
CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-34

SHEET 1 OF 1

LOCATION: N 5012981.8 ;E 367911.1

BORING DATE: January 13, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ⊕ *ND = Not Detected* 20 40 60 80 / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] □ *ND = Not Detected* 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} / WATER CONTENT PERCENT Wp — W — Wl 20 40 60 80	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		89.99						
0	Power Auger 200 mm Diam. (Hollow Stem)	TOPSOIL - (ML) sandy SILT; dark brown; non-cohesive		0.00 / 89.69	1	GRAB	-	⊕		
		(CI/CH) SILTY CLAY to CLAY; grey brown, contains silty sand seams, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		0.30						
1					2	SS	6	⊕		▽
2				87.86	3	SS	3	⊕		
		End of Borehole		2.13						WL in open borehole at 1.06 m depth below ground surface upon completion of drilling
3										
4										
5										
6										
7										
8										
9										
10										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

PROJECT: 1658448

RECORD OF BOREHOLE: 17-35

SHEET 1 OF 1

LOCATION: N 5012965.0 ;E 367856.7

BORING DATE: January 13, 2017

DATUM: Geodetic

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	TYPE	BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ⊕ (ND = Not Detected) 20 40 60 80 / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] □ (ND = Not Detected) 20 40 60 80	HYDRAULIC CONDUCTIVITY, k, cm/s 10^{-6} 10^{-5} 10^{-4} 10^{-3} / WATER CONTENT PERCENT Wp — W — Wl 20 40 60 80	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		90.45						
0	Power Auger 200 mm Diam. (Hollow Stem)	ASPHALTIC CONCRETE		0.06						
		FILL - (SP-GP) SAND and GRAVEL, angular; grey (PAVEMENT STRUCTURE); non-cohesive, moist		90.11	1	GRAB	-	⊕		
		TOPSOIL - (ML) sandy SILT; dark brown; non-cohesive		0.34 89.84						
1		(SM) SILTY SAND; grey brown, contains clayey silt seams; non-cohesive, wet, loose		0.61 89.23	2	SS	7	⊕		
		(CI/CH) SILTY CLAY to CLAY; grey brown, fissured (WEATHERED CRUST); cohesive, w>PL, very stiff		1.22	3	SS	5	⊕		
2				88.32						
		End of Borehole		2.13						
3										
4										
5										
6										
7										
8										
9										
10										

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: PAH

CHECKED: SAT

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

APPENDIX B

Record of Test Pits

PROJECT: 1658448-7000

RECORD OF BOREHOLE: TP 17-01

SHEET 1 OF 1

LOCATION: N 5013074.7 ;E 367831.7

BORING DATE: July 21, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ⊕ *ND = Not Detected* (2 4 6 8) / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] □ *ND = Not Detected* (20 40 60 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp — W — Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		0.00							
0	Excavator	TOPSOIL/FILL - (SM) SILTY SAND, fine to coarse, trace gravel; dark brown, contains organic matter, rootlets; non-cohesive, moist		0.15	1	GRAB	-	⊕			
		FILL - (SW) gravelly SAND, fine to coarse, angular; black, contains asphalt; non-cohesive, moist		0.30							
		(SM) SILTY SAND, fine, trace clay; grey brown; non-cohesive		0.52							
1		(CL/CI) SILTY CLAY, trace sand; grey brown, highly fissured (WEATHERED CRUST); cohesive, w>PL		0.75							
		End of Test Pit									
2											
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: RI

CHECKED: AT

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

PROJECT: 1658448-7000

RECORD OF BOREHOLE: TP 17-02

SHEET 1 OF 1

LOCATION: N 5013079.8 ;E 367848.4

BORING DATE: July 21, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (2, 4, 6, 8) ⊕ / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected (20, 40, 60, 80) □	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}) / WATER CONTENT PERCENT Wp — W — Wl (20, 40, 60, 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE		0.00							
0	Excavator	TOPSOIL/FILL - (SM) gravelly SILTY SAND; dark brown, contains organic matter, rootlets; non-cohesive, moist		0.13							
		FILL - (SW) gravelly SAND, fine to coarse; dark brown to black, contains asphalt; non-cohesive		0.65	1	GRAB	-	⊕			
1		(CL/CI) SILTY CLAY, trace to some sand; grey brown, highly fissured (WEATHERED CRUST); cohesive, w>PL		0.75							
		End of Test Pit									
2											
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: RI

CHECKED: AT

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

PROJECT: 1658448-7000

RECORD OF BOREHOLE: TP 17-03

SHEET 1 OF 1

LOCATION: N 5013066.6 ;E 367826.6

BORING DATE: July 21, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ⊕ *ND = Not Detected* (2, 4, 6, 8) / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] □ *ND = Not Detected* (20, 40, 60, 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}) / WATER CONTENT PERCENT Wp — W — Wl (20, 40, 60, 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Excavator	ASPHALTIC CONCRETE		0.07	1	GRAB	-	⊕			
		FILL - (SW) gravelly SAND, fine to coarse; dark brown to black, contains asphalt, mud, concrete, brick, plastic; non-cohesive, moist		0.47							
		(SM) SILTY SAND, fine, trace clay; grey brown; non-cohesive, moist to wet		0.68							
1		(CL/CI) SILTY CLAY, trace sand; grey brown, highly fissured, thin laminations of silty sand (WEATHERED CRUST); cohesive, w>PL		0.80							
		End of Test Pit									
2											
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: RI

CHECKED: AT

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

PROJECT: 1658448-7000

RECORD OF BOREHOLE: TP 17-04

SHEET 1 OF 1

LOCATION: N 5013055.5 ;E 367846.2

BORING DATE: July 21, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (2, 4, 6, 8) / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected (20, 40, 60, 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}) / WATER CONTENT PERCENT Wp — W — Wl (20, 40, 60, 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Excavator	ASPHALTIC CONCRETE		0.00							
		FILL - (SW) gravelly SAND, fine to coarse, angular; dark brown to black, contains asphalt; non-cohesive, moist		0.14	1	GRAB	-	⊕			
		(ML/SM) sandy SILT, trace silty sand and clay; grey to grey brown, thin laminations of silty clay; non-cohesive, moist		0.40							
1		(CL/CI) SILTY CLAY, trace to some sand; grey brown, highly fissured, thin laminations of silty sand; cohesive, w>PL		0.75							
		End of Test Pit		1.15							
2											
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: RI

CHECKED: AT

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

PROJECT: 1658448-7000

RECORD OF BOREHOLE: TP 17-05

SHEET 1 OF 1

LOCATION: N 5013001.8 ;E 367882.1

BORING DATE: July 21, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected ⊕	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected □	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE										
0	Excavator	ASPHALTIC CONCRETE		0.00								
		FILL - (SM) gravelly SILTY SAND; dark brown; non-cohesive, moist		0.08								
		TOPSOIL/FILL - (SM/ML) SILTY SAND to sandy SILT, trace clay; dark brown with black staining, contains organic matter; cohesive, w~PL		0.20								
		(SM) SILTY SAND, ine, trace clay; grey; non-cohesive, moist		0.35								
		(CL/CI) SILTY CLAY, trace sand; grey brown, highly fissured, thin laminations to thin beds of silty sand (WEATHERED CRUST); cohesive, w>PL		0.50								
1					1	GRAB	-	⊕				
2					2	GRAB	-	⊕				
3					3	GRAB	-	⊕				
		End of Test Pit		3.00								
4												
5												
6												
7												
8												
9												
10												

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl

HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected: 2 4 6 8

HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected: 20 40 60 80

WATER CONTENT PERCENT: 20 40 60 80

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: RI

CHECKED: AT

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

PROJECT: 1658448-7000

RECORD OF BOREHOLE: TP 17-06

SHEET 1 OF 1

LOCATION: N 5013014.5 ;E 367869.6

BORING DATE: July 21, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ⊕ *ND = Not Detected* (2, 4, 6, 8) / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] □ *ND = Not Detected* (20, 40, 60, 80)	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}) / WATER CONTENT PERCENT Wp — W — Wl (20, 40, 60, 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Excavator	FILL - (SW) gravelly SAND, angular; dark brown to black; non-cohesive, moist		0.00							
		FILL - (SW) gravelly SAND, fine to coarse; brown; non-cohesive, wet		0.15							
		TOPSOIL - (SM/ML) SILTY SAND TO sandy SILT, trace clay; dark brown, contains organic matter; cohesive, w>PL		0.35 0.45 0.65							
1		(SM) SILTY SAND, fine, trace clay; brown to grey brown; non-cohesive, moist			1	GRAB	-	⊕			
		(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	-	⊕			
2											
3					3	GRAB	-	⊕			
		End of Test Pit		3.00							
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

LOGGED: RI

CHECKED: AT

Golder Associates

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

PROJECT: 1658448-7000

RECORD OF BOREHOLE: TP 17-07

SHEET 1 OF 1

LOCATION: N 5012987.9 ;E 367870.3

BORING DATE: July 21, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ⊕ / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] □	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT PERCENT	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Excavator	ASPHALTIC CONCRETE		0.06							
		FILL - (SW) gravelly SAND, sub-angular; brown (PAVEMENT STRUCTURE)		0.36							
		TOPSOIL/FILL - (ML) sandy SILT, trace clay; dark brown to black, contains organic matter; non-cohesive, moist		0.45							
		(SM) SILTY SAND, fine, trace clay; grey to grey brown; non-cohesive, moist		0.73							
1		(CL/CI) SILTY CLAY, trace to some sand; grey brown, highly fissured, pockets of thin laminations to thin beds of silty sand (WEATHERED CRUST); cohesive, w>PL			1	GRAB	-	⊕			
2					2	GRAB	-	⊕			
3					3	GRAB	-	⊕			
		End of Test Pit		3.10							
4											
5											
6											
7											
8											
9											
10											

HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ⊕ — *ND = Not Detected* — 2 4 6 8

HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] □ — *ND = Not Detected* — 20 40 60 80

HYDRAULIC CONDUCTIVITY, k, cm/s — 10^{-6} 10^{-5} 10^{-4} 10^{-3}

WATER CONTENT PERCENT — Wp ⊖W WI — 20 40 60 80

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: RI

CHECKED: AT

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

PROJECT: 1658448-7000

RECORD OF BOREHOLE: TP 17-08

SHEET 1 OF 1

LOCATION: N 5012986.5 ;E 367906.5

BORING DATE: July 21, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (2 4 6 8) ⊕ / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected (20 40 60 80) □	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6} 10^{-5} 10^{-4} 10^{-3}) / WATER CONTENT PERCENT Wp — W — Wl (20 40 60 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Excavator	TOPSOIL - (CL) SILTY CLAY, trace sand; dark brown, contains organic matter, rootlets; cohesive, w~PL to w>PL		0.00							
		(CL/CI) SILTY CLAY, trace sand; grey brown, highly fissured (WEATHERED CRUST); cohesive, w>PL		0.30							
1					1	GRAB	-	⊕			
		End of Test Pit		1.10							
2											
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: RI

CHECKED: AT

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

PROJECT: 1658448-7000

RECORD OF BOREHOLE: TP 17-09

SHEET 1 OF 1

LOCATION: N 5013008.9 ;E 367924.4

BORING DATE: July 21, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. / DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected ⊕ / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected □	HYDRAULIC CONDUCTIVITY, k, cm/s / WATER CONTENT PERCENT Wp W Wl	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Excavator	TOPSOIL - (CL) SILTY CLAY, trace sand; dark brown, contains organic matter, rootlets; cohesive, w>PL to w~PL		0.00							
		(CL/CI) SILTY CLAY, trace sand; grey brown, highly fissured, thin laminations to thin beds of silty sand (WEATHERED CRUST); cohesive, w>PL		0.25	1	GRAB	-	⊕			
1					2	GRAB	-	⊕			
2											
3					3	GRAB	-	⊕			
		End of Test Pit		3.00							
4											
5											
6											
7											
8											
9											
10											

HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected: 2, 4, 6, 8 ⊕

HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected: 20, 40, 60, 80 □

HYDRAULIC CONDUCTIVITY, k, cm/s: 10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}

WATER CONTENT PERCENT: Wp — W — Wl; 20, 40, 60, 80

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: RI

CHECKED: AT

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

PROJECT: 1658448-7000

RECORD OF BOREHOLE: TP 17-10

SHEET 1 OF 1

LOCATION: N 5013034.1 ;E 367896.8

BORING DATE: July 21, 2017

DATUM: Geodetic

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE: DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	SAMPLES: NUMBER	SAMPLES: TYPE	SAMPLES: BLOWS/0.30m	HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM] ND = Not Detected (2, 4, 6, 8) ⊕ / HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected (20, 40, 60, 80) □	HYDRAULIC CONDUCTIVITY, k, cm/s (10^{-6}, 10^{-5}, 10^{-4}, 10^{-3}) / WATER CONTENT PERCENT Wp — W — Wl (20, 40, 60, 80)	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION
		GROUND SURFACE									
0	Excavator	TOPSOIL - (CL/CI) SILTY CLAY, trace to some sand; dark brown, contains organic matter, rootlets; cohesive, w>PL		0.00							
		(CL/CI) SILTY CLAY, trace to some sand; grey brown, highly fissured (WEATHERED CRUST); cohesive, w>PL		0.30							
1					1	GRAB	-	⊕			
		End of Test Pit		1.00							
2											
3											
4											
5											
6											
7											
8											
9											
10											

DEPTH SCALE

1 : 50

Golder Associates

LOGGED: RI

CHECKED: AT

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

APPENDIX C

Laboratory Certificates of Analysis

AGAT Laboratories

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**
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

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Certificate of Analysis

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-01-20 **DATE REPORTED: 2017-02-10**

		SAMPLE DESCRIPTION:		BH 17-32 SA2
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		2017-01-13
Parameter	Unit	G / S	RDL	8139183
Antimony	µg/g	7.5	0.8	<0.8
Arsenic	µg/g	18	1	4
Boron	µg/g	120	5	7
Barium	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
Thallium	µg/g	1	0.4	<0.4
Uranium	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 Rotakowska

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-01-20

DATE REPORTED: 2017-02-10

				SAMPLE DESCRIPTION:	BH 17-30 SA2	BH 17-31 SA2	BH 17-32 SA2
				SAMPLE TYPE:	Soil	Soil	Soil
				DATE 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: 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

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Certificate of Analysis

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-01-20

DATE REPORTED: 2017-02-10

		SAMPLE DESCRIPTION:		BH 17-32 SA2
		SAMPLE TYPE:		Soil
		DATE 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**	**Acceptable Limits**		
Chrysene-d12	%	50-140		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.

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AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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
Parameter	**Unit**	**G / S**	**RDL**	**8139178**	**8139179**
Benzene	µg/g	0.21	0.02	<0.02	<0.02
Toluene	µg/g	2.3	0.08	<0.08	<0.08
Ethylbenzene	µg/g	2	0.05	<0.05	<0.05
Xylene Mixture	µg/g	3.1	0.05	<0.05	<0.05
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
F3 (C16 to C34)	µg/g	300	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	24.1	30.2
Surrogate	**Unit**	**Acceptable Limits**			
Terphenyl	%	60-140		96	122

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:

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Certificate of Analysis

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-01-20 **DATE REPORTED: 2017-02-10**

		SAMPLE DESCRIPTION:		BH 17-32 SA2
		SAMPLE TYPE:		Soil
		DATE 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**	**Acceptable Limits**		
Terphenyl	%	60-140		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:

AGAT Laboratories

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Guideline Violation

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

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

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Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

Soil Analysis

RPT Date: Feb 10, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - Metals (Including 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.
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%	NA			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 Rolakowska

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Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z180001

PROJECT: 1658448 - River Rd Phase 2 ESA

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

Trace Organics Analysis

RPT Date: Feb 10, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								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:

AGAT Laboratories

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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

AGAT Laboratories

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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
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

AGAT Laboratories

ISM

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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)

Laboratory Use Only

Work Order #: 17Z180001

Cooler Quantity: one cooler

Arrival Temperatures: 8.5 | 8.6 | 9.0
7' | 7.3 | 6.9

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes: on ice

Report Information:

Company: Golder Associates
Contact: Alyssa Trake / Keith Holmes
Address: 1931 Robertson Rd.

Phone: 613-592-9600 Fax:

Reports to be sent to:
1. Email: atrake@golder.com
2. Email: Kholmes@golder.com

Regulatory Requirements:

☐ No Regulatory Requirement

(Please check all applicable boxes)

☐ Regulation 153/04
Table (Indicate One) ☐ Ind/Com ☒ Res/Park ☐ Agriculture
Soil Texture (Check One) ☒ Coarse ☐ Fine

☐ Sewer Use
☐ Sanitary ☐ Storm
Region (Indicate One)

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
(Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☒ No

Report Guideline on *Certificate of Analysis* ☒ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ 1 Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

Project Information:

Project: 1658448 - ~~865~~ River Rd - Phase II ESA
Site Location:
Sampled By:
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:
Contact:
Address:
Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Please Circle) Y / N	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	(Check Applicable) ORPs: ☐ B-HWS ☐ Cl ☐ CN ☐ $CrVI^{+}$ ☐ EC ☐ FOC ☐ NO_3/NO_2 ☐ Total N ☐ Hg ☐ pH ☐ SAR	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3/NO_2	Volatiles: ☐ VOC ☐ BTEX ☐ THM	CCME Fractions 1 to 4 + BTEX	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	EC	SAR
BH17-30 SA2	Jan. 13/17		3	S	no metals			~~X~~						X								X	X
BH17-31 SA2	↓		3	S										X									
BH17-32 SA2			3	S				X						X		X							

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Alyssa Trake Alyssa Trake	Jan. 20/17	2:30	CBerthelet	20-Jan-17	14h50
CB/FD to Purolator	20-Jan-17	16h30	Sima	17/21/1	934
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

Page 1 of 1

Nº: T 033159

AGAT Laboratories

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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
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Certificate of Analysis

AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:Alyssa Troke

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

DATE RECEIVED: 2017-01-27

DATE REPORTED: 2017-02-06

SAMPLE DESCRIPTION:				BH17-29 SA2	BH17-33 SA2	FP1 SA1	FP2 SA2	BH17-8 SA1
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE 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
Thallium	µg/g	1	0.4	<0.4	<0.4	<0.4	<0.4	<0.4
Uranium	µg/g	23	0.5	0.9	0.6	0.8	0.6	<0.5
Vanadium	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

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Certificate of Analysis

AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:Alyssa Troke

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

DATE RECEIVED: 2017-01-27

DATE REPORTED: 2017-02-06

SAMPLE DESCRIPTION:				BH17-29 SA2	BH17-33 SA2	FP1 SA1	FP2 SA2	BH17-8 SA1
SAMPLE TYPE:				Soil	Soil	Soil	Soil	Soil
DATE 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
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 Limits						
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.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:Alyssa Troke

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

DATE RECEIVED: 2017-01-27

DATE REPORTED: 2017-02-06

		SAMPLE DESCRIPTION:		FP1 SA1	FP2 SA2	BH17-8 SA1
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE SAMPLED:		2017-01-23	2017-01-23	2017-01-23
Parameter	Unit	G / S	RDL	8153714	8153717	8153721
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
F2 (C10 to C16) minus Naphthalene	µg/g		10	<10	<10	<10
F3 (C16 to C34)	µg/g	300	50	58	920	1100
F3 (C16 to C34) minus PAHs	µg/g		50	58	920	1100
F4 (C34 to C50)	µg/g	2800	50	<50	1800	1500
Gravimetric Heavy Hydrocarbons	µg/g	2800	50	NA	NA	NA
Moisture Content	%		0.1	26.0	6.6	6.4
Surrogate	Unit	Acceptable Limits				
Terphenyl	%	60-140		120	120	83

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 Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:Alyssa Troke

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

DATE RECEIVED: 2017-01-27

DATE REPORTED: 2017-02-06

		SAMPLE DESCRIPTION:		BH17-29 SA2	BH17-33 SA2
		SAMPLE TYPE:		Soil	Soil
		DATE 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	Acceptable Limits			
Terphenyl	%	60-140		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 Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:Alyssa Troke

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

DATE RECEIVED: 2017-01-27

DATE REPORTED: 2017-02-06

		SAMPLE DESCRIPTION:		BH17-29 SA2	BH17-33 SA2
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2017-01-23	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 Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:Alyssa Troke

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

DATE RECEIVED: 2017-01-27

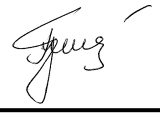
DATE REPORTED: 2017-02-06

		SAMPLE DESCRIPTION:		BH17-29 SA2	BH17-33 SA2
		SAMPLE 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	Acceptable 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.

Certified By:



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Guideline Violation

AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

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

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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			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - All Metals (Soil)															
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	8153721	<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

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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

RPT Date: Feb 06, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - VOCs (Soil)															
Dichlorodifluoromethane	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	84%	50%	140%	105%	50%	140%	96%	50%	140%
Vinyl Chloride	8153711	8153711	< 0.02	< 0.02	NA	< 0.02	106%	50%	140%	113%	50%	140%	84%	50%	140%
Bromomethane	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	111%	50%	140%	103%	50%	140%	77%	50%	140%
Trichlorofluoromethane	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	118%	50%	140%	96%	50%	140%	70%	50%	140%
Acetone	8153711	8153711	< 0.50	< 0.50	NA	< 0.50	108%	50%	140%	94%	50%	140%	87%	50%	140%
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	8153711	< 0.02	< 0.02	NA	< 0.02	90%	50%	140%	104%	60%	130%	103%	50%	140%
Chloroform	8153711	8153711	< 0.04	< 0.04	NA	< 0.04	96%	50%	140%	77%	60%	130%	101%	50%	140%
1,2-Dichloroethane	8153711	8153711	< 0.03	< 0.03	NA	< 0.03	107%	50%	140%	117%	60%	130%	118%	50%	140%
1,1,1-Trichloroethane	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	107%	50%	140%	114%	60%	130%	121%	50%	140%
Carbon Tetrachloride	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	106%	50%	140%	91%	60%	130%	108%	50%	140%
Benzene	8153711	8153711	< 0.02	< 0.02	NA	< 0.02	123%	50%	140%	116%	60%	130%	102%	50%	140%
1,2-Dichloropropane	8153711	8153711	< 0.03	< 0.03	NA	< 0.03	127%	50%	140%	104%	60%	130%	120%	50%	140%
Trichloroethylene	8153711	8153711	< 0.03	< 0.03	NA	< 0.03	121%	50%	140%	110%	60%	130%	129%	50%	140%
Bromodichloromethane	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	121%	50%	140%	94%	60%	130%	103%	50%	140%
Methyl Isobutyl Ketone	8153711	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	8153711	< 0.05	< 0.05	NA	< 0.05	115%	50%	140%	108%	60%	130%	100%	50%	140%
Dibromochloromethane	8153711	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	8153711	< 0.05	< 0.05	NA	< 0.05	83%	50%	140%	103%	60%	130%	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	8153711	< 0.05	< 0.05	NA	< 0.05	82%	50%	140%	91%	60%	130%	79%	50%	140%
1,3-Dichloropropene	8153711	8153711	< 0.04	< 0.04	NA	< 0.04	110%	50%	140%	96%	60%	130%	102%	50%	140%
n-Hexane	8153711	8153711	< 0.05	< 0.05	NA	< 0.05	124%	50%	140%	117%	60%	130%	109%	50%	140%

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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			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PHCs F1 - F4 (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 (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:

AGAT Laboratories

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Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:Alyssa Troke

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
Barium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Beryllium	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS
Boron (Hot Water Soluble)	MET-93-6104	EPA SW 846 6010C; MSA, Part 3, Ch.21	ICP/OES
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
Chromium VI	INOR-93-6029	SM 3500 B; MSA Part 3, Ch. 25	SPECTROPHOTOMETER
Mercury	MET-93-6103	EPA SW-846 3050B & 6020A	ICP-MS

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Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:Alyssa Troke

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

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Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z182021

PROJECT: 1658448 Riverside South Ph. 2

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:Alyssa Troke

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

AGAT Laboratories

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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)

Laboratory Use Only

Work Order #: 17Z182021

Cooler Quantity: one

Arrival Temperatures: 7.8 8.1 18.4 4.6 14.0 13.6

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes: on ice

Report Information:

Company: Golder Associates
Contact: Alyssa Trake / Keith Holmes
Address: 1931 Robertson Rd
Ottawa, ON
Phone: 613-592-9600 Fax:
Reports to be sent to:
1. Email: atrake@golder.com
2. Email: Kholmes@golder.com

Regulatory Requirements:

☐ No Regulatory Requirement

(Please check all applicable boxes)

☒ Regulation 153/04
Table 3 (Indicate One)
☐ Ind/Com
☒ Res/Park
☐ Agriculture
Soil Texture (Check One)
☒ Coarse
☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm
Region (Indicate One)

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
(Indicate One)

Is this submission for a **Record of Site Condition?** ☐ Yes ☒ No

Report Guideline on *Certificate of Analysis* ☒ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ 1 Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

Project Information:

Project: 1658448 - Riverside South Ph. 2
Site Location:
Sampled By:
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:
Contact:
Address:
Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Please Circle) Y / N	Metals and Inorganics	Metal Scan (Reg.153 Animated)	Hydride Forming Metals	Client Custom Metals	ORPs: ☐ B-HWS ☐ Cl⁻ ☐ CN⁻ ☐ Cr^{6+} ☐ EC ☐ FOC ☐ NO_3/NO_2 ☐ Total N ☐ Hg ☐ pH ☐ SAR	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3/NO_2	Volatiles: ☒ VOC ☐ BTEX ☐ THM	CCME Fractions 1 to 4 / BTEX	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use
BH17-29 SA2	Jan. 23/17	–	3	S				X					X	X		X				
BH17-33 SA2	↓	–	↓	↓				X					X	X		X				
FD1 SA1		–						X						X		X				
FD2 SA2		–						X						X		X				
BH17-8 SA1		–						X						X		X				

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Alyssa Trake Alyssa Trake	Jan 27/17	12:00		27-Jan-17	14h00
CBRSIG MIGRATOR	27-Jan-17	16h30	A. MARTIN	17/01/28	0955
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

Page 1 of 1

N°: T 033158

Document ID:Div-78-1511.01)

Pink Copy - Client | Yellow Copy - AGAT | White Copy- AGAT

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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

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Certificate of Analysis

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-01-31

DATE REPORTED: 2017-02-07

		SAMPLE DESCRIPTION:		MW #17-29
		SAMPLE TYPE:		Water
		DATE 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	Acceptable Limits		
Chrysene-d12	%	50-140		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.

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-01-31

DATE REPORTED: 2017-02-07

		SAMPLE DESCRIPTION:		MW #17-30	MW #17-31
		SAMPLE TYPE:		Water	Water
		DATE SAMPLED:		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	%	60-140		72	75

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

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

8158931 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

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-01-31

DATE REPORTED: 2017-02-07

		SAMPLE DESCRIPTION:		MW #17-29
		SAMPLE TYPE:		Water
		DATE SAMPLED:		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 Limits		
Terphenyl	%	60-140		69

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 Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

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
		SAMPLE TYPE:		Water
		DATE SAMPLED:		2017-01-30
Parameter	Unit	G / S	RDL	8158895
Dichlorodifluoromethane	µg/L	4400	0.80	<0.80
Vinyl 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
trans- 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

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Certificate of Analysis

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

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
		SAMPLE TYPE:		Water
		DATE 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	Acceptable Limits		
Toluene-d8	% Recovery	50-140		107
4-Bromofluorobenzene	% Recovery	50-140		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.

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Certificate of Analysis

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

Inorganic Chemistry (Water)

DATE RECEIVED: 2017-01-31

DATE REPORTED: 2017-02-07

		SAMPLE DESCRIPTION:		MW #17-30
		SAMPLE TYPE:		Water
		DATE 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.

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Certificate of Analysis

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

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 DESCRIPTION:		MW #17-29
		SAMPLE TYPE:		Water
		DATE 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

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Guideline Violation

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

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

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Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD
AGAT WORK ORDER: 17Z182712
PROJECT: 1658448 - Claridge Ph II
ATTENTION TO: Alyssa Troke
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis

RPT Date: Feb 07, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								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%
1,1,2-Trichloroethane	8157927		< 0.20	< 0.20	NA	< 0.20	93%	50%	140%	71%	60%	130%	118%	50%	140%
Toluene	8157927		< 0.20	< 0.20	NA	< 0.20	99%	50%	140%	74%	60%	130%	85%	50%	140%
Dibromochloromethane	8157927		< 0.10	< 0.10	NA	< 0.10	93%	50%	140%	74%	60%	130%	103%	50%	140%
Ethylene Dibromide	8157927		< 0.10	< 0.10	NA	< 0.10	86%	50%	140%	88%	60%	130%	112%	50%	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%	140%	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%

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Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD
AGAT WORK ORDER: 17Z182712
PROJECT: 1658448 - Claridge Ph II
ATTENTION TO: Alyssa Troke
SAMPLING SITE:
SAMPLED BY:

Trace Organics Analysis (Continued)

RPT Date: Feb 07, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
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:

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Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z182712

PROJECT: 1658448 - Claridge Ph II

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

Water Analysis

RPT Date: Feb 07, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - All Metals (Water)															
Antimony	8158895	8158895	< 1.0	<1.0	NA	< 1.0	95%	70%	130%	101%	80%	120%	104%	70%	130%
Arsenic	8158895	8158895	1.2	1.4	NA	< 1.0	98%	70%	130%	97%	80%	120%	99%	70%	130%
Barium	8158895	8158895	956	929	2.9%	< 2.0	100%	70%	130%	101%	80%	120%	100%	70%	130%
Beryllium	8158895	8158895	< 0.5	<0.5	NA	< 0.5	94%	70%	130%	95%	80%	120%	97%	70%	130%
Boron	8158895	8158895	< 10.0	<10.0	NA	< 10.0	100%	70%	130%	98%	80%	120%	100%	70%	130%
Cadmium	8158895	8158895	< 0.2	<0.2	NA	< 0.2	100%	70%	130%	100%	80%	120%	99%	70%	130%
Chromium	8158895	8158895	5.1	4.7	NA	< 2.0	100%	70%	130%	105%	80%	120%	104%	70%	130%
Cobalt	8158895	8158895	24.1	25.6	6.0%	< 0.5	98%	70%	130%	92%	80%	120%	90%	70%	130%
Copper	8158895	8158895	9.0	10.1	11.5%	< 1.0	101%	70%	130%	103%	80%	120%	102%	70%	130%
Lead	8158895	8158895	< 0.5	<0.5	NA	< 0.5	100%	70%	130%	102%	80%	120%	99%	70%	130%
Molybdenum	8158895	8158895	3.7	3.8	2.7%	< 0.5	96%	70%	130%	95%	80%	120%	94%	70%	130%
Nickel	8158895	8158895	21.6	22.0	1.8%	< 1.0	91%	70%	130%	92%	80%	120%	90%	70%	130%
Selenium	8158895	8158895	< 1.0	< 1.0	NA	< 1.0	97%	70%	130%	98%	80%	120%	104%	70%	130%
Silver	8158895	8158895	< 0.2	<0.2	NA	< 0.2	101%	70%	130%	109%	80%	120%	108%	70%	130%
Thallium	8158895	8158895	< 0.3	<0.3	NA	< 0.3	103%	70%	130%	104%	80%	120%	102%	70%	130%
Uranium	8158895	8158895	9.0	8.5	5.7%	< 0.5	99%	70%	130%	102%	80%	120%	101%	70%	130%
Vanadium	8158895	8158895	0.7	<0.4	NA	< 0.4	101%	70%	130%	103%	80%	120%	102%	70%	130%
Zinc	8158895	8158895	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	8158895	<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:

AGAT Laboratories

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

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			
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	EPA SW-846 5030 & 8260	(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	EPA SW-846 5030 & 8260	(P&T)GC/MS
Methyl tert-butyl ether	VOL-91-5001	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

AGAT Laboratories

5835 COOPERS AVENUE
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FAX (905)712-5122
http://www.agatlabs.com

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
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

AGAT Laboratories

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http://www.agatlabs.com

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
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

AGAT Laboratories

ILQ

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
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)

Laboratory Use Only

Work Order #: 1721827127

Cooler Quantity: one

Arrival Temperatures: 2.5 2.4 13.0
6 9 17 17 4

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes: on ice

Report Information:

Company: Golder Assoc.
Contact: Alyssa Troke / Keith Holmes
Address: 1931 Robertson Rd., Ottawa

Phone: 613-592-9600 Fax:

Reports to be sent to:
1. Email: atroke@golder.com
2. Email: kholmes@golder.com

Regulatory Requirements:

☐ No Regulatory Requirement

(Please check all applicable boxes)

☑ Regulation 153/04
Table 3 *Indicate One*
☐ Ind/Com
☑ Res/Park
☐ Agriculture

Soil Texture *(Check One)*
☑ Coarse
☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm

Region _____ *Indicate One*

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other

_____ *Indicate One*

Is this submission for a **Record of Site Condition?** ☐ Yes ☑ No

Report Guideline on *Certificate of Analysis* ☑ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 1658448 - Claridge Ph. II
Site Location:
Sampled By:
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:
Contact:
Address:
Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Y/N)	O. Reg 153: Metals and Inorganics ☑ All Metals ☐ Hydride Metals	O. Reg 153: ORPs: ☐ B-HWS ☐ Cl⁻ ☐ CN ☐ Cr⁶⁺ ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3+NO_2	Volatiles: ☑ VOC ☐ 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		Fe, Chloride, Sodium Resistivity Sulphate		
MW#17-29	30/01/17	1430	11	GW		Y	✓					✓	✓		✓								
MW#17-30	30/01/17	1330	7	GW									✓								✓	✓	✓
MW#17-31	30/01/17	1515	4	GW									✓										

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Paul Hulan	30/01/17			30-Jun-17	15h50
LBT Due FedEx	31-Jun-17	16h00	Simon	17/2/1	840

Page 1 of 1

N°: T 041608

AGAT Laboratories

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
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

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

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17Z185120

PROJECT: 1658448

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-02-07

DATE REPORTED: 2017-02-14

		SAMPLE DESCRIPTION:		BH17-8 SA7
		SAMPLE TYPE:		Soil
		DATE SAMPLED:		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

AGAT Laboratories

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

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			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - ORPs (Soil) - EC & SAR															
Electrical Conductivity	8182368		1.10	1.11	0.9%	< 0.005	91%	90%	110%	NA			NA		
Sodium Adsorption Ratio	8174708		8.15	8.03	1.5%	NA	NA			NA			NA		

Comments: NA signifies Not Applicable.

Certified By: Amanjot Bhela

AGAT Laboratories

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Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z185120

PROJECT: 1658448

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

AGAT Laboratories
5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
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)

Laboratory Use Only
Work Order #: 17Z185120
Cooler Quantity: one
Arrival Temperatures: 4.2 | 4.1 | 3.8
4- 3.0 | |
Custody Seal Intact: ☐Yes ☐No ☐N/A
Notes: on ice

Report Information:
Company: Golder Associates
Contact: Alyssa Trake / Keith Holmes
Address: 1931 Robertson Road, Ottawa
Phone: 613-592-9600 Fax:
Reports to be sent to:
1. Email: atrake@golder.com
2. Email: kholmes@golder.com

Regulatory Requirements:
☐ No Regulatory Requirement
(Please check all applicable boxes)

☒ Regulation 153/04
Table 3 (Indicate One)
☐ Ind/Com
☒ Res/Park
☐ Agriculture
Soil Texture (Check One)
☒ Coarse
☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm
Region ____ (Indicate One)

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
(Indicate One)

Is this submission for a Record of Site Condition? ☐ Yes ☒ No

Report Guideline on Certificate of Analysis ☒ Yes ☐ No

Turnaround Time (TAT) Required:
Regular TAT ☒ 5 to 7 Business Days
Rush TAT (Rush Surcharges Apply)
☐ 3 Business Days ☐ 2 Business Days ☐ 1 Business Day
OR Date Required (Rush Surcharges May Apply):
Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

Project Information:
Project:
Site Location:
Sampled By:
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:
Contact:
Address:
Email:

Sample Matrix Legend
B Biota
GW Ground Water
O Oil
P Paint
S Soil
SD Sediment
SW Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Please Circle) Y / N	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	(Check Applicable) ORPs: ☐B-HWS ☐Cl⁻ ☐CN ☐Cr⁶⁺ ☐EC ☐FOC ☐NO_3/NO_2 ☐Total N ☐Hg ☐pH ☐SAR	(Check Applicable) Nutrients: ☐TP ☐NH_3 ☐TKN ☐NO_3 ☐NO_2 ☐NO_3/NO_2	(Check Applicable) Volatiles: ☐VOC ☐BTEX ☐THM	CCME Fractions 1 to 4	ABNs	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	EC	SAR
BH17-8 SA7	Jan. 23/17	—	1	S																	X	X

Samples Relinquished By (Print Name and Sign): Alyssa Trake / Alyssa Trake	Date: Feb. 7/17	Time: 10:30	Samples Received By (Print Name and Sign):	Date: 7 Feb 17	Time: 13h00
Samples Relinquished By (Print Name and Sign): UPS fedex	Date: 7 Feb 17	Time: 16h00	Samples Received By (Print Name and Sign):	Date:	Time:
Samples Relinquished By (Print Name and Sign):	Date:	Time:	Samples Received By (Print Name and Sign): Shaunin Feb 8/17	Date: 10:05	Time:

Page 1 of 1
N°: T 033163

Document ID:Div-78-1511 011
Pink Copy - Client | Yellow Copy - AGAT | White Copy- AGAT
Date Issued: Feb 18, 2016

AGAT Laboratories

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

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

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

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Certificate of Analysis

AGAT WORK ORDER: 17Z240912

PROJECT: 1658448 Claridge TP

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-07-24

DATE REPORTED: 2017-08-02

		SAMPLE DESCRIPTION:		TP17-4 SA1	TP17-5 SA3	TP17-5 SA13	TP17-6 SA1	TP17-7 SA2	TP17-8 SA1	TP17-9 SA3	TP17-10 SA1
		SAMPLE 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 Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17Z240912

PROJECT: 1658448 Claridge TP

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-07-24

DATE REPORTED: 2017-08-02

		SAMPLE DESCRIPTION:		TP17-3 SA1	TP17-4 SA1	TP17-5 SA3	TP17-5 SA13	TP17-6 SA1	TP17-7 SA2	FB2 SA1	FB2 SA2
		SAMPLE 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	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	Acceptable Limits									
Terphenyl	%	60-140		92	87	89	96	105	91	95	84

Certified By:

AGAT Laboratories

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Certificate of Analysis

AGAT WORK ORDER: 17Z240912

PROJECT: 1658448 Claridge TP

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-07-24

DATE REPORTED: 2017-08-02

		SAMPLE DESCRIPTION:		FB2 SA3	TP17-1 SA1	TP17-2 SA1
		SAMPLE TYPE:		Soil	Soil	Soil
		DATE 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	Acceptable Limits				
Terphenyl	%	60-140		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.

Certified By:

AGAT Laboratories

Guideline Violation

AGAT WORK ORDER: 17Z240912

PROJECT: 1658448 Claridge TP

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CANADA L4Z 1Y2
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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

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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:

Soil Analysis

RPT Date: Aug 02, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	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		
Sodium Adsorption Ratio	8600321		2.30	2.41	4.7%	NA	NA			NA			NA		

Comments: NA signifies Not Applicable.

Certified By: Amanjot Bhela

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CANADA L4Z 1Y2
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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:

Trace Organics Analysis

RPT Date: Aug 02, 2017			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
O. Reg. 153(511) - PHCs F1 - F4 (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:

AGAT Laboratories

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CANADA L4Z 1Y2
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Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z240912

PROJECT: 1658448 Claridge TP

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLING SITE:

SAMPLED BY:

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 Method	BALANCE
Terphenyl	VOL-91-5009		GC/FID

AGAT Laboratories

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
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)

Laboratory Use Only

Work Order #: 17Y240912

Cooler Quantity: one - on ice

Arrival Temperatures: 8.1 | 7.3 | 7.0
LT- 7.4 | 6.9 | 7.0

Custody Seal Intact: ☐ Yes ☐ No ☐ N/A

Notes:

Report Information:

Company: Golder Associates
Contact: Alyssa Troke / Keith Holmes
Address: 1931 Robertson Rd, Ottawa
Phone: 613-592-9600 Fax:
Reports to be sent to:
1. Email:
2. Email:

Regulatory Requirements:

☐ No Regulatory Requirement

(Please check all applicable boxes)

☒ Regulation 153/04
Table 3 (Indicate One)
☐ Ind/Com
☒ Res/Park
☐ Agriculture
Soil Texture (Check One)
☒ Coarse
☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm
Region ____ (Indicate One)

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other ____ (Indicate One)

Is this submission for a Record of Site Condition? ☒ Yes ☐ No

Report Guideline on Certificate of Analysis ☒ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply): 5 Days

Please provide prior notification for rush TAT
**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 1658448 - Claridge TP
Site Location:
Sampled By:
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:
Contact:
Address:
Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Y/N)	Metals and Inorganics	☐ All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals	ORPs: ☐ B-HWS ☐ Cl- ☐ CN- ☐ Cr6+ ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH3 ☐ TKN ☐ NO3 ☐ NO2 ☐ NO3+NO2	Volatiles: ☐ VOC ☐ 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	EC	SAR
TP17-1 SA1A	July 21/17	–	3	S										X								
TP17-2 SA1A	↓	–	↓	↓										X								
TP17-3 SA1	↓	–	↓	↓										X								
TP17-4 SA1	↓	–	↓	↓										X							X	X
TP17-5 SA3	↓	–	↓	↓										X							X	X
TP17-5 SA13	↓	–	↓	↓										X							X	X
TP17-6 SA1	↓	–	↓	↓										X							X	X
TP17-7 SA2	↓	–	↓	↓										X							X	X
TP17-8 SA1	↓	–	↓	↓	No PHCs/BTEX									~~X~~							X	X
TP17-9 SA3	↓	–	↓	↓																	X	X
TP17-10 SA1	↓	–	↓	↓																	X	X

Samples Relinquished By (Print Name and Sign)	Date	Time	Samples Received By (Print Name and Sign)	Date	Time
Alyssa Troke / Alyssa Troke	July 24/17	10:30	[illegible signature]	24-July-17	11h00
[illegible] to FedEx	24 July 17	16h00			
			Shenmin [illegible]	July 25/17	10:30

Page 1 of 2

Nº: T 047062

AGAT Laboratories
5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
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)

Laboratory Use Only

Work Order #: 17224092

Cooler Quantity: one on ice

Arrival Temperatures: 2.1 | 7.3 | 7.0

Custody Seal Intact: ☐Yes ☐No ☐N/A

Notes:

Report Information:

Company: ~~Atyssa~~ Golder Associates

Contact: Alyssa Troke / Keith Holmes

Address: Ottawa

Phone: 613-592-9600 Fax:

Reports to be sent to:

1. Email: atroke@golder.com

2. Email: kholmes@golder.com

Regulatory Requirements:

☐ No Regulatory Requirement

(Please check all applicable boxes)

☒ Regulation 153/04
Table 3 (Indicate One)
☐ Ind/Com
☐ Res/Park
☐ Agriculture
Soil Texture (Check One)
☒ Coarse
☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm
Region (Indicate One)

☐ Regulation 558
☐ CCME
☐ Prov. Water Quality Objectives (PWQO)
☐ Other
(Indicate One)

Is this submission for a **Record of Site Condition?** ☒ Yes ☐ No

Report Guideline on *Certificate of Analysis* ☒ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☐ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

☐ 3 Business Days ☐ 2 Business Days ☐ Next Business Day

OR Date Required (Rush Surcharges May Apply):

Please provide prior notification for rush TAT

**TAT is exclusive of weekends and statutory holidays*

For 'Same Day' analysis, please contact your AGAT CPM

Project Information:

Project: 1658448 - Clavidge

Site Location:

Sampled By:

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:

Contact:

Address:

Email:

Sample Matrix Legend

B	Biota
GW	Ground Water
O	Oil
P	Paint
S	Soil
SD	Sediment
SW	Surface Water

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y / N	Field Filtered - Metals, Hg, CrVI	O. Reg 153																								
								Metals and Inorganics	☐ All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals	ORPs: ☐ B-HWS ☐ Cl⁻ ☐ CN ☐ Cr^{6+} ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3+NO_2	Volatiles: ☐ VOC ☐ 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							
FB2SA1	July 21/17	–	3	S										X																	
FB2SA2	↓	–	3	S										X																	
FB2SA3	↓	–	3	S										X																	

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
			[illegible]	24-July-17	11h00
[illegible] to FedEx	24-July-17	11h00	Samples Received By (Print Name and Sign):	Date	Time
Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time

Page 2 of 2

№: T 047096

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.

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