



September 2017



REPORT ON

Phase Two Environmental Site Assessment Part of 3930 Riverside Drive Ottawa, Ontario

Submitted to:

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REPORT

Report Number: 1670692-5000

Distribution:

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1.0 INTRODUCTION

1.1 Site Description

Golder Associates Ltd. (Golder) was retained by Revera Inc.(Revera) to conduct a Phase Two Environmental Site Assessment (Phase Two ESA) of the following properties:

Municipal Address	Part of 3930 Riverside Drive
Property Identification Numbers	Part of 040530578
Legal Description	Part of Lot 5, Concession 2 (Rideau Front), Ottawa, Ontario

The Site location is provided on Figure 1. A plan of survey for the Site was not available at the time this report was prepared. The boundaries of the Phase Two Property are provided in Figure 2.

1.2 Property Ownership

The contact information for the Phase Two Property is as follows:

Site Owner/Client	Address	Contact Information
Revera Inc.	5015 Spectrum Way, Suite 600 Mississauga, Ontario L4W 0E4	Rudiger Hanel Office: 289-719-3212 Email: Rudiger.Hanel@reveraliving.com

1.3 Current and Proposed Future Uses

The Phase Two Property is currently vacant land, and was previously the site of a sand and gravel pit which is considered to be an industrial land use. It is proposed that the Site be redeveloped with a residential building. Given that the Site to be redeveloped with a residential building, there will be a change in the land use from less sensitive to more sensitive use on this portion of the Site. As such, there is a mandatory requirement for a RSC to be filed for the Site.

1.4 Applicable Site Condition Standard

The analytical results of the samples collected for this Phase Two ESA were compared to the Table 3 Generic Site Condition Standards (residential property use, coarse soil texture) presented in the MOECC regulation 153/04 "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", dated April 15, 2011 (O. Reg. 153/04). The applicable site condition standards were selected based on the following rationale:

- The Site and all other properties located, in whole or in part, within 250 metres of the Site are supplied by the City of Ottawa municipal drinking water system. No wells were identified that are used or intended for use as a source of water;
- The Site is not located in an area designated in a municipal official plan as a well-head protection area or other designation identified by the municipality for the protection of ground water;



- Grain size analysis was not completed as part of the Phase Two ESA and therefore “coarse textured” has been assumed as a conservative approach and due to coarse nature of the fill;
- The closest water body is the Rideau River, located 40 m southwest of the Phase Two Property;
- There are no features on the Phase Two Property that would meet the conditions of an environmentally sensitive site, as described in Section 41;
- The average pH of surface soil is $5 \leq \text{pH} \leq 9$ and the pH of sub-surface soil meets the requirement that $5 \leq \text{pH} \leq 11$;
- The intended land use for the Phase Two Property is residential;
- The Phase Two Property is greater than 30 metres from the nearby waterbody (Rideau River);
- The overburden thickness is greater than 2 metres over more than one-third of the Phase Two Property; and,
- The average depth to the water table is 6.85 metres below ground surface (mbgs) with the shallowest being 3.60 mbgs.

2.0 BACKGROUND INFORMATION

This section presents the background conditions of the Phase Two Property including a description of the physical setting and a summary of past investigations conducted.

The objectives of the Phase Two ESA were to obtain information about environmental conditions in the soil and groundwater on, in or under the Site, and to develop the information necessary to complete a Record of Site Condition for the property. The objectives of this Phase Two ESA were achieved by:

- Developing an understanding of the geological and hydrogeological conditions at the Site; and,
- Conducting field sampling for all contaminants of concern (“COCs”) associated with each area of potential environmental concern (“APEC”) identified in the Phase One ESA.

2.1 Physical Setting

The nearest surface water body is the Rideau River, located approximately 40 m southwest of the Phase Two Property. There are no areas of natural significance within the Phase One Study area. Land uses surrounding the Phase Two Property include parkland and commercial, as shown in Figure 2.

The topography of the Site and surrounding area is undulating with an overall slope to the west. The Site consists of very uneven terrain as a result of fill placement on the Site. The greatest change in elevation is at the northeast corner of the Site where the land slopes steeply downward from the boundaries of the Site. Local surface water is anticipated to flow southwest towards the Rideau River located approximately 40 m southwest of the Site.

2.2 Past Investigations

- **“1994 Phase I and Partial Phase II ESA”**, Phase I and Partial Phase II Environmental Site Assessment, Riverwalk Park and St. Mary’s Sites, Riverside Drive, Ottawa, Ontario, dated June 1994, prepared by Golder Associates Ltd. for Cumming Cockburn Limited.



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- **“1998 Phase I ESA”**, Phase I Environmental Site Assessment, St. Mary’s Site, Riverside Drive, Ottawa, Ontario, dated December 1998, prepared by Golder Associates Ltd. for Doran Contractors Limited.
- **“May 2001 Phase I and II ESA”**, Phase I and Phase II Environmental Site Assessment, St. Mary’s Site, Riverside Drive, Ottawa, Ontario, dated May 2001, prepared by Golder Associates Ltd. for Dundee Realty Corporation.

The 1994 Phase I and Partial Phase II ESA was completed for the former “St. Mary’s Site” and the former “Riverwalk Park Site”. The former St. Mary’s Site consists of the entire property at 3930 Riverside Drive (including the Site) and the property located immediately north of the Site at 3860 Riverside Drive (currently occupied by a park). The Riverwalk Park Site includes the surrounding properties north of the Site, some of which are within the Phase One Study Area. Based on the review of the 1994 Phase I and Partial Phase II ESA, the following is of note for the Site:

- The Site was used as a sand and gravel pit prior to 1935. The pit was backfilled during the 1980’s.
- The adjacent lands north of the Site were used as a sand and gravel pit prior to the 1930’s into the 1980’s, with possible re-vegetation in the 1960’s and 1970’s.
- At the time of the Site visit, which was conducted in May 1994, irregular backfill was noted on the Site and the adjacent properties north of the Site. Mounds of sand, silty sand, cobbles, boulders as well as brush, topsoil and debris were noted within the former pit areas on these properties.
- Backfill material on the Site consists of granular fill with some construction waste. The origin of the backfill material is unknown; however, some of the backfill material was reportedly brought to the Site in during construction activities on Elgin Street in Ottawa, back in 1986 and 1987.
- During the 1994 Site visit, one aboveground storage tank (AST), likely a fuel AST, was observed on the St. Mary’s Site; however, it is not known if it was located on the Site or the adjacent property north of the Site. No hydrocarbon odours or staining was observed on the St. Mary’s Site or the Riverwalk Park Site at the time of the Site visit.
- Fill material was encountered in two test pits that were excavated on the Site near the northeast Site boundary. The fill was present in these locations to depths of 4.2 metres below ground surface (mbgs) and 3.0 mbgs and primarily consisted of grey silty sand with some gravel and clay. Brick, wood and a metal tank was present in the fill material at one of these test pits and trace asphalt was present in the fill material at the other test pit.
- Fill material was encountered in four test pits completed on the adjacent property north of the Site (3860 Riverside Drive, off-Site). The fill material in these locations extended to depths ranging from 3.30 mbgs to at least 5.50 mbgs and primarily consisted of silty sand with some gravel and clay. Construction debris including wood, asphalt, glass, brick and/or concrete was observed in the fill at three of these test pit locations.
- As part of the 1994 Phase I and Partial Phase II ESA, samples of fill collected from the tests pits were submitted for laboratory analysis of metals and inorganics as well as oil and grease. The soil analytical results were compared to and satisfied the Province of Ontario Soil Clean-Up Guidelines for Decommissioning of Residential, Fine and Medium Textured Soil (1991). However, the current environmental standards applicable to the Site are the Ontario Ministry of the Environment and Climate Change’s (MOE) Table 3 Standards, Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition for coarse-textured soil



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and Residential/Parkland/Institutional property use presented in the 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). This standard was selected as the applicable Site standards as the Site is located greater than 30 m from a water body, the proposed development of the Site includes residential buildings and the Site will be serviced with municipal water. A comparison of the soil analytical results to the currently applicable Site standards (the MOE Table 3 Standards) indicate that all samples of fill met the MOE Table 3 Standards with the exception of a fill sample from one of the test pits which contained a concentration of electrical conductivity (EC) above the MOE Table 3 Standards. The location of this test pit is close to the eastern property boundary and may be on or off of the Phase Two Property.

The 1998 Phase I ESA was completed for the Site and the property located immediately north of the Site located at 3860 Riverside Drive (i.e., the former St. Mary's Site). Based on the review of the 1998 Phase I ESA, the following is of note for the Site:

- The Site is underlain discontinuously by fill material ranging in thickness of up to 13 m in some locations. The fill, where present, is highly variable in composition, ranging from grey silty clay to gravel, boulders, concrete pieces, asphaltic concrete slabs, etc. Below the fill layer is a native sandy soil layer followed at a depth by a silty clay layer.
- At the time of the Site visit, which was conducted in May 1998, the Site and the adjacent property north of the Site were vacant. The backfill material that was observed within the former pit areas in 1994 was still present. The fuel AST also remained present.

The May 2001 Phase I and II ESA was completed for the Site and the property located immediately northeast of the Site located at 3860 Riverside Drive (i.e., the former St. Mary's Site). Based on the review of the May 2001 Phase I and II ESA, the following is of note for the Site:

- During an interview, the Site Representative stated that approximately 120,000 cubic metres (m³) of fill material was deposited on the Site and the adjacent property north of the Site between December 2000 and March 2001. The source of this material was the excavation for the Nepean stormwater management pond, located across the Rideau River.
- The Site and the adjacent property north of the Site were used as a sand and gravel pit from prior to 1931 until the mid-1960's when backfilling commenced on the adjacent property north of the Site. Backfilling has continued on the Site and the adjacent property north of the Site until at least May 2001. The backfilling has occurred on this portion of the Site since at least 1997.
- The St. Mary's Site was owned by private individuals from 1802 until 1911, and from then on by commercial interests. Sand and gravel extraction commenced on the St. Mary's Site when it was owned by the Ottawa Hunt and Golf Club which was between June 1911 and June 1960. Between June 1960 and May 2001, the St. Mary's Site was owned by commercial and/or industrial companies including St. Mary's Cement Corporation and Dominion Building Materials Limited.
- Two boreholes were completed on the Site in 1991 for geotechnical purposes. One borehole was completed along the east Site boundary and encountered 3.0 m of fill consisting of soils with some wood, brick, concrete and asphalt. This location is believed to be outside the Phase Two Property. The other borehole was located on the southern portion of the Site and did not encounter any debris in the fill material.



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- No ASTs were observed on the St. Mary's Site at the time of the Site visit.
- There is potential that localized areas of debris material may have been buried on the Site during the backfill phases and some of the material may present issues of environmental concern related soil and/or groundwater quality on the Site.
- As part of the 2001 Phase II ESA, seven test pits were excavated on the Site, two test pits were excavated on the adjacent property northeast of the Site and one monitoring well was installed on the easternmost portion of the Site (monitoring well MW01-2 as shown on Figure 2). In addition, one monitoring well was installed just south of the western portion of the Site. Fill material was encountered in all nine test pits and varied in composition, suggesting that there have been several sources of these fill materials. The fill material in the test pit, the on-Site monitoring well and the nearby monitoring well ranged from depths of 2.0 mbgs to at least 5.2 mbgs and were underlain by native light brown sand with trace gravel. Construction debris including small amounts of asphalt, wood, glass, brick, rubber and concrete was observed in the fill material in one of the test pits completed near the eastern Site boundary, in the test pit completed on the western portion of the Site, just east of the treed area, and in the location of the monitoring well that was completed on the eastern portion of the Site (monitoring wells MW01-1). This monitoring well was not observed on the Site during the Phase One ESA Site visit.
- The groundwater levels measured in the monitoring wells located on the eastern portion of the Site and just south of the Site were 4.74 and 12.38 mbgs, respectively.
- Soil samples collected from some of the test pits were analyzed for TPH gas, TPH diesel, TPH heavy oils, metals and/or inorganics. All analyzed soil samples met the MOE Guidelines for Use at Contaminated Sites, Table B Criteria and also meet the currently applicable MOE Table 3 Standards, where direct comparison is applicable. TPH heavy oils cannot be directly compared to the current standards; however, the concentrations TPH heavy oils in one of the soil samples collected from a test pit on the adjacent property north of the Site was 750 ug/g which compares to the MOE Table 3 Standards for F3 and F4 of 300 ug/g and 2,800 ug/g, respectively. This location is outside the Phase Two Property.
- The groundwater samples collected from the on-Site monitoring well and the adjacent monitoring well south of the Site met the MOE Guidelines for Use at Contaminated Sites, Table B Criteria and also meet the MOE Table 3 Standards for all parameters analyzed (TPH gasoline, TPH diesel, benzene, toluene, ethylbenzene and xylenes (BTEX) and metals).

Based on the review of the previous environmental reports, fill material including construction debris is still be present on the Site and the adjacent lands and is considered to be on-Site and off-Site Potentially Contaminating Activities (PCAs). Although fill materials with debris is present across the Phase Two Property, there were no documented exceedances of the currently applicable standards on the Phase Two Property with only one TPH exceedance off-Site and one electrical conductivity exceedance near the property line. The location of the previous test locations on the Phase Two Property are shown on Figure 2.



2.2.1 Phase One ESA

Golder recently conducted a Phase One ESA which included the Phase Two Property. The results of this Phase One ESA were documented in Golder Phase One ESA Report entitled, “Phase One Environmental Site Assessment proposed Development at Riverside Drive and Hunt Club Road Ottawa, Ontario”, dated February 2017, which was completed to assess the likelihood of soil and/or groundwater contamination resulting from historic or present activities at the Site and surrounding area. This included a review of available historical information on the Site and surrounding area, interviews with persons familiar with the Site and a Site reconnaissance. Based on the 2017 Phase One ESA, the follow APEC was identified on the Site:

APEC #	Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity	Location of PCA (on-Site or off-Site)	Contaminants of Potential Concern (COCs)	Media Potentially Impacted (Groundwater, soil and/or Sediment)
1	Impacts due to the presence of fill material.	Site-wide	PCA 30: Importation of Fill material of unknown quality	On-Site and off-Site	PHC F1 to F4, BTEX, PAHs, EC and metals	Groundwater and Soil

Notes

- PCA Potentially contaminating activity as listed O.Reg. 153/04, Schedule D, Table 2
- PHC petroleum hydrocarbon compound fractions
- PAH polycyclic aromatic hydrocarbon
- BTEX benzene, toluene, ethylbenzene, xylenes
- EC electrical conductivity
- SAR sodium adsorption ratio

This report was prepared by the Qualified Person and will be relied upon for the Phase Two investigation. EC was carried as COCs due to the previous reports which identified a single elevated EC result near the property line. Metals, PHC, BTEX and PAHs were selected as common COCs in fill of unknown origin.

3.0 SCOPE OF THE INVESTIGATION

3.1 Overview of Site Investigation

The Phase Two ESA investigation activities were completed between April 26, 2017 and May 9, 2017 and included the following tasks:

- **Health and Safety Plan:** Preparation of a Health and Safety Plan for internal and subcontractor use prior to initiating any field work at the Site.
- **Utility Clearances:** Coordination of utility clearances with local utility companies along with retaining the services of a private locator to assess for possible services in the areas of the proposed test locations.



- **Borehole Advancement and Monitoring Well Installation:** The borehole drilling and monitoring well installation program included drilling of four boreholes, three of which were completed as groundwater monitoring wells which were used for groundwater sampling at the Site. The rationale for the selected location of the boreholes is provided in the Sampling and Analysis Plan provided in Appendix A(i). The location of the boreholes and monitoring wells are shown on Figure 2. The monitoring well construction details are presented in Table 1.
- **Soil Sampling:** Selected soil samples were collected between April 26, 2017 and May 3, 2017 from the boreholes. Soil samples were submitted for chemical analysis of one or more of the following: petroleum hydrocarbon fractions 1 to 4 (“PHCs F1 to F4”), polycyclic aromatic hydrocarbons (“PAHs”), benzene toluene ethylbenzene and xylenes (“BTEX”), metals, EC and/or SAR.
- **Groundwater Monitoring and Sampling:** Groundwater samples were collected on May 2 and 4, 2017 from the monitoring wells completed on the Site as part of this Phase Two ESA. Groundwater samples were submitted for analysis of PHCs, BTEX, PAHs and/or metals. Groundwater levels in the monitoring wells were measured on May 2 and 4, 2017.
- **Surveying:** An elevation survey for the boreholes and monitoring wells completed at the Site as part of This Phase Two ESA was completed on May 8 and 9, 2017.
- **Reporting:** Golder compiled and assessed the field and laboratory results from the above noted activities into this report.

The Phase Two investigation was carried out in general accordance with Golder’s standard operating procedures, which conform to the requirements of O. Reg. 153/04. The data from the Phase Two ESA investigation completed by Golder at the Site were incorporated into a single Phase Two ESA report following the Phase Two ESA report format required by O. Reg. 153/04.

There were no impediments or access limitations that would affect the conclusions of this Phase Two ESA report.

3.2 Media Investigated

To address the potential environmental issues identified in the Phase One ESA, the Phase Two ESA field program included sampling of subsurface soil and of groundwater from wells screened within the overburden at the Site. No sediment was present at the Site and therefore no sediment sampling was completed. A summary of media investigated and the applicable contaminants of potential concern are provided in Tables 3 and 4. The sampling and analysis plan outlines the rationale for the field investigation activities carried out at the Site and the associated methodologies used to meet the objectives of this Phase Two ESA.

3.3 Phase One Conceptual Site Model

The following key Site features (as required by O.Reg. 153/04) are presented in Figures 1 and 2:

- Existing buildings and structures
- Water bodies and areas of natural significance located in the Phase One Study Area
- Roads (including names) and railways within the Phase One Study Area
- Uses of properties adjacent to the Phase One Property
- Location of identified PCAs in the Phase One Study Area (including any storage tanks)



The following describes the Phase One ESA CSM for the Site based on the information obtained and reviewed as part of the Phase One ESA:

- At the time of the Site visit, which was conducted on January 26, 2017, the Site consisted of an approximately 6.46 acre (2.61 hectare) parcel of undeveloped and vacant land. The majority of the Site consisted of fill material overgrown with vegetated and was primarily snow covered at the time of the Site visit.
- Fill material overgrown with vegetation is present throughout the Site. Backfilling of the former sand and gravel pits on the Site began sometime between 1980 and 1985 and continued until sometime between 2001 and 2005. By 2005, the majority of the Site had been backfilled and re-vegetated; however, fill material was present on the southeast corner of the Site and adjacent land south of the Site in the 2005 aerial photograph. Based on the review of previous environmental reports and the Ecolog ERIS report, construction debris is present within the fill material and there is a potential for the fill material to contain contaminants at a concentrations above the current applicable site standard.
- One monitoring well was installed on the Site by Golder during the May 2001 Phase Two ESA investigations. This monitoring well was located near the eastern Site boundary but was not observed on the Site at the time of the Site visit.
- The nearest water body is the Rideau River located approximately 40 m southwest of the Site.
- No areas of natural and scientific interest (ANSI) are known to be located on the Site or on the Phase One Study Area. Based on available information, the Site is not considered to be an environmentally sensitive area.
- At the time of the Phase One ESA, the surrounding properties within the Phase One Study Area were comprised of residential and commercial land uses or were vacant land.
- The only roads located within the Phase One Study Area at the time of the Site visit were Riverside Drive, Hunt Club Road, Kimberwalk Crescent and Chancellor Court.
- Soils and the Site consist of fill material underlain by silty sand, sand and silty clay and bedrock at the Site is of the Oxford Formation (dolostone, minor shale and sandstone).
- Groundwater is anticipated to flow southwest towards the Rideau River located approximately 40 m southwest of the Site.

3.4 Deviations from Sampling and Analysis Plan

A sampling and analysis plan is provided in Appendix A(i) which incorporates the 2017 Phase Two ESA investigation program. The sampling and analysis plan outlines the rationale for the field investigation activities carried out at the Site and the associated methodologies used to meet the objectives of this Phase Two ESA. This plan covers the activities undertaken during the Phase Two ESA. The procedures described in the Sampling and Analysis Plan were generally followed with no material deviations with the exception of an additional sample that was collected from the augers at borehole 17-07 (sample BH#17-07 A.S.). During the drilling of borehole 17-07, a hydrocarbon odour was noted in the soil on the augers at approximately 3.05 to 4.75 mbgs. No field evidence (odours, staining or high organic vapour readings) of hydrocarbon impacts was detected in the split spoon samples collected at this depth and as such, the a sample of the soil containing hydrocarbon odours was collected from the augers and submitted for analysis of PHCs F1 to F4, BTEX, PAHs and metals.



3.5 Impediments

No physical impediments to the Phase Two ESA investigation were encountered. Access to the Phase Two Property was not denied or restricted.

4.0 INVESTIGATION METHOD

4.1 General

The following sections describe the field investigation methodology employed during the Phase Two ESA. The field work was conducted between April 26, 2017 and May 9, 2017.

Prior to initiating the field work, Golder developed and implemented Site-specific protocols to protect the health and safety of its employees and subcontractors through the preparation of a Site-specific Health and Safety Plan. An assessment of potential health and safety hazards at the Phase Two Property and those associated with the proposed work was completed each day of the field program. A health and safety tail gate meeting was held with Golder's subcontractors each day prior to completion of the field work. The document was reviewed and signed on-Site by field personnel prior to commencing work. Additionally, prior to any intrusive investigations, including drilling, Golder completed public and private utility clearances.

4.2 Drilling

Four boreholes (identified as boreholes 17-04, 17-05, 17-07, and 17-09) were advanced to depths of 5.18 to 12.89 metres below ground surface ("mbgs"). The borehole drilling was completed on April 26 and May 3, 2017. The borehole locations are provided in Figure 2 and the Record of Borehole logs can be found in Appendix A(ii). A description of the quality assurance/quality control measures taken to minimize the potential for cross-contamination between sampling locations is provided in Section 5.12.

Boreholes were advanced by Forage Downing Drilling ("Downing") using and a CME-75 Power Auger rig and/or a 6620DT Geoprobe rig. During borehole drilling activities, overburden soil samples were collected using dual tube soil sampling equipment with the geoprobe and a split spoon with the power auger.

When using the geoprobe, soil samples were collected continuously using the following method:

- Dual-tube sampler: 4 foot long, 1.85 inch diameter disposable PVC liner inside a 3.25 inch OD direct push rod.

When using the power auger, soil samples were collected at 0.76 m intervals using the following method:

- Split Spoon sampling: 2 foot long, pushed via 140 pound sampler hammer dropped from 30 inches.

As previously discussed in Section 3.4, one soil sample (sample BH#17-07 A.S.) was collected from the augers at borehole 17-07 due to the suspected presence of hydrocarbon odours in the soil on the augers.

4.3 Soil: Sampling

Soil samples were split in the field into two components. One component was placed into laboratory-prepared containers with minimal headspace and stored in a cooler for potential laboratory analysis. The second component was placed inside a plastic bag for field screening, consisting of the soil description, and noting the presence of any staining, odour and/or debris. A photoionization detector calibrated to 100 parts per million ("ppm") isobutylene (MiniRae 3000) was used to measure the total organic vapour in the headspace in the sealed plastic bag.



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The subsurface soil conditions within the boreholes were described in terms of their texture, presence of staining, odour and debris, if any. Geologic descriptions of soil samples are presented in the Record of Borehole sheets (Appendix A(ii)).

All soil samples collected and submitted for chemical analysis were obtained from undisturbed soils, including fill materials and native overburden, from the Site by borehole drilling methods with the exception of sample BH#17-07 A.S which was collected from the augers during the drilling of borehole 17-07. As discussed in Section 3.4, this soil sample was collected from a depth of 3.05 to 4.75 mbgs and was submitted for chemical analysis due to the presence of a slight hydrocarbon odour in the soil and the absence of field evidence of hydrocarbon impacts in the split spoon sample collected from this depth. Nitrile gloves were worn when handling soil samples and all equipment in contact with soils was washed between sample locations to prevent the potential of cross contamination.

As per the sampling and analysis plan, provided in Appendix A(i), one to three soil samples were submitted for laboratory analysis from each test location with the exception of borehole 17-07 from which four samples were submitted for analysis. The additional sample submitted for analysis at this location was soil sample BH#17-07 A.S which was collected from the augers.

Soil samples were selected for laboratory analysis based on the field headspace screening measurements, visual observations (e.g., staining, discoloration, presence of debris and/or free product, if any), and olfactory observations (if any). Otherwise, if no visual or olfactory observations were noted, the highest recorded field screening reading and/or depth horizons at which potential contamination was considered most likely to have occurred (i.e. near the water table) was used to determine which soil sample to submit for analysis from each test location.

Soil samples were submitted to the analytical laboratory under chain-of-custody procedures. A summary of the soil samples submitted for analysis is provided in Table 3.

Geologic descriptions, visual and olfactory observations, and results of field headspace measurements are presented on the Record of Borehole sheets in Appendix A(ii).

4.4 Field Screening Measurements

Field measurements of sample headspace concentration were made using the following equipment:

Equipment	Make and Model	Parameters Detected	Detection Limits	Precision	Accuracy	Calibration Standard	Calibration Procedure
Photo-ionization detector (PID) MiniRae 3000 10.6 EV bulb	MiniRae 3000	Organic vapours	0 - 15,000 ppm	N/A	+/- 3%	100 ppm Isobutylene	By Golder Associates field staff prior to and during fieldwork



Soil samples were selected for laboratory analysis based on the soil headspace screening measurements, visual observations (e.g., staining, discoloration and/or free product, if any), and olfactory observations (if any). The results of soil headspace screening measurements are provided in the Record of Boreholes in Appendix A(ii).

4.5 Groundwater: Monitoring Well Installation

Groundwater monitoring wells were installed by Downing using threaded 51 mm diameter, schedule 40, polyvinyl chloride (“PVC”) well screens and riser pipe, which were brought to the Site in sealed plastic bags. The annular space was filled with silica filter sand to at least 0.5 m above the well screen. The monitoring well was sealed with bentonite from the top of the sand pack and completed with a stick mount protective well casing set in concrete. Monitoring well construction details are provided in Table 1. A description of the quality assurance/quality control measures taken to minimize the potential for cross-contamination between sampling locations is provided in Section 5.12.

Following drilling, the monitoring wells were developed and purged prior to sampling (on May 2 and 4, 2017) by removing at least three well volumes using dedicated Waterra® pumps (tubing with foot valves). During purging and sampling, qualitative observations were made of water colour, clarity, and the presence or absence of any hydrocarbon sheen or odours.

4.6 Groundwater: Field Measurements for Water Quality Parameters

Groundwater indicator parameters including temperature, pH, conductivity, oxidation-reduction potential (“ORP”) and dissolved oxygen were measured prior to sampling to ensure adequate well development and purging. A Horiba U-22 water quality meter was used to measure groundwater quality during monitoring well development and groundwater sampling. The instrument was calibrated using factory supplied solutions for electrical conductivity (0.718 milliSiemens per centimetre (mS/cm), 5.0 mS/cm and 80.0 mS/cm) and pH (4.01 pH and 7.01 pH), turbidity (0 nephelometric turbidity units (NTU) and 800 NTU), dissolved oxygen (0 milligram per litre (mg/L)), temperature (20.0 degrees Celsius (°C) and ORP (240 millivolts (mV)) parameters. Specifications for the water quality metre are summarized in the following table:

Parameter	Range	Resolution	Accuracy
pH	0.00 to 14.00 pH	0.01 pH	±0.1 pH
Conductivity	0.00 to 100 mS/cm	0.01 mS/cm	± 0.1%
Temperature	-5 to 55 °C	0.01 °C	± (0.3 + 0.005*absolute value of temperature) °C
Dissolved Oxygen	0 to 50 mg/L	0.01 mg/L	± 0.1%
Oxidation-Reduction Potential	-2000 to +2000 ORP	0.1 mV	± 15 mV



4.7 Groundwater: Sampling

Prior to sample collection, each monitoring well was purged and an oil/water interface probe was used to investigate the potential presence of product in the monitoring wells. During purging, qualitative observations were made of water colour, clarity, and the presence of hydrocarbon sheen or odour. Purging was completed by pumping at least three well volumes. Groundwater sampling was carried out on May 2 and 4, 2017.

Groundwater samples were placed in laboratory-prepared containers and stored in a cooler until delivery to the analytical laboratory under chain-of-custody procedures. A summary of the groundwater samples submitted for analysis is presented in Table 4.

4.8 Sediment: Sampling

No sediment samples were collected as part of this investigation.

4.9 Analytical Testing

The contact information for the analytical laboratory is included below.

AGAT Laboratories
Phase 2, unit 7, 6 Antares Dr.
Nepean, ON K2E 8A9
613 255 8668

The analytical laboratory is accredited in accordance with the International Standard ISO/IEC 17025 (CALA) (General Requirement for the Competence of Testing and Calibration Laboratories, May 5, 2005, as amended) and the standards for proficiency testing developed by the Standards Council of Canada, the Canadian Association for Laboratory Accreditation or another accreditation body accepted by the MOECC.

4.10 Residue Management Procedures

All residues produced during the investigation (e.g., soil cuttings from drilling, groundwater from well development purging, wash water from equipment decontamination) were kept on Site.

4.11 Elevation Surveying

The borehole and monitoring wells completed as part of this Phase Two ESA were surveyed on May 8, 2017 with the exception of borehole/monitoring well 17-09 which was surveyed on May 9, 2017. All surveys were completed using a Trimble R8 to a geodetic benchmark. Borehole elevations are indicated on the Field Logs in Appendix A(ii).

Groundwater levels were monitored in all four monitoring wells to determine groundwater flow direction and were measured relative to the elevation of the top of the PVC riser.

A summary of recorded groundwater elevations is provided in Table 2.



4.12 Quality Assurance and Quality Control Measures

Golder's quality assurance program for environmental investigations was implemented to ensure that analytical data obtained by the investigation were valid and representative. The quality assurance program included the following measures:

- The use of standard operating procedures for all field investigation activities;
- All monitoring wells were developed following installation to remove fine particles from the filter pack and any fluids introduced during drilling;
- Monitoring wells were appropriately purged prior to groundwater sample collection to remove stagnant water from the well bore and improve sample representativeness, minimizing sample agitation and aeration to the extent practicable;
- The collection of field duplicate samples at a minimum frequency of one duplicate for every ten samples submitted for laboratory analysis;
- Initial calibration of field equipment was performed at the start of each field day, with a daily checks of calibration, as needed, using a standard of known concentration;
- The collection of at one trip blank for sampling events that include the analysis of PHC F1 and BTEX in groundwater;
- Soil and groundwater samples were handled and stored in accordance with the sample collection and preservation requirement of the Ministry of the Environment (MOE) *Protocol for Analytical Methods Used in the Assessment of Properties Under Part XV.1 of the Environmental Protection Act*, July 1, 2011. Samples were collected directly into pre-cleaned, laboratory-supplied sample containers with the appropriate preservative for the analyte group. Upon collection, samples were placed in insulated coolers with ice for storage and transport to the analytical laboratory under chain-of-custody;
- Dedicated sampling equipment (tubing and footvalves) and clean disposable Nitrile™ gloves were used at each sampling location to prevent cross-contamination. All non-dedicated sampling equipment (e.g., water level meters, split spoons) was decontaminated between sampling locations. Sampling equipment in contact with soil, groundwater, or sediment was: cleaned by mechanical means; washed with a phosphate-free, laboratory-grade detergent (e.g., LiquiNox) and, if necessary, an appropriate desorbing wash solution; and thoroughly rinsed with analyte-free water;
- Detailed field records documenting the methods and circumstances of collection for each field sample were prepared at the time of sample collection. Each sample was assigned a unique sample identification number recorded in the field notes, along with the date and time of sample collection, the sample matrix, and the requested analyses; and,
- The submission of samples to the analytical laboratory in accordance with standard chain of custody procedures.

Below is a summary of the primary and duplicate samples collected during the Phase Two ESA investigation and the trip blank samples.



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Date	Original Soil Sample ID	Duplicate Soil Sample ID	Parameters Analyzed	Trip Blanks
April 28, 2017	17-07 SA11	17-07 SA12	PHCs F1 to F4, BTEX, PAHs and metals	N/A
Date	Original Groundwater Sample ID	Duplicate ID	Parameters Analyzed	Trip Blanks
May 4, 2017	MW17-09	DUP-01	PHCs F1 to F4, BTEX, PAHs and metals	Trip blank

5.0 REVIEW AND EVALUATION

This section of the report presents a review and evaluation of the results of the drilling, monitoring and sampling activities conducted as part of the Phase Two ESA.

5.1 Geology

The soil conditions encountered during the borehole drilling are presented in the Record of Borehole sheets and provided in Appendix A(ii), as well as in the cross sections presented in Figure 6 and 7. The following presents a summary of the subsurface soil conditions encountered during the investigation.

Boreholes were advanced to a maximum depth of 5.18 – 21.5 mbgs. In general, the subsurface soil conditions consist of a layer of fill overlying native overburden. The fill consists of grey and brown silty clay, sandy silt, and/or silty sand with trace organics. Evidence of debris, including bricks, concrete and wood was noted in fill samples collected from borehole 17-04. The fill was penetrated at all boreholes with exception of borehole 17-05. Where fully penetrated, the fill extended to depths ranging between 1.6 and 8.01 mbgs. Fill material was encountered to the full depth of borehole 17-05 which was completed to a depth of 5.18 mbgs. This fill layer is underlain by fine to medium brown native sand extending to the maximum depth of drilling in several locations. Bedrock was not encountered during drilling.

Based on the soil conditions encountered in the boreholes, the native sand is considered a water bearing formation at the Phase Two Property.

5.2 Groundwater: Elevations and Flow Direction

All monitoring wells were used in the interpretation of shallow groundwater contours and shallow groundwater flow direction. Any temporary fluctuation in water levels on the Phase Two Property is not anticipated to effect the conclusions of the Phase Two ESA.

The base of shallow groundwater monitoring well screen intervals were installed at elevations ranging from approximately 86.18 to 75.73 masl and depths of 5.18 to 12.65 mbgs. The location and depth of the screens were selected based on the issues being investigated, and were installed to straddle the water table. A summary of the monitoring well construction details are presented in Table 1. No evidence of petroleum hydrocarbon free product or sheen in groundwater was observed.



The elevations of the potentiometric surface at each monitoring well are summarized in Table 2. Groundwater elevations at the Site ranged from 77.02 to 88.20 masl and groundwater depths from 3.60 to 11.37 mbgs between May 2, 2017 and May 4, 2017. Based on the interpreted groundwater elevation contours presented in Figure 3, the inferred direction of groundwater flow is to the southwest, towards the Rideau River.

Based on the soil conditions encountered in the boreholes and the water level measurements, the native sand unit was inferred to act as an aquifer.

Seasonal fluctuation in water levels on the Site should be expected. Given the limited number of monitoring events seasonal trends could not be identified, however shallow groundwater water levels are typically highest following the spring recharge and decline throughout the summer and fall months into the winter.

Underground utility drawings available for the Phase Two Property do not indicate any services within the boundaries of the Site.

5.3 Groundwater: Hydraulic Gradients

The average horizontal hydraulic gradient was estimated for shallow groundwater conditions based on water levels collected on May 2 and 4, 2017, and the inferred groundwater contours are presented on Figure 3. The horizontal hydraulic gradient for shallow groundwater conditions was calculated to be between 0.0292 and 0.0916 m/m. Variability in hydraulic gradients calculated at the Phase Two property may be related to the presence of buried services at the Site.

Vertical hydraulic gradients were not calculated as no COCs were identified in groundwater exceeding the site condition standards and as such, no nested monitoring wells were installed at the Site.

5.4 Coarse Soil Texture

Grain size analysis was not completed as part of this Phase Two ESA; however, given the coarse-grained fill and native sand material present at the Site, the MOE standards for coarse-grained soil were applied.

5.5 Soil: Field Screening

Headspace vapour measurements were conducted on a soil samples from each borehole. Organic vapour measurements ranged from 2.0 ppm (at borehole 17-09 between 3.81 and 4.42 mbgs) to 63.8 ppm (in the additional sample that was collected from the augers at borehole 17-07 at approximately 3.05 to 4.75 mbgs).

The results of headspace vapour measurements are presented on the Record of Borehole sheets in Appendix C.

5.6 Soil: Quality

Table 3 provides a summary of the soil samples submitted for analysis and the associated test parameters. The analytical results of soil samples are presented in Tables 5A to 5C. Laboratory Certificates of Analysis for the soil samples are included in Appendix A(iii).

Golder completed soil sampling at the Site during borehole advancement from April 26, 2017 to May 3, 2017. The soil samples were submitted to AGAT for analysis of one or more of the following parameters; EC/SAR, metals BTEX, PAHs and/or PHCs.



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A summary of the number of soil samples analysed and the number of soil samples exceeding the MOE Table 3 Standards is provided below:

Parameter	Number of soil samples analyzed	Number of soil samples exceeding the Table 3 Standards
PAHs	8	0
Metals (Inc. Hg and Cr VI)	8	0
PHC F1-F4/BTEX	8	0
SAR	4	0
EC	4	0
pH	4	0

All soil samples (both fill and native) submitted for analysis met the applicable site condition standards for the parameters tested, including the sample of fill collected from the auger at borehole 17-07 (sample BH#17-07 A.S) which contained a slight hydrocarbon odour.

5.7 Groundwater: Quality

Monitoring well construction details are summarized in Table 1 and a list of groundwater samples submitted for laboratory analysis is provided in Table 3. The analytical results for groundwater samples are summarized in Tables 6A through 6C, along with the applicable MOE Table 3 Standards. Laboratory Certificates of Analysis for groundwater are provided in Appendix A(iii).

Golder completed sampling of monitoring wells at the Site on May 2 and 4, 2017. Groundwater samples were submitted to AGAT for analysis for one or more of the following parameters; metals, PAHs, BTEX, and/or PHCs.

A summary of the number of groundwater samples analysed and number of samples exceeding the MOE Table 3 Standards is provided below:

Parameter	Number of groundwater samples analyzed	Number of groundwater samples exceeding the 2011 Table 3 Standards
PAHs	4 (including 1 duplicate groundwater sample)	0
Metals (Inc. Hg and Cr VI)	4 (including 1 duplicate groundwater sample)	0
PHC F1-F4/BTEX	4 (including 1 duplicate groundwater sample)	0

All groundwater samples submitted for analysis met the applicable Site condition standards, for the parameters tested.



In addition to numerical standards, the MOE Table 3 Standard sets out non-numerical (aesthetic) standards relating to the presence of free phase product and hydrocarbon sheen. Specifically, a property does not meet the site condition standards if there is evidence of free product, including but not limited to, visible petroleum hydrocarbon film or sheen present on groundwater, surface water or in any groundwater or surface water samples. No evidence of free product or sheen in groundwater was observed.

5.8 Sediment: Quality

No sediment samples were collected as part of this investigation as sediment is not present on the property.

5.9 Quality Assurance and Quality Control Results

The quality assurance assessment of the field duplicate sample results was conducted according to the document entitled 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) (“Analytical Protocol”).

To determine the precision of the analytical methods and field sampling procedures, blind duplicate samples were collected during soil and 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 and soil 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 Analytical Protocol: RPDs in soil, 30% for metals, 30% for PHCs, 40% for PCBs and 40% for PAHs and in groundwater/surface water, 20% for metals a, 30% for PHCs, 30% for PCBs and 30% for PAHs.

The calculated RPDs for metals in the original and duplicate soil sample were less than 19% and considered within acceptable limits. RPDs could not be calculated for PHCs and PAHs in the original and duplicate sample, as these results were below the laboratory RDL or less than ten times greater than the RDL. The calculated RPDs for the original and duplicate groundwater sample were less than 3% for metals. RPDs could not be calculated for PHCs and PAHs in the original and duplicate sample, as these results were below the laboratory RDL.

One trip blank sample was submitted for analysis of PHC F1 and BTEX. The trip blank and field blank samples were found to have no detectable concentrations of the parameters analyzed. The quality of the analytical results is further supported by AGAT’s internal quality assurance program that includes laboratory blanks, spikes, surrogates and duplicate samples.



All certificates of analysis or analytical reports received pursuant to clause 47 (2) (b) of the regulation comply with subsection 47(3). A certificate of analysis or analytical report has been received for each sample submitted for analysis and is provided in Appendix A(iii). The analytical laboratory did not qualify any of the analytical results.

Accordingly, the analytical data generated during the investigation are valid and representative and may be used in this Phase Two ESA without further qualification.

5.10 Phase Two Conceptual Site Model

The Phase Two Conceptual Site Model (CSM) consists of a narrative description of the current condition of the Site and accompanying diagrams, cross-sections and Figures. The Phase Two conceptual site model is presented in the following sections and the Figures that comprise the Phase Two CSM include:

Figure 1 – Key Plan

Figure 2 – Site Plan

Figure 3 – Groundwater Elevations and Interpreted Groundwater Flow Direction

Figure 4 – Soil Sampling Analytical Program and Exceedances

Figure 5 – Groundwater Sampling Analytical Program and Exceedances

Figure 6 – Cross Section A – A’

Figure 7 – Cross Section B – B’

5.10.1 Current and Historical Site Use and Surrounding Land Use

From Golder’s review of aerial photography and information provided by the Site Representative, the only use of the Phase One Property has been for sand and gravel extractions (i.e., sand and gravel pits) which occurred since prior to 1931 until sometime between 1981 and 1985. Aside from fill material being placed on the Site, the Site has been undeveloped, vacant land since this time and is currently owned by St. Mary’s Land Corporation.

5.10.2 Potential Sources of contamination

5.10.2.1 Potentially Contaminating Activities

Based on the information obtained as part of the Phase One ESA, the following potentially contaminating activities (“PCAs”) were identified.

Location	Potentially Contaminating Activity	Information Source	Rationale for Potential Contribution of the PCA to an APEC
Phase One Property and Phase One Study Area	#30. Importation of Fill Material of Unknown Quality – Fill material of unknown quality and origin has been used to backfill the sand and gravel pits formerly located on the Site and adjacent lands north, east, south and southwest of the Site. This fill material reportedly contains construction debris.	Previous Environmental Reports, Ecolog ERIS Report, Site Representative aerial photographs and Site observations	Previously, some of the fill was found to have been impacted with EC and PHCs (off-Site). In addition, more fill material of unknown quality and origin has been placed on the Site since the most recent 2001 investigations. As such, the presence of the fill material on the Site and adjacent lands is considered to be a PCA that will result in an APEC on the Site.



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Location	Potentially Contaminating Activity	Information Source	Rationale for Potential Contribution of the PCA to an APEC
Phase One Study Area	#28. Gasoline and Associated Products Storage in Fixed Tanks – Current presence of retail fuel outlet with three associated fuel USTs located approximately 225 m south of the Site at 4000 Riverside Drive.	Site observations, TSSA, aerial photographs, Ecolog ERIS Report	Given the distance and amount of infrastructure between the Site and this facility and that this facility is located hydraulically cross-gradient with respect to the Site, it is not considered to be a PCA that will result in an APEC on the Site.

5.10.2.2 Areas of Potential Environmental Concern

The following APEC was identified, its location can be seen in Figure 2:

APEC #	Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern on Phase One Property	Potentially Contaminating Activity	Location of PCA (on-Site or off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, soil and/or Sediment)
1	APEC 1 - Potential for subsurface impacts due to the presence of fill material on the Site and adjacent lands.	Site-wide.	Fill material of unknown quality and origin is present Site-wide and adjacent to the Site.	On-Site and off-Site	PHC F1 to F4, BTEX, PAHs, EC and metals	Soil and Groundwater

5.10.3 Subsurface Structures and Utilities and Potential Migration of COCs

Underground utility drawings available for the Phase Two Property indicated a sewer line running along the north boundary of the Site. The presence of subsurface utilities and structures at the Site could act as preferential pathways promoting the migration of COCs as the water table is inferred to intercept buried utilities and subsurface structures at the Phase Two Property; however, no COCs are present in groundwater exceeding the Site condition standards.

5.10.4 Physical Setting

5.10.4.1 Stratigraphy

Boreholes were advanced to a maximum depth of 5.18 to 12.89 mbgs. In general, the subsurface soil conditions consist of a layer of fill overlying native overburden. The fill consists of grey and brown silty clay, sandy silt, and/or silty sand with trace organics. Evidence of debris, including bricks, concrete and wood was noted in fill samples collected from borehole 17-04. The fill was penetrated at all boreholes with exception of borehole 17-05. Where fully penetrated, the fill extended to depths ranging between 1.6 and 8.1 mbgs. Fill material was encountered to the full depth of borehole 17-05 which was completed to a depth of 5.18 mbgs. This fill layer is underlain by fine to medium brown native sand extending to the maximum depth of drilling in several locations. Bedrock was not encountered during drilling.



Given that the average thickness of overburden at the Site is greater than 2 m, the Site is not considered to be a shallow soil property as defined by O. Reg 153/04 (as amended).

5.10.4.2 Hydrogeological Characteristics

The regional groundwater flow direction is expected to be towards the Rideau River, located approximately 40 m to the southwest of the Site. Based on the interpreted groundwater elevation contours presented in Figure 3, the inferred direction of the local groundwater flow is to the southwest, towards the Rideau River.

Groundwater Levels and Flow Directions

Static groundwater levels were measured in the monitoring wells located across the Site during water sampling on May 2 and 4, 2017. Figure 3 shows May 2, 2017 and May 4, 2017 groundwater elevations and the interpreted groundwater flow direction. Groundwater elevations at the Site ranged from 77.02 to 88.20 masl and were encountered at depths of 3.60 to 11.37 mbgs.

Based on the soil conditions encountered in the boreholes and the water level measurements, the native sand unit was inferred to act as an aquifer.

Horizontal Hydraulic Gradients

The average horizontal hydraulic gradient was estimated for shallow groundwater conditions based on water levels collected on May 2 and 4, 2017, and the inferred groundwater contours are presented on Figure 3. The horizontal hydraulic gradient for shallow groundwater conditions was calculated to be between 0.0292 and 0.0916 m/m. Variability in hydraulic gradients calculated at the Phase Two property may be related to the presence of buried services at the Site.

Vertical Hydraulic Gradient

Vertical hydraulic gradients were not calculated as no COCs were identified in groundwater exceeding the site condition standards and as such, no nested monitoring wells were installed at the Site.

5.10.5 Shallow Soil Property or Water Body (as per section 43.1 of O.Reg. 153/04)

Bedrock was not encountered during the investigation, in which boreholes ranged in depth from 5.18 to 12.89 mbgs. As such, based on the depth to bedrock encountered at the Site, the Site is not considered a shallow soil property.

5.10.6 Potable Water Wells

No potable water wells are located on the Site or within 250 m of the Site, based on the results of the Phase One ESA. As such, the Site is not considered to be a potable water site.

5.10.7 Environmentally Sensitive Areas (as per section 41 of O.Reg. 153/04)

No areas of natural and scientific interest (ANSI) are known to be located on the Site. Available information indicated that the Sites not considered to be an environmentally sensitive area. Additionally the average pH of surface soil is $5 \leq \text{pH} \leq 9$ and the pH of sub-surface soil meets the requirement that $5 \leq \text{pH} \leq 11$. As such, the Site is not considered to be environmentally sensitive.



5.10.8 Applicable Site Condition Standard

The analytical results of the samples collected for this Phase Two ESA were compared to the Table 3 Full Depth The analytical results of the samples collected for this Phase Two ESA were compared to the Table 3 generic site condition standards (residential property use, coarse soil texture) presented in the MOECC “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”, dated April 15, 2011. The applicable site condition standards were selected based on the following rationale:

- The Site and all other properties located, in whole or in part, within 250 metres of the Site are supplied by the City of Ottawa municipal drinking water system. No wells were identified that are used or intended for use as a source of water
- The Site is not located in an area designated in a municipal official plan as a well-head protection area or other designation identified by the municipality for the protection of ground water
- Grain size analysis was not completed as part of the Phase Two ESA and therefore “coarse textured” has been assumed as a conservative approach and due to coarse nature of the fill
- The closest water body is the Rideau River, located 40 m southwest of the Phase Two Property
- There are no features on the Phase Two Property that would meet the conditions of an environmentally sensitive site, as described in Section 41
- The average pH of surface soil is 5≤pH≤9 and the pH of sub-surface soil meets the requirement that 5≤pH≤11
- The intended land use for the Phase Two Property is residential
- The overburden thickness is greater than 2 metres over more than one-third of the Phase Two Property
- The average depth to the water table is 6.85 metres below ground surface (mbgs) with the shallowest being 3.60 mbgs.

5.10.9 Findings of the Phase Two ESA (Golder, 2017) with respect to APECs

To address the APEC identified at the Site, soil and groundwater sampling and analysis of potential COCs was completed as part of this Phase Two ESA. MOE Table 3 Standards (April 15, 2011) were used for comparison of the soil and groundwater results. A summary of the findings of the Phase Two ESA with respect to the APECs identified by the Phase One ESA (Golder, 2017) is provided in the table below:

APEC #	Area of Potential Environmental Concern	Potentially Contaminating Activity	Contaminants of Potential Concern	Soil and/or Groundwater Exceedances of 2011 MOE Table 3 Standards
1	Impacts due to the presence of fill material.	PCA 30: Importation of Fill material of unknown quality	Soil - PHC F1-F4, BTEX, metals and EC Groundwater – PHCs F1-F4, BTEX, PAHs and metals	None



As summarized in the above table, the results of this Phase Two ESA indicate that no soil or groundwater impacts associated with the one APEC were identified in any of the groundwater samples collected from the Site.

5.10.10 Meteorological and Climatic Considerations

Seasonal fluctuation in water levels on the Site should be expected. Given the limited number of monitoring events, seasonal trends could not be identified, however shallow groundwater water levels are typically highest following the spring recharge and decline throughout the summer and fall months into the winter.

5.10.11 Soil Vapour Intrusion Pathways

No volatile compounds exceeding MOE Table 3 Standards were identified in soil or groundwater at the Site. As such, vapour intrusion was not investigated as part of this Phase Two ESA as it is not considered to be a concern for the Site.

5.10.12 Cross-Sections

Lateral and Vertical Distribution of Contaminants

Representative cross-sections of the Site are presented in Figures 4 and 5. No exceedances of site condition standards were identified and therefore did not require delineation.

5.10.13 Potential Exposure Pathways and Receptors

Potential human receptors at the Site might include outdoor workers, construction workers, and visitors to the Site. Potential ecological receptors might include terrestrial plants, mammals, birds and soil invertebrates. The exposure pathways for potential ecological receptors include direct/dermal contact, root/direct uptake and/or ingestion. Exposure pathways for potential human receptors include direct/dermal contact, ingestion and/or inhalation of soil particles.

The above identified potential exposure pathways and receptors are based only on a preliminary evaluation and, as such, the release mechanisms, potential exposure pathways, and receptors may change upon a completion of a risk assessment for the Site. Evaluation of potential exposure pathways and receptors is beyond the scope of the Phase Two ESA work and, as such, it was not performed as part of this Phase Two ESA report. Additionally, there were no exceedances of site condition standards and therefore there is no need to consider pathways for potential exposure.



6.0 CONCLUSIONS

The Phase Two ESA investigated all APECs identified on Site in the 2017 Phase One ESA. The reported concentrations of the contaminants of potential concern in all soil and groundwater samples were below the applicable site condition standards as of the certification date (February 7, 2017). The completion of a risk assessment or remediation is not required prior to the submission of a RSC.

6.1 Additional Considerations

None of the historical or recent Phase Two ESA analysis undertaken in the fill identified any COCs above the applicable site conditions standard and therefore the site is not considered contaminated for the intended residential use. However, the fill was noted to contain trace to some amounts of construction debris in a number of locations, including, metal, wood, concrete, brick and asphalt pieces. Based on the chemical analysis undertaken as part of the Phase Two ESA, the presence of debris as not chemically impaired the fill quality however its presence may result in added construction costs for material which may require removal from the Site. Where debris exceeds trace amounts it may require screening to be accepted as inert fill prior to off-Site disposal.

Fill is random in nature and quality and even through exhaustive testing, isolated pockets of contamination may exist outside the areas investigated as part of this Phase Two ESA. Therefore, the Phase Two ESA should be considered a means of risk reduction not risk elimination.



7.0 REFERENCES

Golder, 2017 Draft Phase One ESA Report No. 1670692-1000 entitled, "*Phase One Environmental Site Assessment, Proposed Development at Riverside Drive and Hunt Club Road, Ottawa, Ontario*", dated February 2017

MOE. 2004. *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).

MOE. 2011. *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, dated April 15, 2011

MOE. 2011. Ontario Regulation 153/04, as amended, *Record of Site Condition - Part XV.1 of the Environmental Protection Act*, amended October 31, 2011



8.0 LIMITATIONS

This report was prepared for the exclusive use of Revera Inc. The report, which specifically includes all tables, figures and appendices, is based on data and information, collected during conducting the Phase Two ESA, and is based solely on the conditions of the property at the time of conducting investigations, supplemented by historical information and data obtained by Golder Associates Ltd. as described in this report.

The assessment of environmental conditions at this Site has been made using the results of field screening techniques and chemical analysis of soil and groundwater samples at a limited number of locations. The Site conditions between sampling locations have been inferred based on conditions observed at the sampling locations. Conditions may vary from these sample locations. Additional study, including further investigation, 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 that part of a Site may be contaminated and remain undetected.

The services performed as described in this report were conducted in a manner consistent with that 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.

Any use which a third party makes of this report, or any reliance on, or decisions to be made based on it, are the responsibilities of such third parties. Golder Associates Ltd. accepts no responsibility for damages, if any, suffered by any third party (other than as noted above) as a result of decisions made or actions based on this report.

The content of this report is based on information collected during the drilling, soil and groundwater sampling activities, our present understanding of the Site conditions, and our professional judgement in light of such information at the time of this report. This report provides a professional opinion and therefore no warranty is expressed, implied, or made as to the conclusions, advice and recommendations offered in this report. This report 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 findings and conclusions of this report are valid only as of the date of this report. If new information is discovered in future work, including excavations, borings or other studies, Golder Associates Ltd. should be requested to re-evaluate the conclusions of this report, and to provide amendments as required.

The monitoring wells installed as part of this project have been constructed using licensed drilling/well contractors employing licensed well technicians. It is owner's responsibility to have a licensed well technician properly abandon all monitoring wells, if required.



Report Signature Page

GOLDER ASSOCIATES LTD.

Handwritten signature of Alyssa Troke in black ink.

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

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Keith Holmes, M.Sc., P.Geo., PMP, QPESA
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AT/KPH/hw

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Monitoring Well ID	Installation Date	Ground Surface Elevation (masl)	Top of Pipe Elevation (masl)	Borehole Depth (mbgs)	Borehole Depth (masl)	Screened Interval (mbgs)	Screened Interval (masl)	Screened Media
17-04	28-Apr-17	88.38	89.17	12.8	75.58	11.15 - 12.65	77.23 - 75.73	Sand, trace gravel
17-07	28-Apr-17	93.80	94.64	8.23	85.57	6.10 - 7.62	87.70 - 86.18	Silty clay and clayey silt (fill) and sand
17-09	03-May-17	88.49	89.45	5.18	83.31	2.13 - 5.18	86.36 - 83.31	Sand and silty clay

Monitoring Well	Date of Monitoring Well Installation	Ground Surface Elevation (mASL)	Depth to Groundwater (mbgs)	Groundwater Elevation (mASL)	Groundwater Level Measurement and Elevation Date	Product Measurement (mm)
17-04	28-Apr-17	88.38	11.37	77.02	02-May-17	0.00
17-07	28-Apr-17	93.80	5.60	88.20	02-May-17	0.00
17-09	03-May-17	88.49	3.60	84.93	04-May-17	0.00

Notes:

mbgs- metres below ground surface

mASL- metres above sea level

Borehole ID	Soil Samples Submitted for Analysis	Sample Depths (meters below top)	Description	PID (PPM)	Sample Collection Date	Analytical Parameters	MOECC Table 3 Exceedances ⁽¹⁾
BH17-04	BH#17-04 SA#2	0.61 - 1.22	FILL; grey and grey-brown silty clay and clayey silt with fine sand mix and trace organics	5.0	26/04/2017	pH, EC, SAR	None
	BH#17-04 SA#4	1.83 - 2.44	FILL; silty clay and sandy silt	6.7	26/04/2017	Metals, PHCs F1-F4, BTEX, PAHs	None
	BH#17-04 SA#7	3.66 - 4.27	FILL; grey-brown and grey silty clay, clayey silt, and silty sand with trace wood and some black staining	5.8	26/04/2017	Metals, PHCs F1-F4, BTEX, PAHs	None
BH17-05	17-05 SA2	3.05 - 3.66	FILL; grey silty clay with fine sand layers and trace gravel	5.4	03/05/2017	Metals, PHCs F1-F4, BTEX, PAHs, pH, EC, SAR	None
BH17-07	BH#17-07 SA#2	0.76 - 1.37	FILL; grey and grey-brown sandy silt with some gravel and silty clay layers	7.0	28/04/2017	pH, SAR, EC	None
	BH#17-07 SA#8	5.33 - 5.94	FILL; grey silty clay and clayey silt with trace gravel	8.0	28/04/2017	Metals, PHCs F1-F4, BTEX, PAHs	None
	17-07 SA11	7.62 - 8.23	NATIVE; brown fine sand	29.4	28/04/2017	Metals, PHCs F1-F4, BTEX, PAHs	None
	17-07 SA12 (DUP SA11)			28/04/2017	Metals, PHCs F1-F4, BTEX, PAHs	None	
	BH#17-07 A.S	3.05 - 4.57	FILL; grey clayey silt with trace gravel and slight hydrocarbon ordour	63.8	28/04/2017	Metals, PHCs F1-F4, BTEX, PAHs	None
BH17-09	17-09 SA1	0.15 - 0.61	FILL; brown silty sand with clayey silt layers and trace organics	3.3	03/05/2017	Metals, PHCs F1-F4, BTEX, PAHs, pH, EC, SAR	None

PHCs F1-F4 = Petroleum hydrocarbon fractions F1 to F4

BTEX = Benzene, toluene, ethylbenzene and xylenes

PAHs = Polycyclic Aromatic Hydrocarbons

EC = Electrical Conductivity

SAR = Sodium Adsorption Ratio

(1) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, Table 3 Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, Residential/Parkland/Institutional Property Use, coarse-textured soil, April 15, 2011 (MOECC Table 3 Standards).

None = Not detected above method detection limit and/ or does not exceed MOE Table 3 Standards

N/A - Not applicable

Table 4: Summary of Groundwater Samples Submitted for Laboratory Analysis

Monitoring Well ID	Groundwater Samples Submitted for Analysis	Date Sampled	Analytical Parameters	MOECC Table 3 Exceedances ⁽¹⁾
17-04	MW17-04	02-May-17	PHCs F1-F4, PAHs, BTEX, and Metals (inc. Hg & Cr VI)	None
17-07	MW17-07	02-May-17	PHCs F1-F4, PAHs, BTEX, and Metals (inc. Hg & Cr VI)	None
17-09	MW17-09 and DUP-01 (duplicate of MW17-09)	04-May-17	PHCs F1-F4, PAHs, BTEX, and Metals (inc. Hg & Cr VI)	None

PHCs F1-F4 = Petroleum hydrocarbon fractions F1 to F4

BTEX = Benzene, toluene, ethylbenzene and xylenes

PAHs = Polycyclic Aromatic Hydrocarbons

Hg = Mercury

Cr VI = Chromium VI

(1) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act, Table 3 Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition, All Property Use, coarse-textured soil, April 15, 2011 (MOECC Table 3 Standards).

None = Not detected above method detection limit and/ or does not exceed MOE Table 3 Standards

Parameter	Unit	MOE Table 3 Standard (R/P/I) ^{(1) (2)}	17-04		17-05		17-07		17-09	
			26-Apr-2017	26-Apr-2017	3-May-2017	28-Apr-2017	28-Apr-2017	28-Apr-2017	28-Apr-2017	3-May-2017
			BH#17-04 SA#4	BH#17-04 SA#7	17-05 SA2	BH#17-07 SA#8	17-07 SA11	17-07 SA12 (Duplicate of 17-07 SA11)	BH#17-07 A.S	17-09 SA1
Sample Depth	m		1.83 - 2.44	3.66 - 4.27	3.05 - 3.66	5.33 - 5.94	7.62 - 8.23	7.62 - 8.23	3.05 - 4.57	0.15 - 0.61
Petroleum Hydrocarbons										
Benzene	ug/g	0.21	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Toluene	ug/g	2.3	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08	<0.08
Ethylbenzene	ug/g	2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Xylenes, Total	ug/g	3.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Petroleum Hydrocarbons - F1 (C6-C10)	ug/g	55	<5	<5	<5	<5	<5	<5	<5	<5
Petroleum Hydrocarbons - F2 (C10-C16)	ug/g	98	<10	<10	<10	<10	<10	<10	67	<10
Petroleum Hydrocarbons - F3 (C16-C34)	ug/g	300	<50	<50	<50	<50	<50	<50	130	<50
Petroleum Hydrocarbons - F4 (C34-C50)	ug/g	2800	<50	<50	<50	<50	<50	<50	<50	<50

Footnotes:

Tables should be read in conjunction with the accompanying document.

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-- Chemical not analyzed or criteria not defined.

Grey background indicates exceedances. In this case no exceedances are observed.

(1) Ontario Regulation 153/04 (2011) Table 3: Full Depth Generic Site Conditions in a Non-Potable Groundwater Condition, Residential/Parkland/Institutional Property Use, Coarse Grained Soils

(2) Bold Font = Parameter concentration greater than MOE Table 3 Standard (R/P/I)

Parameter	Unit	MOE Table 3 Standard (R/P/I) ^{(1) (2)}	17-04		17-05		17-07			17-09
			26-Apr-2017	26-Apr-2017	3-May-2017	28-Apr-2017	28-Apr-2017	28-Apr-2017	28-Apr-2017	3-May-2017
			BH#17-04 SA#4	BH#17-04 SA#7	17-05 SA2	BH#17-07 SA#8	17-07 SA11	17-07 SA12 (Duplicate of 17-01 SA11)	BH#17-07 A.S	17-09 SA1
Sample Depth	m		1.83 - 2.44	3.66 - 4.27	3.05 - 3.66	5.33 - 5.94	7.62 - 8.23	7.62 - 8.23	3.05 - 4.57	0.15 - 0.61
PAHs										
Naphthalene	ug/g	0.6	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	ug/g	0.15	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Acenaphthene	ug/g	7.9	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	ug/g	62	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Phenanthrene	ug/g	6.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.05
Anthracene	ug/g	0.67	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	ug/g	0.69	<0.05	<0.05	<0.05	0.13	<0.05	<0.05	0.17	<0.05
Pyrene	ug/g	78	<0.05	<0.05	<0.05	0.12	<0.05	<0.05	0.16	<0.05
Benz(a)anthracene	ug/g	0.5	<0.05	<0.05	<0.05	0.08	<0.05	<0.05	0.07	<0.05
Chrysene	ug/g	7	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	0.07	<0.05
Benzo(b)fluoranthene	ug/g	0.78	<0.05	<0.05	<0.05	0.1	<0.05	<0.05	0.09	<0.05
Benzo(k)fluoranthene	ug/g	0.78	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(a)pyrene	ug/g	0.3	<0.05	<0.05	<0.05	0.07	<0.05	<0.05	0.07	<0.05
Indeno(1,2,3-cd)pyrene	ug/g	0.38	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Dibenz(a,h)anthracene	ug/g	0.1	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Benzo(g,h,i)perylene	ug/g	6.6	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
2-and 1-methyl Naphthalene	ug/g	0.99 ⁽³⁾	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

Footnotes:

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(1) Ontario Regulation 153/04 (2011) Table 3: Full Depth Generic Site Conditions in a Non-Potable Groundwater Condition, Residential/Parkland/Institutional Property Use, Coarse Grained Soils

(2) Bold Font = Parameter concentration greater than MOE Table 3 Standard (R/P/I)

(3) The methyl naphthalene standards are applicable to both 1-methyl naphthalene and 2-methyl naphthalene, with the provision that if both are detected the sum of the two must not exceed the standard.

Parameter	Unit	MOE Table 3 Standard (R/P/I) ^{(1) (2)}	17-04			17-05	17-07					17-09
			26-Apr-2017	26-Apr-2017	26-Apr-2017	3-May-2017	28-Apr-2017	28-Apr-2017	28-Apr-2017	28-Apr-2017	28-Apr-2017	3-May-2017
			BH#17-04 SA#2	BH#17-04 SA#4	BH#17-04 SA#7	17-05 SA2	BH#17-07 SA#2	BH#17-07 SA#8	17-07 SA11	17-07 SA12 (Duplicate of 17-01 SA11)	BH#17-07 A.S	17-09 SA1
Sample Depth	m		0.61 - 1.22	1.83 - 2.44	3.66 - 4.27	3.05 - 3.66	0.76 - 1.37	5.33 - 5.94	7.62 - 8.23	7.62 - 8.23	3.05 - 4.57	0.15 - 0.61
Metals												
Antimony	ug/g	7.5	--	<0.8	<0.8	--	--	<0.8	--	--	<0.8	--
Arsenic	ug/g	18	--	2	2	--	--	3	--	--	3	--
Barium	ug/g	390	--	175	193	197	--	211	20	24	196	112
Beryllium	ug/g	4	--	0.6	0.7	0.6	--	0.6	<0.5	<0.5	0.6	<0.5
Boron	ug/g	120	--	6	6	5	--	7	<5	<5	6	<5
Boron (Hot Water Soluble)	ug/g	1.5	--	0.11	<0.10	--	--	0.19	--	--	0.28	--
Cadmium	ug/g	1.2	--	<0.5	<0.5	<0.5	--	<0.5	<0.5	<0.5	<0.5	<0.5
Chromium	ug/g	160	--	78	93	68	--	79	5	6	69	35
Cobalt	ug/g	22	--	15.3	17	15.1	--	13.2	1.6	1.9	13.3	9
Copper	ug/g	140	--	30	37	35	--	31	4	5	31	19
Lead	ug/g	120	--	5	6	6	--	14	1	2	19	6
Molybdenum	ug/g	6.9	--	<0.5	<0.5	0.6	--	0.6	<0.5	<0.5	<0.5	0.5
Nickel	ug/g	100	--	43	48	38	--	39	3	3	36	21
Selenium	ug/g	2.4	--	<0.4	<0.4	--	--	<0.4	--	--	<0.4	--
Silver	ug/g	20	--	<0.2	<0.2	<0.2	--	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	ug/g	1	--	<0.4	<0.4	<0.4	--	0.6	<0.4	<0.4	<0.4	<0.4
Uranium	ug/g	23	--	1	1	1.2	--	0.9	<0.5	<0.5	0.8	0.8
Vanadium	ug/g	86	--	68	75	65	--	65	10	12	60	39
Zinc	ug/g	340	--	77	86	84	--	78	7	8	76	50
Chromium VI	ug/g	8	--	<0.2	<0.2	--	--	<0.2	--	--	<0.2	--
Mercury	ug/g	0.27	--	<0.10	<0.10	--	--	<0.10	--	--	<0.10	--
Inorganics												
pH	ug/g	--	7.68	--	--	7.63	7.64	--	--	--	--	7.26
Electrical Conductivity	ug/g	0.7	0.148	--	--	0.265	0.376	--	--	--	--	0.112
Sodium Adsorption Ratio	ug/g	5	0.24	--	--	0.356	1.99	--	--	--	--	0.089

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(1) Ontario Regulation 153/04 (2011) Table 3: Full Depth Generic Site Conditions in a Non-Potable Groundwater Condition, Residential/Parkland/Institutional Property Use, Coarse Grained Soils

(2) Bold Font = Parameter concentration greater than MOE Table 3 Standard (R/P/I)

Parameter	Unit	MOE Table 3 Standard ^{(1) (2)}	17-01	17-02	17-03	17-04	17-07	17-09	
			4-May-2017	2-May-2017	3-May-2017	2-May-2017	2-May-2017	4-May-2017	4-May-2017
			MW17-01	MW17-02	MW17-03	MW17-04	MW17-07	MW17-09	DUP-01 (Field Duplicate of MW17-09)
Petroleum Hydrocarbons									
Benzene	ug/l	44	0.24	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	ug/l	18000	0.61	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	ug/l	2300	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Xylenes, Total	ug/l	4200	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Petroleum Hydrocarbons - F1 (C6-C10)	ug/l	750	<25	<25	<25	<25	<25	<25	<25
Petroleum Hydrocarbons - F2 (C10-C16)	ug/l	150	<100	<100	<100	<100	<100	<100	<100
Petroleum Hydrocarbons - F3 (C16-C34)	ug/l	500	<100	<100	<100	<100	200	<100	<100
Petroleum Hydrocarbons - F4 (C34-C50)	ug/l	500	<100	<100	<100	<100	<100	<100	<100

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(1) Ontario Regulation 153/04 (2011) Table 3: Full Depth Generic Site Conditions in a Non-Potable Groundwater Condition, All Types of Property Use, Non-Potable Groundwater

(2) Bold Font = Parameter concentration greater than MOE Table 3 Standard

Table 6B: Groundwater Analytical Results: Polycyclic Aromatic Hydrocarbons

Parameter	Unit	MOE Table 3 Standard ^{(1) (2)}	17-01	17-02	17-03	17-04	17-07	17-09	
			4-May-2017	2-May-2017	3-May-2017	2-May-2017	2-May-2017	4-May-2017	4-May-2017
			MW17-01	MW17-02	MW17-03	MW17-04	MW17-07	MW17-09	DUP-01 (Field Duplicate of MW17-09)
PAHs									
Naphthalene	ug/l	1400	0.56	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Acenaphthylene	ug/l	1.8	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Acenaphthene	ug/l	600	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Fluorene	ug/l	400	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Phenanthrene	ug/l	580	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	ug/l	2.4	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Fluoranthene	ug/l	130	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Pyrene	ug/l	68	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzo(a)anthracene	ug/l	4.7	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chrysene	ug/l	1	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo(b)fluoranthene	ug/l	0.75	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo(k)fluoranthene	ug/l	0.4	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10
Benzo(a)pyrene	ug/l	0.81	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	ug/l	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Dibenz(a,h)anthracene	ug/l	0.52	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Benzo(g,h,i)perylene	ug/l	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
2-and 1-methyl Naphthalene	ug/l	1800 ⁽³⁾	0.24	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

Footnotes:

Tables should be read in conjunction with the accompanying document.

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> value = Indicates parameter detected above equipment analytical range.

-- Chemical not analyzed or criteria not defined.

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(1) Ontario Regulation 153/04 (2011) Table 3: Full Depth Generic Site Conditions in a Non-Potable Groundwater Condition, All Types of Property Use, Non-Potable Groundwater

(2) Bold Font = Parameter concentration greater than MOE Table 3 Standard

(3) The methyl naphthalene standards are applicable to both 1-methyl naphthalene and 2-methyl naphthalene, with the provision that if both are detected the sum of the two must not exceed the standard.

Parameter	Unit	MOE Table 3 Standard ^{(1) (2)}	15-08	15-08	17-03	17-04	17-07	17-09	
			17-01	17-02				4-May-2017	4-May-2017
			4-May-2017	2-May-2017	3-May-2017	2-May-2017	2-May-2017	4-May-2017	4-May-2017
			MW17-01	MW17-02	MW17-03	MW17-04	MW17-07	MW17-09	DUP-01 (Field Duplicate of MW17-09)
Metals									
Antimony	ug/l	20000	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	ug/l	1900	2.1	1.2	<1.0	<1.0	1.1	<1.0	<1.0
Barium	ug/l	29000	57.3	90.5	75.6	89.1	145	252	246
Beryllium	ug/l	67	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Boron	ug/l	45000	32.4	24.8	65.7	19.8	41.4	28.3	26.9
Cadmium	ug/l	2.7	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chromium	ug/l	810	<2.0	6.2	<2.0	9.4	12.1	<2.0	<2.0
Cobalt	ug/l	66	0.6	1.5	<0.5	2.2	9.2	0.9	0.9
Copper	ug/l	87	<1.0	1	2.2	<1.0	<1.0	1.2	1.2
Lead	ug/l	25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	ug/l	9200	22.3	2.7	<0.5	1.3	0.5	0.8	0.8
Nickel	ug/l	490	<1.0	4.3	<1.0	3.2	5.2	<1.0	<1.0
Selenium	ug/l	63	<1.0	<1.0	<1.0	3.9	2.7	<1.0	<1.0
Silver	ug/l	1.5	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Thallium	ug/l	510	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3	<0.3
Uranium	ug/l	420	2.6	1.5	1.9	1.5	0.6	1	1
Vanadium	ug/l	250	3.6	3.1	0.5	3.1	3.2	0.9	1
Zinc	ug/l	1100	<5.0	<5.0	<5.0	<5.0	<5.0	5.5	<5.0
Mercury	ug/l	0.29	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Chromium VI	ug/l	140	<5	<5	<5	<5	<5	<5	<5

Footnotes:

Tables should be read in conjunction with the accompanying document.

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

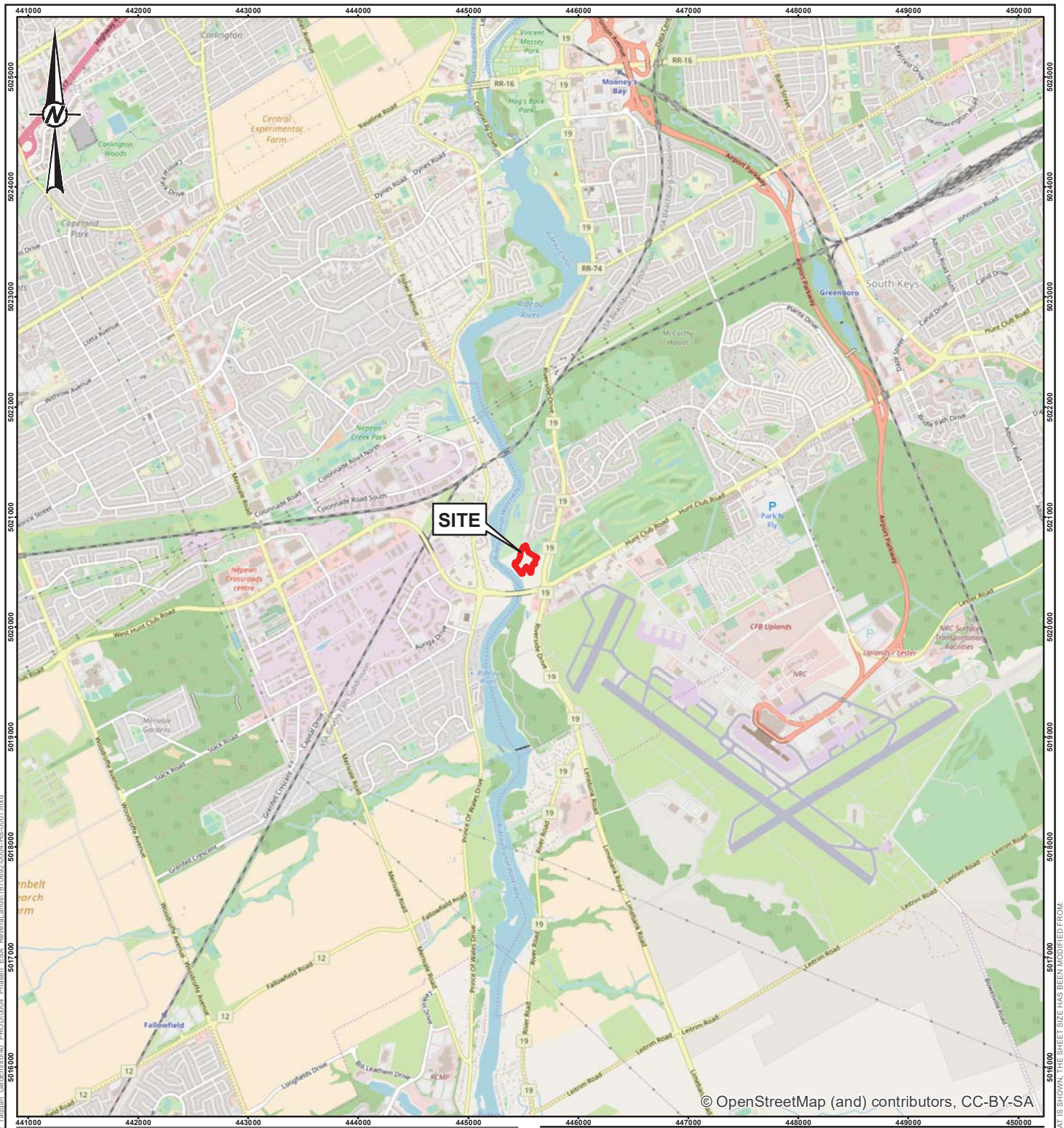
> value = Indicates parameter detected above equipment analytical range.

-- Chemical not analyzed or criteria not defined.

Grey background indicates exceedances. In this case no exceedances are observed.

(1) Ontario Regulation 153/04 (2011) Table 3: Full Depth Generic Site Conditions in a Non-Potable Groundwater Condition, All Types of Property Use, Non-Potable Groundwater

(2) Bold Font = Parameter concentration greater than MOE Table 3 Standard



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LEGEND

 APPROXIMATE PHASE TWO PROPERTY AND RSC BOUNDARY

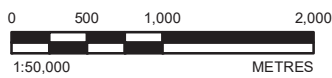
CLIENT
REVERA INC.

PROJECT
**PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
PART OF 3930 RIVERSIDE DRIVE, OTTAWA, ONTARIO**

TITLE
KEY PLAN

CONSULTANT	YYYY-MM-DD	2017-09-26
	DESIGNED	----
	PREPARED	JEM
	REVIEWED	AT
	APPROVED	KPH

PROJECT NO. 1670692	CONTROL 0004	REV. 0	FIGURE 1
------------------------	-----------------	-----------	--------------------



REFERENCE(S)
1. PROJECTION: TRANSVERSE MERCATOR DATUM: NAD 83
COORDINATE SYSTEM: UTM ZONE 18 VERTICAL DATUM: CGVD28



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



LEGEND

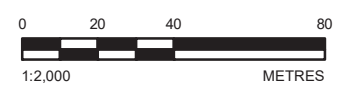
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- APPROXIMATE BOREHOLE LOCATION
- APPROXIMATE BOREHOLE LOCATION, PREVIOUS INVESTIGATION
- APPROXIMATE TEST PIT LOCATION, PREVIOUS INVESTIGATION
- APPROXIMATE PHASE TWO PROPERTY AND RSC BOUNDARY
- APEC 1 (SITE-WIDE)
- LOCATION OF PCA 1

NOTE(S)
1. ALL LOCATIONS ARE APPROXIMATE

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: UTM ZONE 18, VERTICAL DATUM: CGVD28

Areas of Potential Environmental Concern ("APEC")		
APEC #	Detail	PCA #
1	Importation of Fill Material of Unknown Quality	30

Potentially Contaminating Activity ("PCA")		
Location	Detail	PCA #
1 (see legend)	Importation of Fill Material of Unknown Quality – Fill material of unknown quality and origin has been used to backfill the sand and gravel pits formerly located on the Site and adjacent lands north, east, south and southwest of the Site. This fill material reportedly contains construction debris.	30
2	Gasoline and Associated Products Storage in Fixed Tanks – Currently presence of a retail fuel outlet with three associated fuel USTs located on approximately 225 m south of the Site at 4000 Riverside Drive.	28



CLIENT
REVERA INC.

PROJECT
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
PART OF 3930 RIVERSIDE DRIVE, OTTAWA, ONTARIO

TITLE
SITE PLAN

CONSULTANT	YYYY-MM-DD	2017-09-26
	DESIGNED	---
	PREPARED	JEM
	REVIEWED	AT
	APPROVED	KPH

PROJECT NO. 1670692	CONTROL 0004	REV. 0	FIGURE 2
------------------------	-----------------	-----------	--------------------

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM 28mm



LEGEND

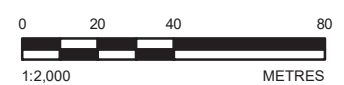
- APPROXIMATE BOREHOLE/MONITORING WELL LOCATION
- APPROXIMATE BOREHOLE LOCATION
- CROSS-SECTION LOCATION
- APPROXIMATE PHASE TWO PROPERTY AND RSC BOUNDARY
- APEC 1 (SITE-WIDE)
- LOCATION OF PCA 1
- 9999 GROUNDWATER ELEVATION, mASL
- GROUNDWATER CONTOUR, mASL
- INTERPRETED GROUNDWATER FLOW DIRECTION

NOTE(S)
1. ALL LOCATIONS ARE APPROXIMATE

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: UTM ZONE 18, VERTICAL DATUM: CGVD28

Areas of Potential Environmental Concern ("APEC")		
APEC #	Detail	PCA #
1	Importation of Fill Material of Unknown Quality	30

Potentially Contaminating Activity ("PCA")		
Location	Detail	PCA #
1 (see legend)	Importation of Fill Material of Unknown Quality – Fill material of unknown quality and origin has been used to backfill the sand and gravel pits formerly located on the Site and adjacent lands north, east, south and southwest of the Site. This fill material reportedly contains construction debris.	30
2	Gasoline and Associated Products Storage in Fixed Tanks – Currently presence of a retail fuel outlet with three associated fuel USTs located on approximately 225 m south of the Site at 4000 Riverside Drive.	28



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REVERA INC.

PROJECT
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
PART OF 3930 RIVERSIDE DRIVE, OTTAWA, ONTARIO

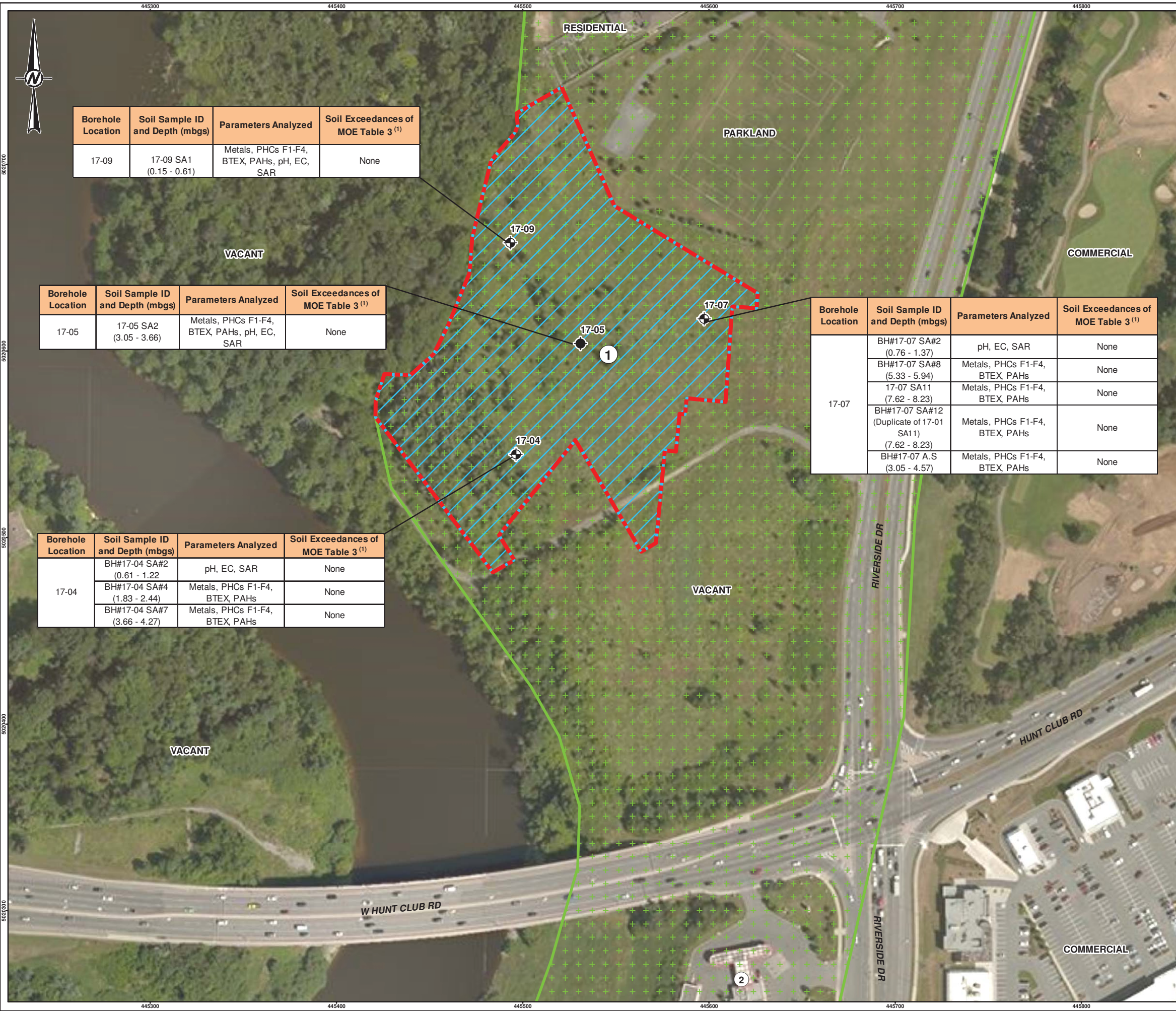
TITLE
**GROUNDWATER ELEVATIONS AND INTERPRETED
GROUNDWATER FLOW DIRECTION**

CONSULTANT	YYYY-MM-DD	2017-09-26
	DESIGNED	---
	PREPARED	JEM
	REVIEWED	AT
	APPROVED	KPH

PROJECT NO. 1670692	CONTROL 0004	REV. 0	FIGURE 3
------------------------	-----------------	-----------	--------------------

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM 28mm



Borehole Location	Soil Sample ID and Depth (mbgs)	Parameters Analyzed	Soil Exceedances of MOE Table 3 ⁽¹⁾
17-09	17-09 SA1 (0.15 - 0.61)	Metals, PHCs F1-F4, BTEX, PAHs, pH, EC, SAR	None

Borehole Location	Soil Sample ID and Depth (mbgs)	Parameters Analyzed	Soil Exceedances of MOE Table 3 ⁽¹⁾
17-05	17-05 SA2 (3.05 - 3.66)	Metals, PHCs F1-F4, BTEX, PAHs, pH, EC, SAR	None

Borehole Location	Soil Sample ID and Depth (mbgs)	Parameters Analyzed	Soil Exceedances of MOE Table 3 ⁽¹⁾
17-07	BH#17-07 SA#2 (0.76 - 1.37)	pH, EC, SAR	None
	BH#17-07 SA#8 (5.33 - 5.94)	Metals, PHCs F1-F4, BTEX, PAHs	None
	17-07 SA11 (7.62 - 8.23)	Metals, PHCs F1-F4, BTEX, PAHs	None
	BH#17-07 SA#12 (Duplicate of 17-01 SA11) (7.62 - 8.23)	Metals, PHCs F1-F4, BTEX, PAHs	None
	BH#17-07 A.S (3.05 - 4.57)	Metals, PHCs F1-F4, BTEX, PAHs	None

Borehole Location	Soil Sample ID and Depth (mbgs)	Parameters Analyzed	Soil Exceedances of MOE Table 3 ⁽¹⁾
17-04	BH#17-04 SA#2 (0.61 - 1.22)	pH, EC, SAR	None
	BH#17-04 SA#4 (1.83 - 2.44)	Metals, PHCs F1-F4, BTEX, PAHs	None
	BH#17-04 SA#7 (3.66 - 4.27)	Metals, PHCs F1-F4, BTEX, PAHs	None

LEGEND

- APPROXIMATE BOREHOLE/MONITORING WELL LOCATION
- APPROXIMATE BOREHOLE LOCATION
- APPROXIMATE PHASE TWO PROPERTY AND RSC BOUNDARY
- APEC 1 (SITE-WIDE)
- LOCATION OF PCA 1

NOTE(S)

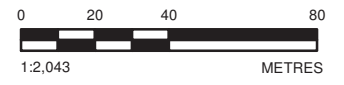
1. ⁽¹⁾O. REG 153 (2011) TABLE 3 STANDARDS, FULL DEPTH GENERIC SITE CONDITION STANDARDS IN A NON-POTABLE GROUNDWATER CONDITION, RESIDENTIAL/PARKLAND/INSTITUTIONAL PROPERTY USE, COARSE TEXTURE SOIL
2. MBGS = METRES BELOW GROUND SURFACE
3. PHCS F1-F4 = PETROLEUM HYDROCARBON FRACTIONS F1 TO F4
4. BTEX = BENZENE, TOLUENE, ETHYLBENZENE AND XYLENES
5. PAHS = POLYCYCLIC AROMATIC HYDROCARBONS
6. EC = ELECTRICAL CONDUCTIVITY
7. SAR = SODIUM ADSORPTION RATIO

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: UTM ZONE 18, VERTICAL DATUM: CGVD28

Areas of Potential Environmental Concern ("APEC")		
APEC #	Detail	PCA #
1	Importation of Fill Material of Unknown Quality	30

Potentially Contaminating Activity ("PCA")		
Location	Detail	PCA #
1 (see legend)	Importation of Fill Material of Unknown Quality – Fill material of unknown quality and origin has been used to backfill the sand and gravel pits formerly located on the Site and adjacent lands north, east, south and southwest of the Site. This fill material reportedly contains construction debris.	30
2	Gasoline and Associated Products Storage in Fixed Tanks – Currently presence of a retail fuel outlet with three associated fuel USTs located on approximately 225 m south of the Site at 4000 Riverside Drive.	28



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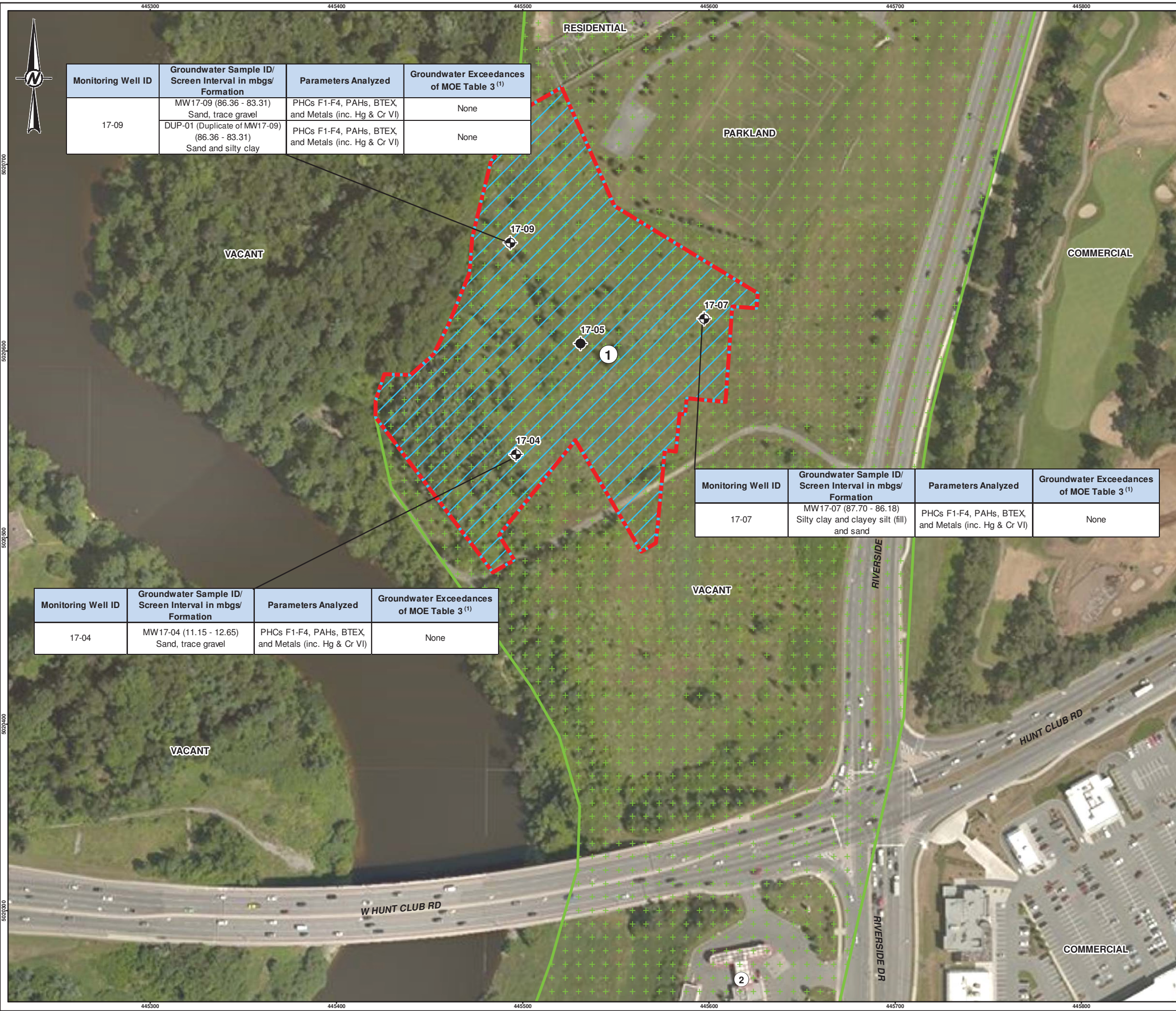
PROJECT
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
PART OF 3930 RIVERSIDE DRIVE, OTTAWA, ONTARIO

TITLE
SOIL SAMPLING ANALYTICAL PROGRAM AND EXCEEDANCES

CONSULTANT	DATE	BY
	YYYY-MM-DD	2017-09-26
	DESIGNED	---
	PREPARED	JEM
	REVIEWED	AT
	APPROVED	KPH

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



Monitoring Well ID	Groundwater Sample ID/ Screen Interval in mbgs/ Formation	Parameters Analyzed	Groundwater Exceedances of MOE Table 3 ⁽¹⁾
17-09	MW17-09 (86.36 - 83.31) Sand, trace gravel	PHCs F1-F4, PAHs, BTEX, and Metals (inc. Hg & Cr VI)	None
	DUP-01 (Duplicate of MW17-09) (86.36 - 83.31) Sand and silty clay	PHCs F1-F4, PAHs, BTEX, and Metals (inc. Hg & Cr VI)	None

Monitoring Well ID	Groundwater Sample ID/ Screen Interval in mbgs/ Formation	Parameters Analyzed	Groundwater Exceedances of MOE Table 3 ⁽¹⁾
17-07	MW17-07 (87.70 - 86.18) Silty clay and clayey silt (fill) and sand	PHCs F1-F4, PAHs, BTEX, and Metals (inc. Hg & Cr VI)	None

Monitoring Well ID	Groundwater Sample ID/ Screen Interval in mbgs/ Formation	Parameters Analyzed	Groundwater Exceedances of MOE Table 3 ⁽¹⁾
17-04	MW17-04 (11.15 - 12.65) Sand, trace gravel	PHCs F1-F4, PAHs, BTEX, and Metals (inc. Hg & Cr VI)	None

LEGEND

- APPROXIMATE BOREHOLE/MONITORING WELL LOCATION
- APPROXIMATE BOREHOLE LOCATION
- APPROXIMATE PHASE TWO PROPERTY AND RSC BOUNDARY
- APEC 1 (SITE-WIDE)
- LOCATION OF PCA 1

NOTE(S)

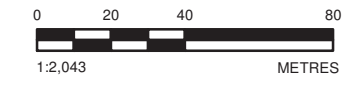
1. ⁽¹⁾ O.REG 153 (2011) TABLE 3 STANDARDS, FULL DEPTH GENERIC SITE CONDITION STANDARDS IN A NON-POTABLE GROUNDWATER CONDITION, ALL TYPES OF PROPERTY USE, COARSE TEXTURE SOIL
2. MBGS = METRES BELOW GROUND SURFACE
3. PHCS F1-F4 = PETROLEUM HYDROCARBON FRACTIONS F1 TO F4
4. BTEX = BENZENE, TOLUENE, ETHYLBENZENE AND XYLENES
5. PAHS = POLYCYCLIC AROMATIC HYDROCARBONS
6. HG = MERCURY
7. CR VI = CHROMIUM VI

REFERENCE(S)

1. LAND INFORMATION ONTARIO (LIO) DATA PRODUCED BY GOLDER ASSOCIATES LTD. UNDER LICENCE FROM ONTARIO MINISTRY OF NATURAL RESOURCES, © QUEEN'S PRINTER 2014
2. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83, COORDINATE SYSTEM: UTM ZONE 18, VERTICAL DATUM: CGVD28

Areas of Potential Environmental Concern ("APEC")		
APEC #	Detail	PCA #
1	Importation of Fill Material of Unknown Quality	30

Potentially Contaminating Activity ("PCA")		
Location	Detail	PCA #
1 (see legend)	Importation of Fill Material of Unknown Quality – Fill material of unknown quality and origin has been used to backfill the sand and gravel pits formerly located on the Site and adjacent lands north, east, south and southwest of the Site. This fill material reportedly contains construction debris.	30
2	Gasoline and Associated Products Storage in Fixed Tanks – Currently presence of a retail fuel outlet with three associated fuel USTs located on approximately 225 m south of the Site at 4000 Riverside Drive.	28



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REVERA INC.

PROJECT
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
PART OF 3930 RIVERSIDE DRIVE, OTTAWA, ONTARIO

TITLE
GROUNDWATER SAMPLING ANALYTICAL PROGRAM AND EXCEEDANCES

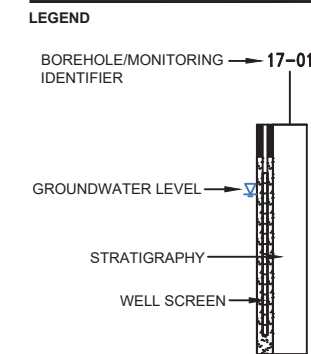
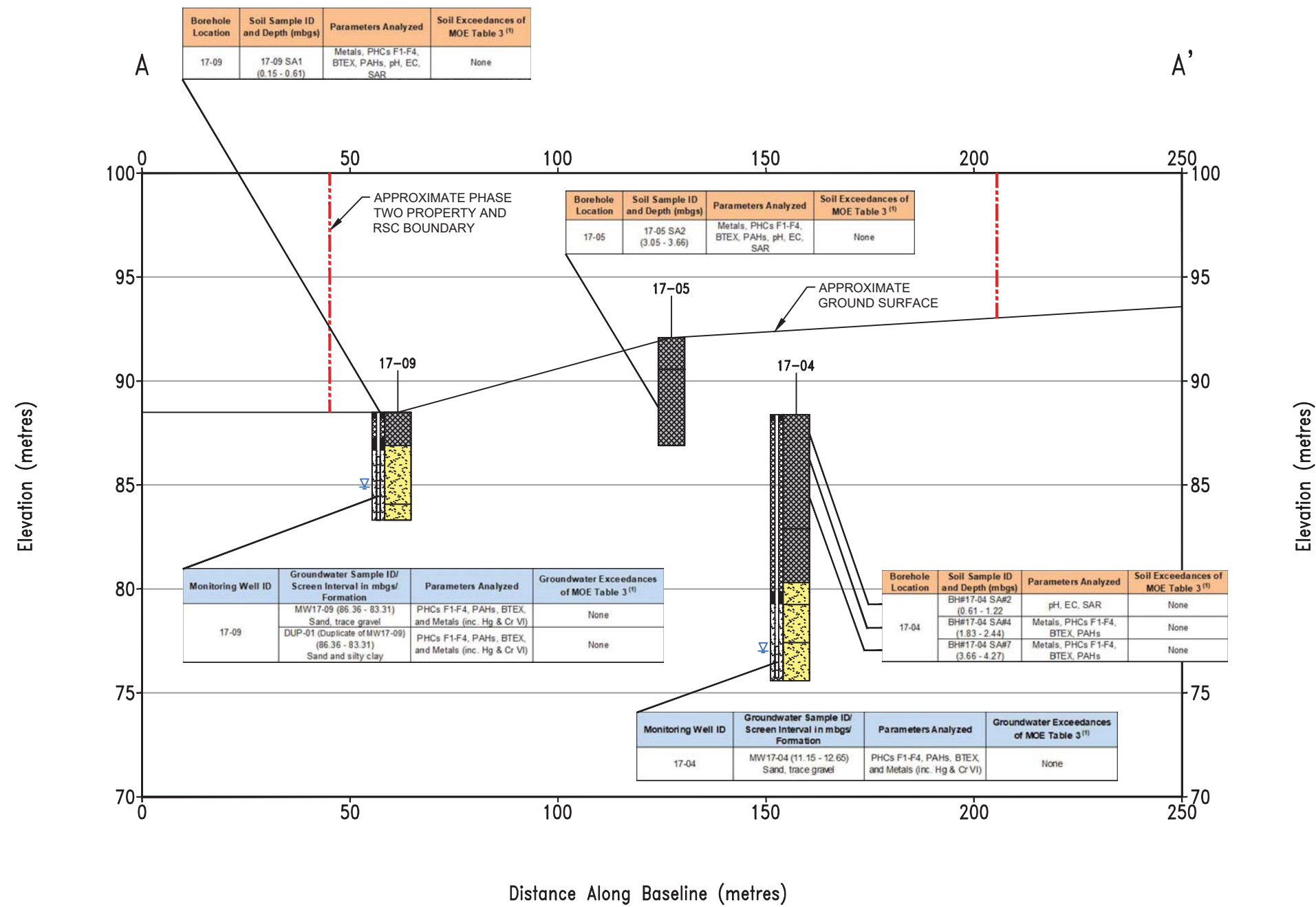
CONSULTANT

YYYY-MM-DD	2017-09-26
DESIGNED	---
PREPARED	JEM
REVIEWED	AT
APPROVED	KPH

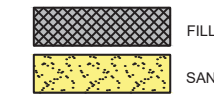
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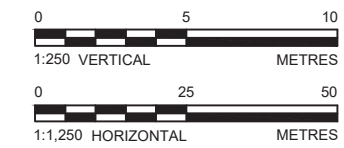


STRATIGRAPHY LEGEND



NOTE(S)

- GROUNDWATER: (1) O. REG 153 (2011) TABLE 3 STANDARDS, FULL DEPTH GENERIC SITE CONDITION STANDARDS IN A NON-POTABLE GROUNDWATER CONDITION, ALL TYPES OF PROPERTY USE, COARSE TEXTURE SOIL
- SOIL: (1) O. REG 153 (2011) TABLE 3 STANDARDS, FULL DEPTH GENERIC SITE CONDITION STANDARDS IN A NON-POTABLE GROUNDWATER CONDITION, RESIDENTIAL/PARKLAND/INSTITUTIONAL PROPERTY USE, COARSE TEXTURE SOIL
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- Hg = MERCURY
- Cr VI = CHROMIUM VI
- EC = ELECTRICAL CONDUCTIVITY
- SAR = SODIUM ADSORPTION RATIO



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REVERA INC.

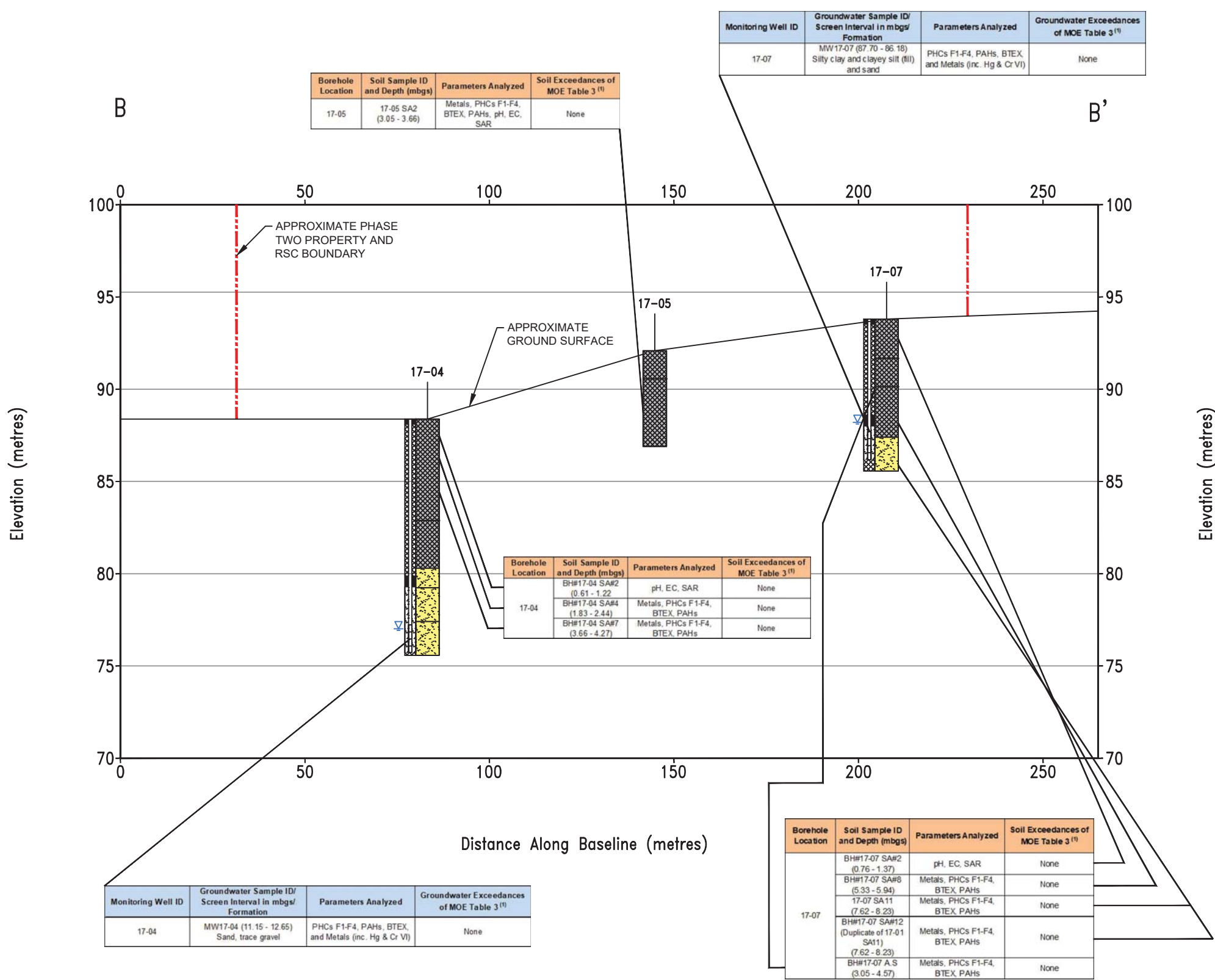
PROJECT
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
PART OF 3930 RIVERSIDE DRIVE, OTTAWA, ONTARIO

TITLE
CROSS-SECTION A-A'

CONSULTANT	YYYY-MM-DD	2017-09-27
DESIGNED	---	
PREPARED	JEM	
REVIEWED	AT	
APPROVED	KPH	

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3/B3

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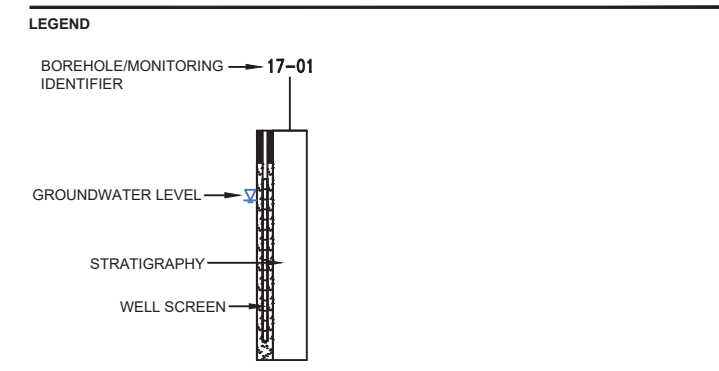
Borehole Location	Soil Sample ID and Depth (mbgs)	Parameters Analyzed	Soil Exceedances of MOE Table 3 (1)
17-05	17-05 SA2 (3.05 - 3.66)	Metals, PHCs F1-F4, BTEX, PAHs, pH, EC, SAR	None

Monitoring Well ID	Groundwater Sample ID/ Screen Interval in mbgs/ Formation	Parameters Analyzed	Groundwater Exceedances of MOE Table 3 (1)
17-07	MW17-07 (87.70 - 86.18) Silty clay and clayey silt (M) and sand	PHCs F1-F4, PAHs, BTEX, and Metals (inc. Hg & Cr VI)	None

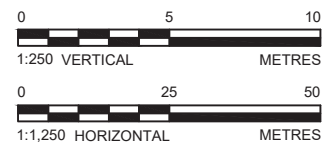
Borehole Location	Soil Sample ID and Depth (mbgs)	Parameters Analyzed	Soil Exceedances of MOE Table 3 (1)
17-04	BH#17-04 SA#2 (0.61 - 1.22)	pH, EC, SAR	None
	BH#17-04 SA#4 (1.83 - 2.44)	Metals, PHCs F1-F4, BTEX, PAHs	None
	BH#17-04 SA#7 (3.66 - 4.27)	Metals, PHCs F1-F4, BTEX, PAHs	None

Borehole Location	Soil Sample ID and Depth (mbgs)	Parameters Analyzed	Soil Exceedances of MOE Table 3 (1)
17-07	BH#17-07 SA#2 (0.76 - 1.37)	pH, EC, SAR	None
	BH#17-07 SA#8 (5.33 - 5.94)	Metals, PHCs F1-F4, BTEX, PAHs	None
	17-07 SA11 (7.62 - 8.23)	Metals, PHCs F1-F4, BTEX, PAHs	None
	BH#17-07 SA#12 (Duplicate of 17-01 SA11) (7.62 - 8.23)	Metals, PHCs F1-F4, BTEX, PAHs	None
	BH#17-07 A.S (3.05 - 4.57)	Metals, PHCs F1-F4, BTEX, PAHs	None

Monitoring Well ID	Groundwater Sample ID/ Screen Interval in mbgs/ Formation	Parameters Analyzed	Groundwater Exceedances of MOE Table 3 (1)
17-04	MW17-04 (11.15 - 12.65) Sand, trace gravel	PHCs F1-F4, PAHs, BTEX, and Metals (inc. Hg & Cr VI)	None



- NOTE(S)**
- GROUNDWATER: (1) O. REG 153 (2011) TABLE 3 STANDARDS, FULL DEPTH GENERIC SITE CONDITION STANDARDS IN A NON-POTABLE GROUNDWATER CONDITION, ALL TYPES OF PROPERTY USE, COARSE TEXTURE SOIL
 - SOIL: (1) O. REG 153 (2011) TABLE 3 STANDARDS, FULL DEPTH GENERIC SITE CONDITION STANDARDS IN A NON-POTABLE GROUNDWATER CONDITION, RESIDENTIAL/PARKLAND/INSTITUTIONAL PROPERTY USE, COARSE TEXTURE SOIL
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 - BTEX = BENZENE, TOLUENE, ETHYLBENZENE AND XYLENES
 - PAHs = POLYCYCLIC AROMATIC HYDROCARBONS
 - Hg = MERCURY
 - Cr VI = CHROMIUM VI
 - EC = ELECTRICAL CONDUCTIVITY
 - SAR = SODIUM ADSORPTION RATIO



CLIENT
REVERA INC.

PROJECT
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
PART OF 3930 RIVERSIDE DRIVE, OTTAWA, ONTARIO

TITLE
CROSS-SECTION B-B'

CONSULTANT	DATE	REVISION
	YYYY-MM-DD	2017-09-27
	DESIGNED	---
	PREPARED	JEM
	REVIEWED	AT
	APPROVED	KPH

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM A3/B3



APPENDIX A (i)

Sampling and Analysis Plan

**TABLE A-1
SAMPLING AND ANALYSIS PLAN
1309 Carling Avenue, Ottawa, ON**

Area of Potential Environmental Concern	Borehole Location ID	Location	Rationale	Borehole Depth (mbgs)	Well to be Installed (Y/N)	Depth of Well	Soil Samples	Groundwater Samples	QA/QC Soil Samples	QA/QC Groundwater Samples
	17-04	To be located on the Revera Lands (northwest portion of the Site) near the western Site boundary.	Borehole to be completed with a monitoring well to assess potential soil and groundwater impacts related to the presence of fill on the Site.	11.8	Y	Bottom of screen (1.5 m screen) in all monitoring wells will be located such that the screen straddles the water table	One shallow fill sample (<1.5 mbgs) will be submitted for analysis of EC, SAR and pH and two deeper fill samples will be submitted for analysis of PHCs F1-F4/BTEX, PAHs and metals		One duplicate soil sample will be submitted for analysis of PHCs F1-F4/BTEX, PAHs and metals.	One duplicate groundwater sample will be submitted for analysis of PHCs F1-F4/BTEX, PAHs and metals (inc. Hg and Cr VI) and one trip blank sample will be submitted for analysis of PHC F1 and BTEX.
	17-05	To be located centrally located on the Revera Lands (northwest portion of the Site).	Borehole to assess the quality of fill on Site.	5.18	N	NA	One fill sample will be submitted for analysis of PHCs F1-F4/BTEX, PAHs and metals	NA		
	17-07	To be located on the eastern portion of the Revera Lands (northwest portion of the Site).	Borehole to be completed with a monitoring well to assess potential soil and groundwater impacts related to the presence of fill on the Site.	7.33	Y	Bottom of screen (1.5 m screen) in all monitoring wells will be located such that the screen straddles the water table	One shallow fill sample (<1.5 mbgs) will be submitted for analysis of EC, SAR and pH. In addition, one deeper fill sample and one native sample (near inferred water table) will be submitted for analysis of PHCs F1-F4/BTEX, PAHs and metals	One groundwater sample will be submitted for analysis of PHCs F1-F4/BTEX, PAHs and metals (in.c Hg and Cr VI)		
	17-09	To be located on the northern portion of the Revera Lands (northwest portion of the Site).	Borehole to be completed with a monitoring well to assess potential soil and groundwater impacts related to the presence of fill on the Site.	5.18	Y	Bottom of screen (12 m screen) in all monitoring wells will be located such that the screen straddles the water table	One shallow fill sample (<1.5 mbgs) will be submitted for analysis of PHCs F1-F4/BTEX, PAHs, metals, EC, SAR and pH			

Notes:
All drilling and sampling to be completed in accordance with Golder Standard Operating Procedures.



APPENDIX A (ii)

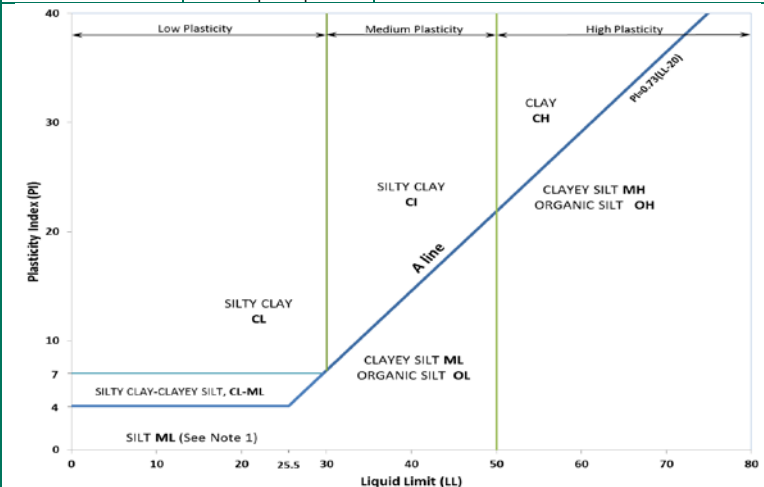
Field Logs



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	$C_u = \frac{D_{60}}{D_{10}}$	$C_c = \frac{(D_{30})^2}{D_{10} \times D_{60}}$	Organic Content	USCS Group Symbol	Group Name							
INORGANIC (Organic Content $\leq 30\%$ 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)	Poorly Graded	<4	≤ 1 or ≥ 3	$\leq 30\%$	GP	GRAVEL							
			Well Graded	≥ 4	1 to 3		GW	GRAVEL							
			Below A Line	n/a			GM	SILTY GRAVEL							
			Above A Line	n/a			GC	CLAYEY GRAVEL							
		SANDS ($\geq 50\%$ by mass of coarse fraction is smaller than 4.75 mm)	Poorly Graded	<6	≤ 1 or ≥ 3		SP	SAND							
			Well Graded	≥ 6	1 to 3		SW	SAND							
			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 $\leq 30\%$ by mass)	FINE-GRAINED SOILS ($\geq 50\%$ by mass is smaller than 0.075 mm)	SILTS (Non-Plastic or PL 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				
			Liquid Limit ≥ 50	Slow to very slow	Low to medium	Dull to slight	3mm to 6 mm	Low	5% to 30%	OL	ORGANIC SILT				
				Slow to very slow	Low to medium	Slight	3mm to 6 mm	Low to medium	$<5\%$	MH	CLAYEY 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				
				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				
			HIGHERLY ORGANIC SOILS (Organic Content $>30\%$ by mass)	Peat and mineral soil mixtures						30% to 75%	PT	SILTY PEAT, SANDY 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	19 to 75	0.75 to 3
	Fine	4.75 to 19	(4) to 0.75
SAND	Coarse	2.00 to 4.75	(10) to (4)
	Medium	0.425 to 2.00	(40) to (10)
	Fine	0.075 to 0.425	(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 cm² 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, G _s)
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

Compactness²

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

- SPT 'N' in accordance with ASTM D1586, uncorrected for overburden pressure effects.
- Definition of compactness descriptions based on SPT 'N' ranges from Terzaghi and Peck (1967) and correspond to typical average N₆₀ 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

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

(a) Index Properties (continued)

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)

(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 = $\tan \delta$
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

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

Notes: 1
2

$$\tau = c' + \sigma' \tan \phi'$$

$$\text{shear strength} = (\text{compressive strength})/2$$

RECORD OF BOREHOLE: 17-04

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM]	HYDRAULIC CONDUCTIVITY, k, cm/s	ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m			HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected	WATER CONTENT PERCENT
										20 40 60 80	Wp I — W — WI
0	Geoprobe Direct Push	GROUND SURFACE		88.38							
		FILL - (CL-ML) SILTY CLAY and CLAYEY SILT, some fine sand, trace gravel, organics, wood; grey and brown; cohesive, w>PL			0.00						
				1	DT	-					
1				2	DT	-	⊕				
				3	DT	-	⊕				
2				4	DT	-	⊕				
				5	DT	-	⊕				
				6	DT	-	⊕				
3				7	DT	-	⊕				
				8	DT	-	⊕				
4				9	DT	-	⊕				
				10	DT	-	⊕				
5				11	DT	-	⊕				
				12	DT	-	⊕				
6			FILL (SM/GM, ML) SILTY SAND and GRAVEL, shaley, and sandy SILT; dark brown to black; non-cohesive, moist		82.89						
					5.49						
				13	DT	-	⊕				
7			14	DT	-	⊕					
			15	DT	-	⊕					
8		(SP) SAND, fine to medium; brown; non-cohesive, moist		80.30							
				8.08							
			16	DT	-	⊕					
9		(SW) SAND, fine to coarse, trace gravel; light brown; non-cohesive, moist, dense		79.24							
				9.14							
			17	DT	-	⊕					
10											

CONTINUED NEXT PAGE

MIS-BHS 001 1670692.GPJ GAL-MIS.GDT 18-4-4 JEM



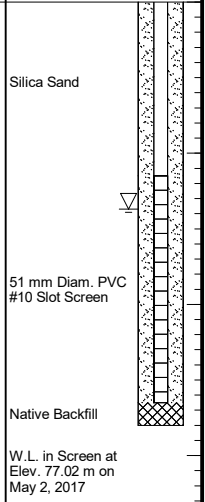
PROJECT: 1670692
 LOCATION: N 5020544.6 ; E 445496.4

RECORD OF BOREHOLE: 17-04

BORING DATE: April 26, 2017

SHEET 2 OF 2
 DATUM: CGVD28

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES			HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM]	HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	ND = Not Detected	WATER CONTENT PERCENT					
								HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected	Wp	W	Wi			
10	Geoprobe Direct Push	-- CONTINUED FROM PREVIOUS PAGE --												
		(SW) SAND, fine to coarse, trace gravel; light brown; non-cohesive, moist, dense					⊕							
		(SW) SAND, fine to coarse, trace gravel; brown; non-cohesive, wet, very dense					⊕							
11				77.41										
				10.97										
12														
13		End of Borehole		75.58										
				12.80										
14														
15														
16														
17														
18														
19														
20														



MIS-BHS 001 1670692.GPJ GAL-MIS.GDT 18-4-4 JEM



PROJECT: 1670692

RECORD OF BOREHOLE: 17-05

SHEET 1 OF 1


LOCATION: N 5020604.0 ; E 445531.0

BORING DATE: May 3, 2017

DATUM: CGVD28

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM]	HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION	
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	ND = Not Detected 20 40 60 80	10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³	WATER CONTENT PERCENT Wp I — W — WI				20 40 60 80
0	Power Auger 200 mm Diam. (Hollow Stem)	GROUND SURFACE		92.08									
		FILL - (ML-CL) sandy SILT and CLAYEY SILT, trace to some organics; brown; moist		0.00									
1.52		FILL - (CI/CH) SILTY CLAY, trace gravel; grey, contains sand layers; cohesive, w>PL, soft		1.52	1	GRAB	⊕						
3.52					2	SS	1	⊕					
5.18					3	SS	1	⊕					
5.18		End of Borehole		86.90									
5.18				5.18									

MIS-BHS 001 1670692.GPJ GAL-MIS.GDT 18-4-4 JEM

DEPTH SCALE

1 : 50



LOGGED: PAH

CHECKED: KPH

PROJECT: 1670692

RECORD OF BOREHOLE: 17-07

SHEET 1 OF 1

LOCATION: N 5020617.3 ; E 445597.4

BORING DATE: April 26, 2017

DATUM: CGVD28

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM]	HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION		
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	BLOWS/0.30m	ND = Not Detected	10 ⁻⁶ 10 ⁻⁵ 10 ⁻⁴ 10 ⁻³					
								HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected	WATER CONTENT PERCENT					
0		GROUND SURFACE		93.80										
		FILL - (CL-ML) SILTY CLAY and sandy SILT, some gravel; grey brown, contains cobbles; non-cohesive, moist, loose to compact		0.00	1	GRAB	-	⊕						
1					2	SS	11	⊕						
					3	SS	5	⊕						
2				91.67										
		FILL - (SM) SILTY SAND, fine; grey with clayey silt lumps; non-cohesive, moist, compact		2.13	4	SS	16	⊕						
3					5	SS	12	⊕						
				90.14										
4		FILL - (CL/ML) SILTY CLAY and CLAYEY SILT, trace gravel; grey; cohesive, w>PL		3.66	6	SS	4	⊕						
5					7	SS	4	⊕						
6					8	SS	3	⊕						
				87.40										
7		(SP) SAND, fine; brown, contains thin clayey silt seams; non-cohesive, wet, loose to compact		6.40	9	SS	6							
					10	SS	6	⊕						
8					11	SS	11	⊕						
				85.57										
		End of Borehole		8.23										

Power Auger
200 mm Diam. (Hollow Stem)

Native Backfill

Bentonite Seal

Silica Sand

51 mm Diam. PVC #10 Slot Screen

Native Backfill

W.L. in Screen at Elev. 88.20 m on May 2, 2017

MIS-BHS 001 1670692.GPJ GAL-MIS.GDT 18-4-4 JEM

DEPTH SCALE

1 : 50



LOGGED: PAH

CHECKED: KPH

PROJECT: 1670692

RECORD OF BOREHOLE: 17-09

SHEET 1 OF 1

LOCATION: N 5020658.0 ; E 445493.4

BORING DATE: May 3, 2017

DATUM: CGVD28

SAMPLER HAMMER, 64kg; DROP, 760mm

PENETRATION TEST HAMMER, 64kg; DROP, 760mm

DEPTH SCALE METRES	BORING METHOD	SOIL PROFILE		SAMPLES		HEADSPACE ORGANIC VAPOUR CONCENTRATIONS [PPM]				HYDRAULIC CONDUCTIVITY, k, cm/s				ADDITIONAL LAB. TESTING	PIEZOMETER OR STANDPIPE INSTALLATION							
		DESCRIPTION	STRATA PLOT	ELEV. DEPTH (m)	NUMBER	TYPE	HEADSPACE COMBUSTIBLE VAPOUR CONCENTRATIONS [%LEL] ND = Not Detected				WATER CONTENT PERCENT											
							20 40 60 80				Wp ----- W ----- WI											
0		GROUND SURFACE		88.49																		
	Power Auger 200 mm Diam. (Hollow Stem)	FILL - (SM/GL-ML) SILTY SAND and CLAYEY SILT mixed, trace organics; brown and grey; non-cohesive, moist, loose		0.00	1	GRAB	-	⊕								Native Backfill and Bentonite Mix						
1				2	SS	3	⊕											Bentonite Seal				
		(SP) SAND, fine; brown, occasional clayey silt seam; non-cohesive, moist to wet with depth, loose to compact		86.90	3	SS	38	⊕								Silica Sand						
2				4	SS	4	⊕											51 mm Diam. PVC #10 Slot Screen				
3				5	SS	2	⊕													W.L. in Screen at Elev. 84.93 m on May 4, 2017		
4				6	SS	11	⊕															W.L. in Screen at Elev. 84.93 m on May 4, 2017
5				7	SS	14	⊕															
	(SP-CL) layered SAND, fine and SILTY CLAY; brown and grey brown; w-PL, very stiff		84.07												W.L. in Screen at Elev. 84.93 m on May 4, 2017							
5			4.42														W.L. in Screen at Elev. 84.93 m on May 4, 2017					
6		End of Borehole		83.31																		
7				5.18																		
8																						
9																						
10																						

MIS-BHS 001 1670692.GPJ GAL-MIS.GDT 18-4-4 JEM

DEPTH SCALE

1 : 50



LOGGED: PAH

CHECKED: KPH



APPENDIX A (iii)

Certificates of Analysis



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

ATTENTION TO: Alyssa Troke; Keith Holmes

PROJECT: 1670692 Taggart Phase II ESA

AGAT WORK ORDER: 17Z210773

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Coordinator

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: May 09, 2017

PAGES (INCLUDING COVER): 10

VERSION*: 2

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

***NOTES**

VERSION 2: Partial report issued May 8/17.

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



Certificate of Analysis

AGAT WORK ORDER: 17Z210773

PROJECT: 1670692 Taggart Phase II ESA

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

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-02

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION: BH#17-02 SA#5								
		BH#17-02 SA#22			BH#17-02 SA#26			BH#17-04 SA#4		
		Soil			Soil			Soil		
		G / S	RDL	8352975	8352992	8352995	8352998	8353003	8353006	8353010
Antimony	µg/g	7.5	0.8	<0.8	<0.8	<0.8	<0.8	<0.8	<0.8	
Arsenic	µg/g	18	1	1	1	3	2	2	3	
Barium	µg/g	390	2	126	65	89	175	193	211	
Beryllium	µg/g	4	0.5	<0.5	<0.5	<0.5	0.6	0.7	0.6	
Boron	µg/g	120	5	5	<5	11	6	6	7	
Boron (Hot Water Soluble)	µg/g	1.5	0.10	0.26	<0.10	<0.10	0.11	<0.10	0.19	
Cadmium	µg/g	1.2	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	
Chromium	µg/g	160	2	44	17	23	78	93	79	
Cobalt	µg/g	22	0.5	7.7	4.5	10.2	15.3	17.0	13.2	
Copper	µg/g	140	1	19	11	20	30	37	31	
Lead	µg/g	120	1	13	3	8	5	6	14	
Molybdenum	µg/g	6.9	0.5	<0.5	0.9	2.1	<0.5	<0.5	0.6	
Nickel	µg/g	100	1	21	8	10	43	48	39	
Selenium	µg/g	2.4	0.4	<0.4	<0.4	<0.4	<0.4	<0.4	<0.4	
Silver	µg/g	20	0.2	<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	0.6	
Uranium	µg/g	23	0.5	0.6	<0.5	0.6	1.0	1.0	0.9	
Vanadium	µg/g	86	1	37	19	22	68	75	65	
Zinc	µg/g	340	5	46	18	22	77	86	78	
Chromium VI	µg/g	8	0.2	<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	<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



Certificate of Analysis

AGAT WORK ORDER: 17Z210773

PROJECT: 1670692 Taggart Phase II ESA

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CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-02

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION: BH#17-02 SA#5													
		SAMPLE TYPE: Soil		BH#17-02 SA#22		BH#17-02 SA#26		BH#17-04 SA#4		BH#17-04 SA#7		BH#17-07 SA#8		BH#17-07 A.S	
		DATE SAMPLED: 2017-04-26		2017-04-27		2017-04-27		2017-04-26		2017-04-26		2017-04-28		2017-04-28	
		G / S	RDL	8352975	8352992	8352995	8352998	8353003	8353006	8353010					
Naphthalene	µg/g	0.6	0.05	<0.05	<0.05	<0.05	<0.05	<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	<0.05	<0.05	<0.05	<0.05	<0.05		
Acenaphthene	µg/g	7.9	0.05	0.22	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Fluorene	µg/g	62	0.05	0.26	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Phenanthrene	µg/g	6.2	0.05	1.8	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.15	<0.05		
Anthracene	µg/g	0.67	0.05	0.51	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		
Fluoranthene	µg/g	0.69	0.05	1.8	<0.05	<0.05	<0.05	<0.05	<0.05	0.13	0.17				
Pyrene	µg/g	78	0.05	1.4	<0.05	<0.05	<0.05	<0.05	<0.05	0.12	0.16				
Benz(a)anthracene	µg/g	0.5	0.05	0.79	<0.05	<0.05	<0.05	<0.05	<0.05	0.08	0.07				
Chrysene	µg/g	7	0.05	0.67	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	0.07				
Benzo(b)fluoranthene	µg/g	0.78	0.05	0.73	<0.05	<0.05	<0.05	<0.05	<0.05	0.10	0.09				
Benzo(k)fluoranthene	µg/g	0.78	0.05	0.35	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
Benzo(a)pyrene	µg/g	0.3	0.05	0.58	<0.05	<0.05	<0.05	<0.05	<0.05	0.07	0.07				
Indeno(1,2,3-cd)pyrene	µg/g	0.38	0.05	0.33	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
Dibenz(a,h)anthracene	µg/g	0.1	0.05	0.07	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05				
Benzo(g,h,i)perylene	µg/g	6.6	0.05	0.30	<0.05	<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	<0.05	<0.05	<0.05				
Moisture Content	%		0.1	24.3	13.2	12.4	30.0	27.5	22.9	19.4					
Surrogate	Unit	Acceptable Limits													
Chrysene-d12	%	50-140		68	58	58	61	54	69	58					

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

8352975-8353010 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:



Certificate of Analysis

AGAT WORK ORDER: 17Z210773

PROJECT: 1670692 Taggart Phase II ESA

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CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke; Keith Holmes

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-02

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION: BH#17-02 SA#5																	
		BH#17-02 SA#22			BH#17-02 SA#26			BH#17-04 SA#4			BH#17-04 SA#7			BH#17-07 SA#8			BH#17-07 A.S		
		Soil			Soil			Soil			Soil			Soil			Soil		
		DATE SAMPLED:	2017-04-26	2017-04-27	2017-04-27	2017-04-26	2017-04-26	2017-04-28	2017-04-28	2017-04-28	2017-04-28								
Benzene	µg/g	0.21	0.02	<0.02	<0.02	<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	<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	<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	<0.05	<0.05	<0.05					
F1 (C6 to C10)	µg/g	55	5	<5	<5	<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	<5	<5	<5					
F2 (C10 to C16)	µg/g	98	10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	67					
F2 (C10 to C16) minus Naphthalene	µg/g		10	<10	<10	<10	<10	<10	<10	<10	<10	<10	<10	67					
F3 (C16 to C34)	µg/g	300	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	130					
F3 (C16 to C34) minus PAHs	µg/g		50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	130					
F4 (C34 to C50)	µg/g	2800	50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50	<50					
Gravimetric Heavy Hydrocarbons	µg/g	2800	50	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA					
Moisture Content	%		0.1	24.3	13.2	12.4	30.0	27.5	22.9	19.4									
Surrogate	Unit	Acceptable Limits																	
Terphenyl	%	60-140	87	79	109	77	66	97	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 - Soil - Residential/Parkland/Institutional Property Use - Coarse Textured Soils

8352975-8353010 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:



Guideline Violation

AGAT WORK ORDER: 17Z210773

PROJECT: 1670692 Taggart Phase II ESA

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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
8352975	BH#17-02 SA#5	ON T3 S RPI CT	O. Reg. 153(511) - PAHs (Soil)	Benz(a)anthracene	µg/g	0.5	0.79
8352975	BH#17-02 SA#5	ON T3 S RPI CT	O. Reg. 153(511) - PAHs (Soil)	Benzo(a)pyrene	µg/g	0.3	0.58
8352975	BH#17-02 SA#5	ON T3 S RPI CT	O. Reg. 153(511) - PAHs (Soil)	Fluoranthene	µg/g	0.69	1.8

Quality Assurance

 CLIENT NAME: GOLDER ASSOCIATES LTD
 PROJECT: 1670692 Taggart Phase II ESA
 SAMPLING SITE:

 AGAT WORK ORDER: 17Z210773
 ATTENTION TO: Alyssa Troke; Keith Holmes
 SAMPLED BY:

Soil Analysis															
RPT Date: May 09, 2017			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

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

Antimony	8361780		<0.8	<0.8	NA	< 0.8	91%	70%	130%	101%	80%	120%	87%	70%	130%
Arsenic	8361780		5	4	NA	< 1	115%	70%	130%	105%	80%	120%	93%	70%	130%
Barium	8361780		26	23	12.2%	< 2	105%	70%	130%	98%	80%	120%	92%	70%	130%
Beryllium	8361780		<0.5	<0.5	NA	< 0.5	100%	70%	130%	106%	80%	120%	93%	70%	130%
Boron	8361780		8	7	NA	< 5	90%	70%	130%	104%	80%	120%	113%	70%	130%
Boron (Hot Water Soluble)	8361821		1.37	1.44	5.0%	< 0.10	105%	60%	140%	106%	70%	130%	104%	60%	140%
Cadmium	8361780		<0.5	<0.5	NA	< 0.5	105%	70%	130%	99%	80%	120%	88%	70%	130%
Chromium	8361780		8	7	NA	< 2	97%	70%	130%	107%	80%	120%	112%	70%	130%
Cobalt	8361780		4.6	4.1	11.5%	< 0.5	102%	70%	130%	100%	80%	120%	87%	70%	130%
Copper	8361780		28	25	11.3%	< 1	99%	70%	130%	105%	80%	120%	96%	70%	130%
Lead	8361780		14	12	15.4%	< 1	106%	70%	130%	108%	80%	120%	88%	70%	130%
Molybdenum	8361780		0.6	<0.5	NA	< 0.5	101%	70%	130%	102%	80%	120%	91%	70%	130%
Nickel	8361780		8	7	13.3%	< 1	101%	70%	130%	102%	80%	120%	93%	70%	130%
Selenium	8361780		0.9	<0.4	NA	< 0.4	104%	70%	130%	101%	80%	120%	92%	70%	130%
Silver	8361780		<0.2	<0.2	NA	< 0.2	95%	70%	130%	113%	80%	120%	91%	70%	130%
Thallium	8361780		0.8	<0.4	NA	< 0.4	118%	70%	130%	113%	80%	120%	92%	70%	130%
Uranium	8361780		0.5	<0.5	NA	< 0.5	109%	70%	130%	105%	80%	120%	88%	70%	130%
Vanadium	8361780		12	12	0.0%	< 1	104%	70%	130%	105%	80%	120%	108%	70%	130%
Zinc	8361780		77	73	5.3%	< 5	102%	70%	130%	108%	80%	120%	106%	70%	130%
Chromium VI	8361821		<0.2	<0.2	NA	< 0.2	91%	70%	130%	102%	80%	120%	97%	70%	130%
Mercury	8361780		<0.10	<0.10	NA	< 0.10	112%	70%	130%	98%	80%	120%	89%	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:



Quality Assurance

 CLIENT NAME: GOLDER ASSOCIATES LTD
 PROJECT: 1670692 Taggart Phase II ESA
 SAMPLING SITE:

 AGAT WORK ORDER: 17Z210773
 ATTENTION TO: Alyssa Troke; Keith Holmes
 SAMPLED BY:

Trace Organics Analysis

RPT Date: May 09, 2017			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		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)															
Benzene	8357655		< 0.02	< 0.02	NA	< 0.02	107%	60%	130%	105%	60%	130%	110%	60%	130%
Toluene	8357655		< 0.08	< 0.08	NA	< 0.08	96%	60%	130%	91%	60%	130%	101%	60%	130%
Ethylbenzene	8357655		< 0.05	< 0.05	NA	< 0.05	92%	60%	130%	88%	60%	130%	92%	60%	130%
Xylene Mixture	8357655		< 0.05	< 0.05	NA	< 0.05	104%	60%	130%	111%	60%	130%	115%	60%	130%
F1 (C6 to C10)	8357655		< 5	< 5	NA	< 5	71%	60%	130%	87%	85%	115%	79%	70%	130%
F2 (C10 to C16)	8353010	8353010	67	66	1.5%	< 10	101%	60%	130%	96%	80%	120%	72%	70%	130%
F3 (C16 to C34)	8353010	8353010	130	130	NA	< 50	102%	60%	130%	94%	80%	120%	92%	70%	130%
F4 (C34 to C50)	8353010	8353010	< 50	< 50	NA	< 50	88%	60%	130%	88%	80%	120%	79%	70%	130%
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	8358141		< 0.05	< 0.05	NA	< 0.05	90%	50%	140%	92%	50%	140%	91%	50%	140%
Acenaphthylene	8358141		< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	87%	50%	140%	88%	50%	140%
Acenaphthene	8358141		< 0.05	< 0.05	NA	< 0.05	97%	50%	140%	92%	50%	140%	92%	50%	140%
Fluorene	8358141		< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	98%	50%	140%	97%	50%	140%
Phenanthrene	8358141		< 0.05	< 0.05	NA	< 0.05	97%	50%	140%	101%	50%	140%	96%	50%	140%
Anthracene	8358141		< 0.05	< 0.05	NA	< 0.05	100%	50%	140%	107%	50%	140%	108%	50%	140%
Fluoranthene	8358141		< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	100%	50%	140%	106%	50%	140%
Pyrene	8358141		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	100%	50%	140%	98%	50%	140%
Benz(a)anthracene	8358141		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	98%	50%	140%	92%	50%	140%
Chrysene	8358141		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	91%	50%	140%	84%	50%	140%
Benzo(b)fluoranthene	8358141		< 0.05	< 0.05	NA	< 0.05	121%	50%	140%	105%	50%	140%	97%	50%	140%
Benzo(k)fluoranthene	8358141		< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	94%	50%	140%	96%	50%	140%
Benzo(a)pyrene	8358141		< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	105%	50%	140%	103%	50%	140%
Indeno(1,2,3-cd)pyrene	8358141		< 0.05	< 0.05	NA	< 0.05	113%	50%	140%	76%	50%	140%	72%	50%	140%
Dibenz(a,h)anthracene	8358141		< 0.05	< 0.05	NA	< 0.05	114%	50%	140%	83%	50%	140%	79%	50%	140%
Benzo(g,h,i)perylene	8358141		< 0.05	< 0.05	NA	< 0.05	104%	50%	140%	78%	50%	140%	79%	50%	140%
2-and 1-methyl Naphthalene	8358141		< 0.05	< 0.05	NA	< 0.05	112%	50%	140%	93%	50%	140%	94%	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:





Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD
 PROJECT: 1670692 Taggart Phase II ESA
 SAMPLING SITE:

AGAT WORK ORDER: 17Z210773
 ATTENTION TO: Alyssa Troke; Keith Holmes
 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
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

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z210773

PROJECT: 1670692 Taggart Phase II ESA

ATTENTION TO: Alyssa Troke; Keith Holmes

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
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	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
web@earth.agatlabs.com

Laboratory Use Only

Work Order #: 178210773
Cooler Quantity: one-on ice
Arrival Temperatures: 5.8 5.6 5.2
4-3.7 | 3.2 | 3.3
Custody Seal Intact: Yes No N/A
Notes:

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)

Report Information:

Company: Golder
Contact: Alyssa Troke/Keith Holmes
Address: 1981 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 Sewer Use Regulation 558
Table 3 Ind/Com Sanitary CCME
 Res/Park Storm Prov. Water Quality Objectives (PWQO)
 Agriculture Other
Soil Texture (Check One) Coarse Fine Other
Region _____ Indicate One

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):

May 8, 2017 as per Jeff Jones
Please provide prior notification for rush TAT
*TAT is exclusive of weekends and statutory holidays

Project Information:

Project: 1670692 - Taggart Phase 11 ESA
Site Location: _____
Sampled By: _____
AGAT Quote #: _____ PO: _____
Please note: If quotation number is not provided, client will be billed full price for analysis.

Is this submission for a Record of Site Condition?

Yes No

Report Guideline on Certificate of Analysis

Yes No

Sample Matrix Legend

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

Invoice Information:

Bill To Same: Yes No

Company: _____
Contact: _____
Address: _____
Email: _____

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Y / N	Field Filtered - Metals, Hg, CrVI (Please Circle)	Metals and Inorganics	Hydride Forming Metals	Client Custom Metals	ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> CN <input type="checkbox"/> Cr ⁶⁺ <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO ₃ /NO ₂ <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH ₃ <input type="checkbox"/> TKN <input type="checkbox"/> NO ₃ <input type="checkbox"/> NO ₂ <input type="checkbox"/> NO _x /NO ₂	Volatiles: <input type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM	CCME Fractions 1 to 4	ABNS	PAHS	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	
BH#17-02 SA#5	Apr. 26/17		3	S				X							X	X						
BH#17-02 SA#22	Apr. 27/17		↓	↓				X							X	X						
BH#17-02 SA#26	Apr. 27/17		↓	↓				X							X	X						
BH#17-04 SA#4	Apr. 26		↓	↓				X							X	X						
BH#17-04 SA#7	Apr. 26		↓	↓				X							X	X						
BH#17-07 SA#8	Apr. 28		↓	↓				X							X	X						
BH#17-07 A.S	Apr. 28		↓	↓				X							X	X						

Samples Relinquished By (Print Name and Sign): <u>Alyssa Troke</u> <u>Alyssa Troke</u>	Date: <u>May 2/17</u>	Time: <u>9:30</u>	Samples Received By (Print Name and Sign): <u>Ubertreist</u>	Date: <u>2 May-17</u>	Time: <u>11:05</u>
Samples Relinquished By (Print Name and Sign): <u>UBS to feed Ex</u>	Date: <u>2 May-17</u>	Time: <u>11:00</u>	Samples Received By (Print Name and Sign): <u>Sharamin</u>	Date: <u>may 3/17</u>	Time: <u>11:00am</u>

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

ATTENTION TO: Alyssa Troke

PROJECT: 1670692

AGAT WORK ORDER: 17Z210954

TRACE ORGANICS REVIEWED BY: Gulhan Yalamova, Report Reviewer

WATER ANALYSIS REVIEWED BY: Parvathi Malemath, Data Reviewer

DATE REPORTED: May 09, 2017

PAGES (INCLUDING COVER): 9

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.



Certificate of Analysis

AGAT WORK ORDER: 17Z210954

PROJECT: 1670692

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

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-02

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION:		MW 17-07	MW 01-2	MW 17-04	MW 17-02
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2017-05-02	2017-05-02	2017-05-02	2017-05-02
		G / S	RDL	8354167	8354173	8354181	8354190
Naphthalene	µg/L	1400	0.20	<0.20	<0.20	<0.20	<0.20
Acenaphthylene	µg/L	1.8	0.20	<0.20	<0.20	<0.20	<0.20
Acenaphthene	µg/L	600	0.20	<0.20	<0.20	<0.20	<0.20
Fluorene	µg/L	400	0.20	<0.20	<0.20	<0.20	<0.20
Phenanthrene	µg/L	580	0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	µg/L	2.4	0.10	<0.10	<0.10	<0.10	<0.10
Fluoranthene	µg/L	130	0.20	<0.20	<0.20	<0.20	<0.20
Pyrene	µg/L	68	0.20	<0.20	<0.20	<0.20	<0.20
Benz(a)anthracene	µg/L	4.7	0.20	<0.20	<0.20	<0.20	<0.20
Chrysene	µg/L	1	0.10	<0.10	<0.10	<0.10	<0.10
Benzo(b)fluoranthene	µg/L	0.75	0.10	<0.10	<0.10	<0.10	<0.10
Benzo(k)fluoranthene	µg/L	0.4	0.10	<0.10	<0.10	<0.10	<0.10
Benzo(a)pyrene	µg/L	0.81	0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L	0.2	0.20	<0.20	<0.20	<0.20	<0.20
Dibenz(a,h)anthracene	µg/L	0.52	0.20	<0.20	<0.20	<0.20	<0.20
Benzo(g,h,i)perylene	µg/L	0.2	0.20	<0.20	<0.20	<0.20	<0.20
2-and 1-methyl Naphthalene	µg/L	1800	0.20	<0.20	<0.20	<0.20	<0.20
Surrogate	Unit	Acceptable Limits					
Chrysene-d12	%	50-140		85	93	60	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

8354167-8354190 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:



Certificate of Analysis

AGAT WORK ORDER: 17Z210954

PROJECT: 1670692

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

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: 2017-05-02

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION:		MW 17-07	MW 01-2	MW 17-04	MW 17-02
		G / S	RDL	8354167	8354173	8354181	8354190
Benzene	µg/L	44	0.20	<0.20	<0.20	<0.20	<0.20
Toluene	µg/L	18000	0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	µg/L	2300	0.10	<0.10	<0.10	<0.10	<0.10
Xylene Mixture	µg/L	4200	0.20	<0.20	<0.20	<0.20	<0.20
F1 (C6 to C10)	µg/L	750	25	<25	<25	<25	<25
F1 (C6 to C10) minus BTEX	µg/L	750	25	<25	<25	<25	<25
F2 (C10 to C16)	µg/L	150	100	<100	<100	<100	<100
F2 (C10 to C16) minus Naphthalene	µg/L		100	<100	<100	<100	<100
F3 (C16 to C34)	µg/L	500	100	200	<100	<100	<100
F3 (C16 to C34) minus PAHs	µg/L		100	200	<100	<100	<100
F4 (C34 to C50)	µg/L	500	100	<100	<100	<100	<100
Gravimetric Heavy Hydrocarbons	µg/L	500	500	NA	NA	NA	NA
Surrogate	Unit	Acceptable Limits					
Terphenyl	%	60-140		85	93	76	90

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

8354167-8354190 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 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:



Certificate of Analysis

AGAT WORK ORDER: 17Z210954

PROJECT: 1670692

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

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-02

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION:		MW 17-07	MW 01-2	MW 17-04	MW 17-02
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2017-05-02	2017-05-02	2017-05-02	2017-05-02
		G / S	RDL	8354167	8354173	8354181	8354190
Antimony	µg/L	20000	1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	µg/L	1900	1.0	1.1	1.3	<1.0	1.2
Barium	µg/L	29000	2.0	145	98.4	89.1	90.5
Beryllium	µg/L	67	0.5	<0.5	<0.5	<0.5	<0.5
Boron	µg/L	45000	10.0	41.4	26.7	19.8	24.8
Cadmium	µg/L	2.7	0.2	<0.2	<0.2	<0.2	<0.2
Chromium	µg/L	810	2.0	12.1	8.5	9.4	6.2
Cobalt	µg/L	66	0.5	9.2	<0.5	2.2	1.5
Copper	µg/L	87	1.0	<1.0	<1.0	<1.0	1.0
Lead	µg/L	25	0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	µg/L	9200	0.5	0.5	1.0	1.3	2.7
Nickel	µg/L	490	1.0	5.2	2.2	3.2	4.3
Selenium	µg/L	63	1.0	2.7	<1.0	3.9	<1.0
Silver	µg/L	1.5	0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	510	0.3	<0.3	<0.3	<0.3	<0.3
Uranium	µg/L	420	0.5	0.6	1.2	1.5	1.5
Vanadium	µg/L	250	0.4	3.2	3.2	3.1	3.1
Zinc	µg/L	1100	5.0	<5.0	<5.0	<5.0	<5.0
Mercury	µg/L	0.29	0.02	<0.02	<0.02	<0.02	<0.02
Chromium VI	µg/L	140	5	<5	<5	<5	<5

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

Certified By:



Quality Assurance

CLIENT NAME: GOLDR ASSOCIATES LTD
 PROJECT: 1670692
 SAMPLING SITE:

AGAT WORK ORDER: 17Z210954
 ATTENTION TO: Alyssa Troke
 SAMPLED BY:

Trace Organics Analysis															
RPT Date: May 09, 2017			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		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)

Benzene	8365114		< 0.20	< 0.20	NA	< 0.20	80%	50%	140%	83%	60%	130%	99%	50%	140%
Toluene	8365114		< 0.20	< 0.20	NA	< 0.20	80%	50%	140%	81%	60%	130%	96%	50%	140%
Ethylbenzene	8365114		< 0.10	< 0.10	NA	< 0.10	80%	50%	140%	83%	60%	130%	94%	50%	140%
Xylene Mixture	8365114		< 0.20	< 0.20	NA	< 0.20	83%	50%	140%	91%	60%	130%	100%	50%	140%
F1 (C6 to C10)	8365114		< 25	< 25	NA	< 25	77%	60%	140%	78%	60%	140%	82%	60%	140%
F2 (C10 to C16)		TW	< 100	< 100	NA	< 100	108%	60%	140%	72%	60%	140%	60%	60%	140%
F3 (C16 to C34)		TW	< 100	< 100	NA	< 100	110%	60%	140%	72%	60%	140%	87%	60%	140%
F4 (C34 to C50)		TW	< 100	< 100	NA	< 100	105%	60%	140%	84%	60%	140%	104%	60%	140%

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

Naphthalene		TW	< 0.20	< 0.20	NA	< 0.20	90%	50%	140%	92%	50%	140%	91%	50%	140%
Acenaphthylene		TW	< 0.20	< 0.20	NA	< 0.20	95%	50%	140%	87%	50%	140%	88%	50%	140%
Acenaphthene		TW	< 0.20	< 0.20	NA	< 0.20	97%	50%	140%	92%	50%	140%	92%	50%	140%
Fluorene		TW	< 0.20	< 0.20	NA	< 0.20	102%	50%	140%	98%	50%	140%	97%	50%	140%
Phenanthrene		TW	< 0.10	< 0.10	NA	< 0.10	97%	50%	140%	101%	50%	140%	96%	50%	140%
Anthracene		TW	< 0.10	< 0.10	NA	< 0.10	100%	50%	140%	107%	50%	140%	108%	50%	140%
Fluoranthene		TW	< 0.20	< 0.20	NA	< 0.20	102%	50%	140%	100%	50%	140%	106%	50%	140%
Pyrene		TW	< 0.20	< 0.20	NA	< 0.20	101%	50%	140%	100%	50%	140%	98%	50%	140%
Benz(a)anthracene		TW	< 0.20	< 0.20	NA	< 0.20	101%	50%	140%	98%	50%	140%	92%	50%	140%
Chrysene		TW	< 0.10	< 0.10	NA	< 0.10	96%	50%	140%	91%	50%	140%	84%	50%	140%
Benzo(b)fluoranthene		TW	< 0.10	< 0.10	NA	< 0.10	121%	50%	140%	105%	50%	140%	97%	50%	140%
Benzo(k)fluoranthene		TW	< 0.10	< 0.10	NA	< 0.10	102%	50%	140%	94%	50%	140%	96%	50%	140%
Benzo(a)pyrene		TW	< 0.01	< 0.01	NA	< 0.01	110%	50%	140%	105%	50%	140%	103%	50%	140%
Indeno(1,2,3-cd)pyrene		TW	< 0.20	< 0.20	NA	< 0.20	113%	50%	140%	76%	50%	140%	72%	50%	140%
Dibenz(a,h)anthracene		TW	< 0.20	< 0.20	NA	< 0.20	114%	50%	140%	83%	50%	140%	79%	50%	140%
Benzo(g,h,i)perylene		TW	< 0.20	< 0.20	NA	< 0.20	104%	50%	140%	78%	50%	140%	79%	50%	140%
2-and 1-methyl Naphthalene		TW	< 0.20	< 0.20	NA	< 0.20	112%	50%	140%	93%	50%	140%	94%	50%	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: _____



Quality Assurance

CLIENT NAME: GOLDR ASSOCIATES LTD
 PROJECT: 1670692
 SAMPLING SITE:

AGAT WORK ORDER: 17Z210954
 ATTENTION TO: Alyssa Troke
 SAMPLED BY:

Water Analysis															
RPT Date: May 09, 2017			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

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

Antimony	8361453		<1.0	<1.0	NA	< 1.0	98%	70%	130%	92%	80%	120%	91%	70%	130%
Arsenic	8361453		<1.0	<1.0	NA	< 1.0	104%	70%	130%	99%	80%	120%	105%	70%	130%
Barium	8361453		10.7	10.6	0.9%	< 2.0	100%	70%	130%	97%	80%	120%	89%	70%	130%
Beryllium	8361453		<0.5	<0.5	NA	< 0.5	101%	70%	130%	97%	80%	120%	99%	70%	130%
Boron	8361453		<10.0	<10.0	NA	< 10.0	105%	70%	130%	100%	80%	120%	104%	70%	130%
Cadmium	8361453		<0.2	<0.2	NA	< 0.2	104%	70%	130%	98%	80%	120%	97%	70%	130%
Chromium	8361453		<2.0	<2.0	NA	< 2.0	103%	70%	130%	100%	80%	120%	103%	70%	130%
Cobalt	8361453		<0.5	<0.5	NA	< 0.5	102%	70%	130%	95%	80%	120%	94%	70%	130%
Copper	8361453		1.8	1.8	NA	< 1.0	96%	70%	130%	95%	80%	120%	95%	70%	130%
Lead	8361453		<0.5	<0.5	NA	< 0.5	95%	70%	130%	92%	80%	120%	88%	70%	130%
Molybdenum	8361453		<0.5	<0.5	NA	< 0.5	105%	70%	130%	100%	80%	120%	106%	70%	130%
Nickel	8361453		1.5	1.5	NA	< 1.0	107%	70%	130%	102%	80%	120%	104%	70%	130%
Selenium	8361453		<1.0	<1.0	NA	< 1.0	107%	70%	130%	98%	80%	120%	114%	70%	130%
Silver	8361453		<0.2	<0.2	NA	< 0.2	103%	70%	130%	109%	80%	120%	109%	70%	130%
Thallium	8361453		<0.3	<0.3	NA	< 0.3	106%	70%	130%	104%	80%	120%	106%	70%	130%
Uranium	8361453		<0.5	<0.5	NA	< 0.5	102%	70%	130%	92%	80%	120%	91%	70%	130%
Vanadium	8361453		1.4	1.3	NA	< 0.4	103%	70%	130%	98%	80%	120%	104%	70%	130%
Zinc	8361453		<5.0	<5.0	NA	< 5.0	99%	70%	130%	104%	80%	120%	94%	70%	130%
Mercury	8357662		<0.02	<0.02	NA	< 0.02	104%	70%	130%	104%	80%	120%	97%	70%	130%
Chromium VI	8361277		<5	<5	NA	< 5	100%	70%	130%	102%	80%	120%	102%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL (Reporting Limit), 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: _____



Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z210954

PROJECT: 1670692

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/MS
Toluene	VOL-91-5010	MOE PHC E3421	(P&T)GC/MS
Ethylbenzene	VOL-91-5010	MOE PHC E3421	(P&T)GC/MS
Xylene Mixture	VOL-91-5010	MOE PHC E3421	(P&T)GC/MS
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
Terphenyl	VOL-91-5010		GC/FID

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z210954

PROJECT: 1670692

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
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



Laboratory Use Only

Work Order #: 172210954
Cooler Quantity: one-onice
Arrival Temperatures: 8.1 | 7.5 | 7.4
LT - 6.2 | 5.9 | 6.0
Custody Seal Intact: Yes No N/A
Notes:

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)

Report Information:

Company: Golder Associates
Contact: Alyssa Troke
Address: 1931 Robertson Road
Ottawa ON
Phone: 613 592 9600 Fax: 613 592 9600
Reports to be sent to:
1. Email: alyssa-troke@golder.com
2. Email: keith-holmes@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
 Regulation 558
 CCME
 Prov. Water Quality Objectives (PWQO)
 Other
Region: _____ Indicate One

Project Information:

Project: Je Cormier @ golder.com
Site Location: 1670692
Sampled By: J-Cormier
AGAT Quote #: _____ PO: _____
Please note: if quotation number is not provided, client will be billed full price for analysis.

Is this submission for a Record of Site Condition?

Yes No

Report Guideline on Certificate of Analysis

Yes No

Invoice Information:

Company: _____
Contact: _____
Address: _____
Email: _____
Bill To Same: Yes No

Sample Matrix Legend

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

Q/N	O, Reg 153																								
	Metals and Inorganics		Full Metals Scan		Regulation/Custom Metals		Nutrients		Volatiles		CCME Fractions 1 to 4		Sewer Use												
	All Metals	153 Metals (excl. Hydrides)	ORPs	pH	TP	NH ₄	TKN	NO ₃	NO ₂	VOC	BTEX	THM	ABNS	PAHs	PCBs	Organochlorine Pesticides	TCLP	M&I	VOCs	ABNS	B(a)P	PCBs			
Mw 17-07	X																								
Mw 01-2	X																								
Mw 17-04	X																								
Mw 17-02	X																								

Samples Relinquished By (Print Name and Sign): <u>Jen Cormier</u>	Date: <u>May 2, 2017</u>	Time: <u>15:04</u>	Samples Received By (Print Name and Sign): <u>Ubeathriet</u>	Date: <u>2 May 17</u>	Time: <u>15:07</u>
Samples Relinquished By (Print Name and Sign): <u>CPDS to FedEx</u>	Date: <u>2 May 17</u>	Time: <u>16:00</u>	Samples Received By (Print Name and Sign): <u>Shanmin</u>	Date: <u>May 3/17</u>	Time: <u>11:00 am</u>

Page 1 of 1
N#: T 041799

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

ATTENTION TO: Alyssa Troke

PROJECT: 1670692 - Taggart Phase II ESA

AGAT WORK ORDER: 17Z211435

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Coordinator

TRACE ORGANICS REVIEWED BY: Gyulhan Yalamova, Report Reviewer

DATE REPORTED: May 09, 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.



Certificate of Analysis

AGAT WORK ORDER: 17Z211435

PROJECT: 1670692 - Taggart Phase II ESA

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

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-03

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION: BH#17-03 SA#2		BH#17-03	BH#17-01	BH#17-01	BH#17-01
		Soil		SA#10	SA#17	SA#17	SA#24
		Soil		Soil	Soil	Soil	Soil
		DATE SAMPLED:	2017-05-02	2017-05-02	2017-05-02	2017-05-02	2017-05-02
		G / S	RDL	8358139	8358144	8358147	8358150
Antimony	µg/g		0.8	<0.8	<0.8	<0.8	<0.8
Arsenic	µg/g		1	3	<1	2	7
Barium	µg/g		2	197	17	188	176
Beryllium	µg/g		0.5	0.8	<0.5	0.6	0.6
Boron	µg/g		5	7	7	5	6
Boron (Hot Water Soluble)	µg/g		0.10	0.13	<0.10	0.31	0.32
Cadmium	µg/g		0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/g		2	52	6	49	75
Cobalt	µg/g		0.5	15.6	1.7	13.2	13.8
Copper	µg/g		1	29	5	22	32
Lead	µg/g		1	8	2	12	9
Molybdenum	µg/g		0.5	<0.5	0.6	0.5	1.1
Nickel	µg/g		1	33	3	29	40
Selenium	µg/g		0.4	<0.4	<0.4	<0.4	<0.4
Silver	µg/g		0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/g		0.4	<0.4	<0.4	<0.4	<0.4
Uranium	µg/g		0.5	0.9	<0.5	0.6	1.0
Vanadium	µg/g		1	69	8	54	64
Zinc	µg/g		5	90	7	83	73
Chromium VI	µg/g		0.2	<0.2	<0.2	<0.2	<0.2
Mercury	µg/g		0.10	<0.10	<0.10	<0.10	<0.10

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

Certified By:

Amanjot Bhela



Certificate of Analysis

AGAT WORK ORDER: 17Z211435

PROJECT: 1670692 - Taggart Phase II ESA

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

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-03

DATE REPORTED: 2017-05-09

SAMPLE DESCRIPTION: BH#17-07 SA#2 BH#17-04 SA#2

SAMPLE TYPE: Soil Soil

DATE SAMPLED: 2017-04-28 2017-04-26

Parameter	Unit	G / S	RDL	8358137	8358138
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.64	7.68
Electrical Conductivity	mS/cm		0.005	0.376	0.148
Sodium Adsorption Ratio	NA		NA	1.99	0.240

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8358137-8358138 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract obtained from 2:1 leaching procedure (2 parts extraction fluid:1 part wet soil).

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 17Z211435

PROJECT: 1670692 - Taggart Phase II ESA

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

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-03

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION: BH#17-03 SA#2		BH#17-03	BH#17-01	BH#17-01	BH#17-01	
		SA#10		SA#10	BH#17-01 SA#7	SA#17	SA#24	
		SAMPLE TYPE: Soil		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED: 2017-05-02		2017-05-02	2017-05-02	2017-05-02	2017-05-02	2017-05-02
	G / S	RDL	8358139	8358141	8358144	8358147	8358150	
Naphthalene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Acenaphthylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Acenaphthene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Fluorene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Phenanthrene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.05	
Anthracene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Fluoranthene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.06	
Pyrene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	0.05	
Benz(a)anthracene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Chrysene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo(b)fluoranthene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo(k)fluoranthene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo(a)pyrene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Indeno(1,2,3-cd)pyrene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Dibenz(a,h)anthracene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Benzo(g,h,i)perylene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
2-and 1-methyl Naphthalene	µg/g	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	
Moisture Content	%	0.1	21.0	17.5	25.1	26.6	15.5	
Surrogate	Unit	Acceptable Limits						
Chrysene-d12	%	50-140	54	62	55	58	71	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8358139-8358150 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:



Certificate of Analysis

AGAT WORK ORDER: 17Z211435

PROJECT: 1670692 - Taggart Phase II ESA

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

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-03

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION: BH#17-03 SA#2		BH#17-03	BH#17-01	BH#17-01	BH#17-01	
		SA#10		SA#10	BH#17-01 SA#7	SA#17	SA#24	
		SAMPLE TYPE: Soil		Soil	Soil	Soil	Soil	Soil
		DATE SAMPLED: 2017-05-02		2017-05-02	2017-05-02	2017-05-02	2017-05-02	2017-05-02
		G / S	RDL	8358139	8358141	8358144	8358150	
Benzene	µg/g		0.02	<0.02	<0.02	<0.02	<0.02	
Toluene	µg/g		0.08	<0.08	<0.08	<0.08	<0.08	
Ethylbenzene	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	
Xylene Mixture	µg/g		0.05	<0.05	<0.05	<0.05	<0.05	
F1 (C6 to C10)	µg/g		5	<5	<5	<5	<5	
F1 (C6 to C10) minus BTEX	µg/g		5	<5	<5	<5	<5	
F2 (C10 to C16)	µg/g		10	<10	<10	<10	<10	
F2 (C10 to C16) minus Naphthalene	µg/g		10	<10	<10	<10	<10	
F3 (C16 to C34)	µg/g		50	<50	<50	<50	65	
F3 (C16 to C34) minus PAHs	µg/g		50	<50	<50	<50	65	
F4 (C34 to C50)	µg/g		50	<50	<50	<50	<50	
Gravimetric Heavy Hydrocarbons	µg/g		50	NA	NA	NA	NA	
Moisture Content	%		0.1	21.0	17.5	25.1	26.6	
Surrogate	Unit	Acceptable Limits						
Terphenyl	%		60-140	65	81	119	102	

Comments: RDL - Reported Detection Limit; G / S - Guideline / Standard

8358139-8358150 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:



Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD
PROJECT: 1670692 - Taggart Phase II ESA
SAMPLING SITE:

AGAT WORK ORDER: 17Z211435
ATTENTION TO: Alyssa Troke
SAMPLED BY:

Soil Analysis															
RPT Date: May 09, 2017			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

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

pH, 2:1 CaCl2 Extraction	8354138		7.33	7.31	0.3%	NA	101%	90%	110%	NA			NA	
Electrical Conductivity	8358137	8358137	0.376	0.369	1.9%	< 0.005	96%	90%	110%	NA			NA	
Sodium Adsorption Ratio	8358137	8358137	1.99	2.01	1.0%	NA	NA			NA			NA	

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

Antimony	8354163		<0.8	<0.8	NA	< 0.8	90%	70%	130%	102%	80%	120%	80%	70%	130%
Arsenic	8354163		3	3	NA	< 1	108%	70%	130%	117%	80%	120%	106%	70%	130%
Barium	8354163		61	64	4.8%	< 2	99%	70%	130%	107%	80%	120%	95%	70%	130%
Beryllium	8354163		<0.5	<0.5	NA	< 0.5	92%	70%	130%	110%	80%	120%	105%	70%	130%
Boron	8354163		6	6	NA	< 5	81%	70%	130%	112%	80%	120%	114%	70%	130%
Boron (Hot Water Soluble)	8354163		<0.10	<0.10	NA	< 0.10	110%	60%	140%	100%	70%	130%	94%	60%	140%
Cadmium	8354163		<0.5	<0.5	NA	< 0.5	106%	70%	130%	103%	80%	120%	93%	70%	130%
Chromium	8354163		19	20	5.1%	< 2	99%	70%	130%	115%	80%	120%	122%	70%	130%
Cobalt	8354163		7.1	6.8	4.3%	< 0.5	93%	70%	130%	107%	80%	120%	96%	70%	130%
Copper	8354163		18	18	0.0%	< 1	91%	70%	130%	117%	80%	120%	86%	70%	130%
Lead	8354163		9	9	0.0%	< 1	101%	70%	130%	110%	80%	120%	96%	70%	130%
Molybdenum	8354163		0.6	0.6	NA	< 0.5	98%	70%	130%	106%	80%	120%	95%	70%	130%
Nickel	8354163		18	17	5.7%	< 1	94%	70%	130%	110%	80%	120%	98%	70%	130%
Selenium	8354163		<0.4	<0.4	NA	< 0.4	81%	70%	130%	108%	80%	120%	106%	70%	130%
Silver	8354163		<0.2	<0.2	NA	< 0.2	94%	70%	130%	119%	80%	120%	98%	70%	130%
Thallium	8354163		<0.4	<0.4	NA	< 0.4	105%	70%	130%	116%	80%	120%	97%	70%	130%
Uranium	8354163		<0.5	<0.5	NA	< 0.5	99%	70%	130%	107%	80%	120%	98%	70%	130%
Vanadium	8354163		26	27	3.8%	< 1	97%	70%	130%	108%	80%	120%	112%	70%	130%
Zinc	8354163		37	36	2.7%	< 5	98%	70%	130%	117%	80%	120%	96%	70%	130%
Chromium VI	8361170		<0.2	<0.2	NA	< 0.2	92%	70%	130%	102%	80%	120%	98%	70%	130%
Mercury	8354163		<0.10	<0.10	NA	< 0.10	100%	70%	130%	100%	80%	120%	105%	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

Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD
 PROJECT: 1670692 - Taggart Phase II ESA
 SAMPLING SITE:

AGAT WORK ORDER: 17Z211435
 ATTENTION TO: Alyssa Troke
 SAMPLED BY:

Trace Organics Analysis

RPT Date: May 09, 2017			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		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)															
Benzene	8365440		< 0.02	< 0.02	NA	< 0.02	79%	60%	130%	111%	60%	130%	115%	60%	130%
Toluene	8365440		< 0.08	< 0.08	NA	< 0.08	76%	60%	130%	118%	60%	130%	115%	60%	130%
Ethylbenzene	8365440		< 0.05	< 0.05	NA	< 0.05	76%	60%	130%	115%	60%	130%	113%	60%	130%
Xylene Mixture	8365440		< 0.05	< 0.05	NA	< 0.05	78%	60%	130%	114%	60%	130%	105%	60%	130%
F1 (C6 to C10)	8365440		< 5	< 5	NA	< 5	71%	60%	130%	88%	85%	115%	92%	70%	130%
F2 (C10 to C16)	8364406		< 10	< 10	NA	< 10	109%	60%	130%	80%	80%	120%	78%	70%	130%
F3 (C16 to C34)	8364406		< 50	< 50	NA	< 50	110%	60%	130%	81%	80%	120%	97%	70%	130%
F4 (C34 to C50)	8364406		< 50	< 50	NA	< 50	98%	60%	130%	101%	80%	120%	102%	70%	130%
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	90%	50%	140%	92%	50%	140%	91%	50%	140%
Acenaphthylene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	87%	50%	140%	88%	50%	140%
Acenaphthene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	97%	50%	140%	92%	50%	140%	92%	50%	140%
Fluorene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	98%	50%	140%	97%	50%	140%
Phenanthrene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	97%	50%	140%	101%	50%	140%	96%	50%	140%
Anthracene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	100%	50%	140%	107%	50%	140%	108%	50%	140%
Fluoranthene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	100%	50%	140%	106%	50%	140%
Pyrene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	100%	50%	140%	98%	50%	140%
Benz(a)anthracene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	98%	50%	140%	92%	50%	140%
Chrysene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	91%	50%	140%	84%	50%	140%
Benzo(b)fluoranthene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	121%	50%	140%	105%	50%	140%	97%	50%	140%
Benzo(k)fluoranthene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	94%	50%	140%	96%	50%	140%
Benzo(a)pyrene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	105%	50%	140%	103%	50%	140%
Indeno(1,2,3-cd)pyrene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	113%	50%	140%	76%	50%	140%	72%	50%	140%
Dibenz(a,h)anthracene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	114%	50%	140%	83%	50%	140%	79%	50%	140%
Benzo(g,h,i)perylene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	104%	50%	140%	78%	50%	140%	79%	50%	140%
2-and 1-methyl Naphthalene	8358141	8358141	< 0.05	< 0.05	NA	< 0.05	112%	50%	140%	93%	50%	140%	94%	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: _____





Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD
 PROJECT: 1670692 - Taggart Phase II ESA
 SAMPLING SITE:

AGAT WORK ORDER: 17Z211435
 ATTENTION TO: Alyssa Troke
 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
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
pH, 2:1 CaCl ₂ Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	pH METER
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z211435

PROJECT: 1670692 - Taggart Phase II 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
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	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009		GC/FID



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Laboratory Use Only

Work Order #: *17Z211485'*

Cooler Quantity: *one - on ice*
Arrival Temperatures: *4.3 | 4.1 | 4.0*

Custody Seal Intact: Yes No N/A
Notes: *S | S+ | 6²*

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)

Report Information:

Company: *Golden*
Contact: *Alyssa Troke / Keith Holmes*
Address: _____
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
 - Sewer Use
 - Sanitary
 - Storm
 - Regulation 558
 - CCME
 - Prov. Water Quality Objectives (PWQO)
 - Other
- Soil Texture (Check One) Coarse Fine
Region _____ Indicate One

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):

May 9/17 as per Jeff Jones

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

Project Information:

Project: *1670692 - Taggart Phase II ESA*
Site Location: _____
Sampled By: _____
AGAT Quote #: _____ PO: _____

Is this submission for a Record of Site Condition?

Yes No

Report Guideline on Certificate of Analysis

Yes No

Sample Matrix Legend

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

Invoice Information:

Bill To Same: Yes No

Company: _____
Contact: _____
Address: _____
Email: _____

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Metals and Inorganics	Metal Spec: <i>Reg 153 All Metals</i>	Hydride Forming Metals	Client Custom Metals	ORPs: <input type="checkbox"/> BAWs <input type="checkbox"/> Cl <input type="checkbox"/> CN <input type="checkbox"/> Cr ⁶⁺ <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO ₃ /NO ₂ <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH ₄ <input type="checkbox"/> TKN <input type="checkbox"/> NO ₃ <input type="checkbox"/> NO ₂ <input type="checkbox"/> NO _x	Volatiles: <input type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM	CCME Fractions 1 to 4 <i>1 BTEX</i>	ABNS	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	
<i>BH#17-07 SA#2</i>	<i>Apr. 28/17</i>		<i>1</i>	<i>S</i>																	
<i>BH#17-04 SA#2</i>	<i>Apr. 26/17</i>		<i>1</i>																		
<i>BH#17-03 SA#2</i>	<i>May 24/17</i>		<i>3</i>																		
<i>BH#17-03 SA#10</i>			<i>3</i>																		
<i>BH#17-01 SA#7</i>			<i>3</i>																		
<i>BH#17-01 SA#17</i>			<i>3</i>																		
<i>BH#17-01 SA#24</i>			<i>3</i>																		
<i>BH#17-01 SA#16</i>			<i>3</i>		<i>HOLD</i>																
<i>BH#17-01 SA#8</i>			<i>3</i>		<i>HOLD</i>																

Samples Relinquished By (Print Name and Sign): <i>Alyssa Troke Alyssa Troke</i>	Date: <i>May 3/17</i> Time: <i>2:30</i>	Samples Received By (Print Name and Sign): <i>Berthelet / [Signature]</i>	Date: <i>3-May-17</i> Time: <i>14h30</i>	Page <i>1</i> of <i>1</i>
Samples Relinquished By (Print Name and Sign): <i>UB/OO to Fed Ex</i>	Date: <i>3-May-17</i> Time: <i>16h00</i>	Samples Received By (Print Name and Sign): <i>Sima [Signature]</i>	Date: <i>17/5/17</i> Time: <i>10:47</i>	N#: T 018527

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

ATTENTION TO: Keith Holmes

PROJECT: 1670692

AGAT WORK ORDER: 17Z211874

TRACE ORGANICS REVIEWED BY: Gulhan Yalamova, Report Reviewer

WATER ANALYSIS REVIEWED BY: Parvathi Malemath, Data Reviewer

DATE REPORTED: May 09, 2017

PAGES (INCLUDING COVER): 11

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.



Certificate of Analysis

AGAT WORK ORDER: 17Z211874

PROJECT: 1670692

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

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE: 3930 Riverside Dr

ATTENTION TO: Keith Holmes

SAMPLED BY: S Barter

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

DATE RECEIVED: 2017-05-04

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION:		MW01-6	MW17-01	MW17-09	DUP-01
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2017-05-04	2017-05-04	2017-05-04	2017-05-04
		G / S	RDL	8361227	8361229	8361246	8361259
Naphthalene	µg/L	1400	0.20	<0.20	0.56	<0.20	<0.20
Acenaphthylene	µg/L	1.8	0.20	<0.20	<0.20	<0.20	<0.20
Acenaphthene	µg/L	600	0.20	<0.20	<0.20	<0.20	<0.20
Fluorene	µg/L	400	0.20	<0.20	<0.20	<0.20	<0.20
Phenanthrene	µg/L	580	0.10	<0.10	<0.10	<0.10	<0.10
Anthracene	µg/L	2.4	0.10	<0.10	<0.10	<0.10	<0.10
Fluoranthene	µg/L	130	0.20	<0.20	<0.20	<0.20	<0.20
Pyrene	µg/L	68	0.20	<0.20	<0.20	<0.20	<0.20
Benz(a)anthracene	µg/L	4.7	0.20	<0.20	<0.20	<0.20	<0.20
Chrysene	µg/L	1	0.10	<0.10	<0.10	<0.10	<0.10
Benzo(b)fluoranthene	µg/L	0.75	0.10	<0.10	<0.10	<0.10	<0.10
Benzo(k)fluoranthene	µg/L	0.4	0.10	<0.10	<0.10	<0.10	<0.10
Benzo(a)pyrene	µg/L	0.81	0.01	<0.01	<0.01	<0.01	<0.01
Indeno(1,2,3-cd)pyrene	µg/L	0.2	0.20	<0.20	<0.20	<0.20	<0.20
Dibenz(a,h)anthracene	µg/L	0.52	0.20	<0.20	<0.20	<0.20	<0.20
Benzo(g,h,i)perylene	µg/L	0.2	0.20	<0.20	<0.20	<0.20	<0.20
2-and 1-methyl Naphthalene	µg/L	1800	0.20	<0.20	0.24	<0.20	<0.20
Surrogate	Unit	Acceptable Limits					
Chrysene-d12	%	50-140		83	68	75	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

8361227-8361259 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:



Certificate of Analysis

AGAT WORK ORDER: 17Z211874

PROJECT: 1670692

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

CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE: 3930 Riverside Dr

ATTENTION TO: Keith Holmes

SAMPLED BY: S Barter

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

DATE RECEIVED: 2017-05-04

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION:		MW01-6	MW17-01	MW17-09	DUP-01
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2017-05-04	2017-05-04	2017-05-04	2017-05-04
		G / S	RDL	8361227	8361229	8361246	8361259
Benzene	µg/L	44	0.20	<0.20	0.24	<0.20	<0.20
Toluene	µg/L	18000	0.20	<0.20	0.61	<0.20	<0.20
Ethylbenzene	µg/L	2300	0.10	<0.10	<0.10	<0.10	<0.10
Xylene Mixture	µg/L	4200	0.20	<0.20	<0.20	<0.20	<0.20
F1 (C6 to C10)	µg/L	750	25	<25	<25	<25	<25
F1 (C6 to C10) minus BTEX	µg/L	750	25	<25	<25	<25	<25
F2 (C10 to C16)	µg/L	150	100	<100	<100	<100	<100
F2 (C10 to C16) minus Naphthalene	µg/L		100	<100	<100	<100	<100
F3 (C16 to C34)	µg/L	500	100	<100	<100	<100	<100
F3 (C16 to C34) minus PAHs	µg/L		100	<100	<100	<100	<100
F4 (C34 to C50)	µg/L	500	100	<100	<100	<100	<100
Gravimetric Heavy Hydrocarbons	µg/L	500	500	NA	NA	NA	NA
Surrogate	Unit	Acceptable Limits					
Terphenyl	%	60-140		94	86	74	60

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 17Z211874

PROJECT: 1670692

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

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Keith Holmes

SAMPLING SITE: 3930 Riverside Dr

SAMPLED BY: S Barter

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

DATE RECEIVED: 2017-05-04

DATE REPORTED: 2017-05-09

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

8361227 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.

8361229 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.

8361246-8361259 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.
Some sediment was observed in the sample. The whole bottle extraction was performed.

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 17Z211874

PROJECT: 1670692

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CLIENT NAME: GOLDER ASSOCIATES LTD

SAMPLING SITE: 3930 Riverside Dr

ATTENTION TO: Keith Holmes

SAMPLED BY: S Barter

O. Reg. 153(511) - PHCs F1/BTEX (Water)

DATE RECEIVED: 2017-05-04

DATE REPORTED: 2017-05-09

		SAMPLE DESCRIPTION: TRIP BLANK		
		SAMPLE TYPE: Water		
		DATE SAMPLED: 2017-05-04		
Parameter	Unit	G / S	RDL	8361267
Benzene	µg/L	44	0.20	<0.20
Toluene	µg/L	18000	0.20	<0.20
Ethylbenzene	µg/L	2300	0.10	<0.10
Xylene Mixture	µg/L	4200	0.20	<0.20
F1 (C6 to C10)	µg/L	750	25	<25
F1 (C6 to C10) minus BTEX	µg/L	750	25	<25

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
8361267 The C6-C10 fraction is calculated using Toluene response factor.
Total C6-C10 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.
Extraction and holding times were met for this sample.
NA = Not Applicable

Certified By:



Certificate of Analysis

AGAT WORK ORDER: 17Z211874

PROJECT: 1670692

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CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Keith Holmes

SAMPLING SITE: 3930 Riverside Dr

SAMPLED BY: S Barter

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

DATE RECEIVED: 2017-05-04

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION:		MW01-6	MW17-01	MW17-09	DUP-01
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2017-05-04	2017-05-04	2017-05-04	2017-05-04
		G / S	RDL	8361227	8361229	8361246	8361259
Antimony	µg/L	20000	1.0	<1.0	<1.0	<1.0	<1.0
Arsenic	µg/L	1900	1.0	<1.0	2.1	<1.0	<1.0
Barium	µg/L	29000	2.0	140	57.3	252	246
Beryllium	µg/L	67	0.5	<0.5	<0.5	<0.5	<0.5
Boron	µg/L	45000	10.0	17.1	32.4	28.3	26.9
Cadmium	µg/L	2.7	0.2	<0.2	<0.2	<0.2	<0.2
Chromium	µg/L	810	2.0	2.8	<2.0	<2.0	<2.0
Cobalt	µg/L	66	0.5	<0.5	0.6	0.9	0.9
Copper	µg/L	87	1.0	<1.0	<1.0	1.2	1.2
Lead	µg/L	25	0.5	<0.5	<0.5	<0.5	<0.5
Molybdenum	µg/L	9200	0.5	1.9	22.3	0.8	0.8
Nickel	µg/L	490	1.0	<1.0	<1.0	<1.0	<1.0
Selenium	µg/L	63	1.0	<1.0	<1.0	<1.0	<1.0
Silver	µg/L	1.5	0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/L	510	0.3	<0.3	<0.3	<0.3	<0.3
Uranium	µg/L	420	0.5	1.7	2.6	1.0	1.0
Vanadium	µg/L	250	0.4	<0.4	3.6	0.9	1.0
Zinc	µg/L	1100	5.0	<5.0	<5.0	5.5	<5.0
Mercury	µg/L	0.29	0.02	<0.02	<0.02	<0.02	<0.02
Chromium VI	µg/L	140	5	<5	<5	<5	<5

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

Certified By:



Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD
 PROJECT: 1670692
 SAMPLING SITE: 3930 Riverside Dr

AGAT WORK ORDER: 17Z211874
 ATTENTION TO: Keith Holmes
 SAMPLED BY: S Barter

Trace Organics Analysis

RPT Date: May 09, 2017			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		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)															
Benzene	8361229	8361229	0.24	0.23	NA	< 0.20	80%	50%	140%	83%	60%	130%	99%	50%	140%
Toluene	8361229	8361229	0.61	0.63	NA	< 0.20	80%	50%	140%	81%	60%	130%	96%	50%	140%
Ethylbenzene	8361229	8361229	< 0.10	< 0.10	NA	< 0.10	80%	50%	140%	83%	60%	130%	94%	50%	140%
Xylene Mixture	8361229	8361229	< 0.20	< 0.20	NA	< 0.20	83%	50%	140%	91%	60%	130%	100%	50%	140%
F1 (C6 to C10)	8361229	8361229	< 25	< 25	NA	< 25	77%	60%	140%	78%	60%	140%	82%	60%	140%
F2 (C10 to C16)		TW	< 100	< 100	NA	< 100	106%	60%	140%	62%	60%	140%	75%	60%	140%
F3 (C16 to C34)		TW	< 100	< 100	NA	< 100	106%	60%	140%	80%	60%	140%	82%	60%	140%
F4 (C34 to C50)		TW	< 100	< 100	NA	< 100	87%	60%	140%	80%	60%	140%	85%	60%	140%
O. Reg. 153(511) - PAHs (Water)															
Naphthalene		TW	< 0.20	< 0.20	NA	< 0.20	90%	50%	140%	92%	50%	140%	91%	50%	140%
Acenaphthylene		TW	< 0.20	< 0.20	NA	< 0.20	95%	50%	140%	87%	50%	140%	88%	50%	140%
Acenaphthene		TW	< 0.20	< 0.20	NA	< 0.20	97%	50%	140%	92%	50%	140%	92%	50%	140%
Fluorene		TW	< 0.20	< 0.20	NA	< 0.20	102%	50%	140%	98%	50%	140%	97%	50%	140%
Phenanthrene		TW	< 0.10	< 0.10	NA	< 0.10	97%	50%	140%	101%	50%	140%	96%	50%	140%
Anthracene		TW	< 0.10	< 0.10	NA	< 0.10	100%	50%	140%	107%	50%	140%	108%	50%	140%
Fluoranthene		TW	< 0.20	< 0.20	NA	< 0.20	102%	50%	140%	100%	50%	140%	106%	50%	140%
Pyrene		TW	< 0.20	< 0.20	NA	< 0.20	101%	50%	140%	100%	50%	140%	98%	50%	140%
Benz(a)anthracene		TW	< 0.20	< 0.20	NA	< 0.20	101%	50%	140%	98%	50%	140%	92%	50%	140%
Chrysene		TW	< 0.10	< 0.10	NA	< 0.10	96%	50%	140%	91%	50%	140%	84%	50%	140%
Benzo(b)fluoranthene		TW	< 0.10	< 0.10	NA	< 0.10	121%	50%	140%	105%	50%	140%	97%	50%	140%
Benzo(k)fluoranthene		TW	< 0.10	< 0.10	NA	< 0.10	102%	50%	140%	94%	50%	140%	96%	50%	140%
Benzo(a)pyrene		TW	< 0.01	< 0.01	NA	< 0.01	110%	50%	140%	105%	50%	140%	103%	50%	140%
Indeno(1,2,3-cd)pyrene		TW	< 0.20	< 0.20	NA	< 0.20	113%	50%	140%	76%	50%	140%	72%	50%	140%
Dibenz(a,h)anthracene		TW	< 0.20	< 0.20	NA	< 0.20	114%	50%	140%	83%	50%	140%	79%	50%	140%
Benzo(g,h,i)perylene		TW	< 0.20	< 0.20	NA	< 0.20	104%	50%	140%	78%	50%	140%	79%	50%	140%
2-and 1-methyl Naphthalene		TW	< 0.20	< 0.20	NA	< 0.20	112%	50%	140%	93%	50%	140%	94%	50%	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: _____



Quality Assurance

CLIENT NAME: GOLDER ASSOCIATES LTD
 PROJECT: 1670692
 SAMPLING SITE: 3930 Riverside Dr

AGAT WORK ORDER: 17Z211874
 ATTENTION TO: Keith Holmes
 SAMPLED BY: S Barter

Water Analysis															
RPT Date: May 09, 2017			DUPLICATE				Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE	
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Measured Value		Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

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

Antimony	8361227	8361227	<1.0	<1.0	NA	< 1.0	98%	70%	130%	97%	80%	120%	101%	70%	130%
Arsenic	8361227	8361227	<1.0	<1.0	NA	< 1.0	102%	70%	130%	100%	80%	120%	104%	70%	130%
Barium	8361227	8361227	140	135	3.6%	< 2.0	101%	70%	130%	99%	80%	120%	101%	70%	130%
Beryllium	8361227	8361227	<0.5	<0.5	NA	< 0.5	98%	70%	130%	100%	80%	120%	104%	70%	130%
Boron	8361227	8361227	17.1	16.9	NA	< 10.0	102%	70%	130%	100%	80%	120%	99%	70%	130%
Cadmium	8361227	8361227	<0.2	<0.2	NA	< 0.2	100%	70%	130%	98%	80%	120%	97%	70%	130%
Chromium	8361227	8361227	2.8	2.7	NA	< 2.0	100%	70%	130%	102%	80%	120%	98%	70%	130%
Cobalt	8361227	8361227	<0.5	<0.5	NA	< 0.5	99%	70%	130%	99%	80%	120%	94%	70%	130%
Copper	8361227	8361227	<1.0	<1.0	NA	< 1.0	100%	70%	130%	102%	80%	120%	92%	70%	130%
Lead	8361227	8361227	<0.5	<0.5	NA	< 0.5	101%	70%	130%	101%	80%	120%	98%	70%	130%
Molybdenum	8361227	8361227	1.9	2.2	NA	< 0.5	97%	70%	130%	97%	80%	120%	102%	70%	130%
Nickel	8361227	8361227	<1.0	<1.0	NA	< 1.0	99%	70%	130%	101%	80%	120%	93%	70%	130%
Selenium	8361227	8361227	<1.0	<1.0	NA	< 1.0	104%	70%	130%	103%	80%	120%	108%	70%	130%
Silver	8361227	8361227	<0.2	<0.2	NA	< 0.2	100%	70%	130%	108%	80%	120%	97%	70%	130%
Thallium	8361227	8361227	<0.3	<0.3	NA	< 0.3	103%	70%	130%	100%	80%	120%	97%	70%	130%
Uranium	8361227	8361227	1.7	1.8	NA	< 0.5	99%	70%	130%	98%	80%	120%	102%	70%	130%
Vanadium	8361227	8361227	<0.4	<0.4	NA	< 0.4	100%	70%	130%	101%	80%	120%	101%	70%	130%
Zinc	8361227	8361227	<5.0	<5.0	NA	< 5.0	100%	70%	130%	100%	80%	120%	98%	70%	130%
Mercury	8361227	8361227	<0.02	<0.02	NA	< 0.02	103%	70%	130%	100%	80%	120%	101%	70%	130%
Chromium VI	8361229	8361229	<5	<5	NA	< 5	100%	70%	130%	102%	80%	120%	102%	70%	130%

Comments: NA signifies Not Applicable.

Duplicate Qualifier: As the measured result approaches the RL (Reporting Limit), 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: _____



Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z211874

PROJECT: 1670692

ATTENTION TO: Keith Holmes

SAMPLING SITE: 3930 Riverside Dr

SAMPLED BY: S Barter

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/MS
Toluene	VOL-91-5010	MOE PHC E3421	(P&T)GC/MS
Ethylbenzene	VOL-91-5010	MOE PHC E3421	(P&T)GC/MS
Xylene Mixture	VOL-91-5010	MOE PHC E3421	(P&T)GC/MS
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
Terphenyl	VOL-91-5010		GC/FID
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



Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD
 PROJECT: 1670692
 SAMPLING SITE: 3930 Riverside Dr

AGAT WORK ORDER: 17Z211874
 ATTENTION TO: Keith Holmes
 SAMPLED BY: S Barter

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Water Analysis			
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

1614

5835 Coopers Avenue
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Laboratory Use Only

Work Order #: 177211874

Cooler Quantity: one - on ice
Arrival Temperatures: 15.1 15.3 14.8
17.7 17.4 17.7

Custody Seal Intact: Yes No N/A
Notes:

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)

Report Information:

Company: Golder Associates Ltd.
Contact: Alysa Trohe
Address: 1931 ROBERTSON RD
OTTAWA, ON
Phone: 613-592-9600 Fax: 613-592-9601
Reports to be sent to:
1. Email: atrohe@golder.com
2. Email: khalmey@golder.com

Regulatory Requirements:

No Regulatory Requirement
(Please check all applicable boxes)
 Regulation 153/04
Table 3
 Ind/Com
 Res/Park
 Agriculture
 Sewer Use
 Sanitary
 Storm
 Regulation 558
 CCME
 Prov. Water Quality Objectives (PWQO)
 Other
Soil Texture (Check One) Coarse Fine
Region _____ Indicate One

Project Information:

Project: 1670692
Site Location: 3930 RIVERSIDE DR.
Sampled By: S. BARTER
AGAT Quote #: _____ PO: _____
Please note: If quotation number is not provided, client will be billed full price for analysis.

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

Invoice Information:

Company: _____
Contact: _____
Address: _____
Email: _____
Bill To Same: Yes No

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, Cr (Please Circle)	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	ORPs: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cl <input type="checkbox"/> CN <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO ₃ /NO ₂ <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR	Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH ₃ <input type="checkbox"/> TKN <input type="checkbox"/> NO ₃ <input type="checkbox"/> NO ₂ <input type="checkbox"/> NO _x	Volatiles: <input type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM	CCME Fractions 1 to 4	ABNS	PAHS	Chlorophenols	PCBS	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use	H ₂ <input type="checkbox"/> Cr <input type="checkbox"/> Metals		
MW01-6	MAY 4	11:00	8	GW	SAMPLES CONTAIN	Y									X		X						X	X	X
MW17-01		12:30	8	GW	SEDIMENT	Y									X		X						X	X	X
MW17-09		13:30	8	GW		Y									X		X						X	X	X
DUP-01		13:30	8	GW		Y									X		X						X	X	X
TRIP BLANK			3	W		N									X										

Samples Relinquished By (Print Name and Sign): <u>SHEILA BARTER</u>	Date: <u>MAY 4, 17</u> Time: <u>14:30</u>	Samples Received By (Print Name and Sign): <u>Berthelet</u>	Date: <u>4-May-17</u> Time: <u>14h30</u>
Samples Relinquished By (Print Name and Sign): <u>U/S</u>	Date: <u>4 May-17</u> Time: <u>16h00</u>	Samples Received By (Print Name and Sign): <u>Shaumin</u>	Date: <u>may 5/17</u> Time: <u>8:55am</u>
Samples Relinquished By (Print Name and Sign):	Date:	Samples Received By (Print Name and Sign):	Date:

Page 1 of 1
N#: **T 033133**

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

ATTENTION TO: Keith Holmes; Alyssa Troke

PROJECT: 1670692

AGAT WORK ORDER: 17Z211882

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Coordinator

TRACE ORGANICS REVIEWED BY: Neli Popnikolova, Senior Chemist

DATE REPORTED: May 09, 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.



Certificate of Analysis

AGAT WORK ORDER: 17Z211882

PROJECT: 1670692

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

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Keith Holmes; Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-04

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION:		17-05 SA2	17-09 SA1	17-07 SA11	17-07 SA12
		SAMPLE TYPE:		Soil	Soil	Soil	Soil
		DATE SAMPLED:		2017-05-03	2017-05-03	2017-04-28	2017-04-28
		G / S	RDL	8361207	8361208	8361212	8361217
Boron	µg/g	120	5	5	<5	<5	<5
Barium	µg/g	390	2	197	112	20	24
Beryllium	µg/g	4	0.5	0.6	<0.5	<0.5	<0.5
Cadmium	µg/g	1.2	0.5	<0.5	<0.5	<0.5	<0.5
Chromium	µg/g	160	2	68	35	5	6
Cobalt	µg/g	22	0.5	15.1	9.0	1.6	1.9
Copper	µg/g	140	1	35	19	4	5
Lead	µg/g	120	1	6	6	1	2
Molybdenum	µg/g	6.9	0.5	0.6	0.5	<0.5	<0.5
Nickel	µg/g	100	1	38	21	3	3
Silver	µg/g	20	0.2	<0.2	<0.2	<0.2	<0.2
Thallium	µg/g	1	0.4	<0.4	<0.4	<0.4	<0.4
Uranium	µg/g	23	0.5	1.2	0.8	<0.5	<0.5
Vanadium	µg/g	86	1	65	39	10	12
Zinc	µg/g	340	5	84	50	7	8

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



Certificate of Analysis

AGAT WORK ORDER: 17Z211882

PROJECT: 1670692

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

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Keith Holmes; Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-04

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION:		DATE SAMPLED:	
		G / S	RDL	8361207	8361208
		17-05 SA2	17-09 SA1	2017-05-03	2017-05-03
		Soil	Soil		
pH, 2:1 CaCl ₂ Extraction	pH Units	NA	7.63	7.26	
Electrical Conductivity	mS/cm	0.7	0.005	0.265	0.112
Sodium Adsorption Ratio	NA	5	NA	0.356	0.089

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

8361207-8361208 EC & SAR were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl₂ extract obtained from 2:1 leaching procedure (2 parts extraction fluid:1 part wet soil).

Certified By:

Amanjot Bhela



Certificate of Analysis

AGAT WORK ORDER: 17Z211882

PROJECT: 1670692

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

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Keith Holmes; Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-04

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION:		17-05 SA2	17-09 SA1	17-07 SA11	17-07 SA12
		G / S	RDL	8361207	8361208	8361212	8361217
Naphthalene	µg/g	0.6	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
Acenaphthene	µg/g	7.9	0.05	<0.05	<0.05	<0.05	<0.05
Fluorene	µg/g	62	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
Anthracene	µg/g	0.67	0.05	<0.05	<0.05	<0.05	<0.05
Fluoranthene	µg/g	0.69	0.05	<0.05	<0.05	<0.05	<0.05
Pyrene	µg/g	78	0.05	<0.05	<0.05	<0.05	<0.05
Benz(a)anthracene	µg/g	0.5	0.05	<0.05	<0.05	<0.05	<0.05
Chrysene	µg/g	7	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
Benzo(k)fluoranthene	µg/g	0.78	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
Indeno(1,2,3-cd)pyrene	µg/g	0.38	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
Benzo(g,h,i)perylene	µg/g	6.6	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
Surrogate	Unit	Acceptable Limits					
Chrysene-d12	%	50-140	74	81	70	72	

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

8361207-8361217 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:



Certificate of Analysis

AGAT WORK ORDER: 17Z211882

PROJECT: 1670692

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

CLIENT NAME: GOLDER ASSOCIATES LTD

ATTENTION TO: Keith Holmes; Alyssa Troke

SAMPLING SITE:

SAMPLED BY:

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

DATE RECEIVED: 2017-05-04

DATE REPORTED: 2017-05-09

Parameter	Unit	SAMPLE DESCRIPTION:		17-05 SA2	17-09 SA1	17-07 SA11	17-07 SA12
		G / S	RDL	8361207	8361208	8361212	8361217
Benzene	µg/g	0.21	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
Ethylbenzene	µg/g	2	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
F1 (C6 to C10)	µg/g	55	5	<5	<5	<5	<5
F1 (C6 to C10) minus BTEX	µg/g	55	5	<5	<5	<5	<5
F2 (C10 to C16)	µg/g	98	10	<10	<10	<10	<10
F2 (C10 to C16) minus Naphthalene	µg/g		10	<10	<10	<10	<10
F3 (C16 to C34)	µg/g	300	50	<50	<50	<50	<50
F3 (C16 to C34) minus PAHs	µg/g		50	<50	<50	<50	<50
F4 (C34 to C50)	µg/g	2800	50	<50	<50	<50	<50
Gravimetric Heavy Hydrocarbons	µg/g	2800	50	NA	NA	NA	NA
Moisture Content	%		0.1	27.4	14.0	18.2	20.2
Surrogate	Unit	Acceptable Limits					
Terphenyl	%	60-140		83	79	75	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

8361207-8361217

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:

Quality Assurance

 CLIENT NAME: GOLDER ASSOCIATES LTD
 PROJECT: 1670692
 SAMPLING SITE:

 AGAT WORK ORDER: 17Z211882
 ATTENTION TO: Keith Holmes; Alyssa Troke
 SAMPLED BY:

Soil Analysis															
RPT Date: May 09, 2017			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE		MATRIX SPIKE			
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper

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

Boron	8369441	<5	<5	NA	< 5	78%	70%	130%	100%	80%	120%	82%	70%	130%
Barium	8369441	62	59	5.0%	< 2	103%	70%	130%	99%	80%	120%	102%	70%	130%
Beryllium	8369441	<0.5	<0.5	NA	< 0.5	101%	70%	130%	103%	80%	120%	91%	70%	130%
Cadmium	8369441	<0.5	<0.5	NA	< 0.5	105%	70%	130%	101%	80%	120%	112%	70%	130%
Chromium	8369441	11	10	9.5%	< 2	100%	70%	130%	101%	80%	120%	107%	70%	130%
Cobalt	8369441	4.5	5.2	14.4%	< 0.5	95%	70%	130%	103%	80%	120%	100%	70%	130%
Copper	8369441	11	10	9.5%	< 1	99%	70%	130%	109%	80%	120%	102%	70%	130%
Lead	8369441	6	6	0.0%	< 1	103%	70%	130%	103%	80%	120%	104%	70%	130%
Molybdenum	8369441	<0.5	<0.5	NA	< 0.5	103%	70%	130%	99%	80%	120%	106%	70%	130%
Nickel	8369441	8	10	22.2%	< 1	97%	70%	130%	103%	80%	120%	101%	70%	130%
Silver	8369441	<0.2	<0.2	NA	< 0.2	98%	70%	130%	94%	80%	120%	96%	70%	130%
Thallium	8369441	<0.4	<0.4	NA	< 0.4	108%	70%	130%	97%	80%	120%	98%	70%	130%
Uranium	8369441	0.5	<0.5	NA	< 0.5	111%	70%	130%	98%	80%	120%	101%	70%	130%
Vanadium	8369441	19	18	5.4%	< 1	104%	70%	130%	101%	80%	120%	103%	70%	130%
Zinc	8369441	27	27	0.0%	< 5	104%	70%	130%	113%	80%	120%	120%	70%	130%

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

pH, 2:1 CaCl ₂ Extraction	8365451	7.32	7.31	0.1%	NA	100%	90%	110%	NA				NA	
Electrical Conductivity	8369441	0.237	0.242	2.1%	< 0.005	95%	90%	110%	NA				NA	
Sodium Adsorption Ratio	8369441	0.759	0.793	4.4%	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:



Quality Assurance

 CLIENT NAME: GOLDR ASSOCIATES LTD
 PROJECT: 1670692
 SAMPLING SITE:

 AGAT WORK ORDER: 17Z211882
 ATTENTION TO: Keith Holmes; Alyssa Troke
 SAMPLED BY:

Trace Organics Analysis

RPT Date: May 09, 2017			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		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)															
Benzene	8365440		< 0.02	< 0.02	NA	< 0.02	79%	60%	130%	111%	60%	130%	115%	60%	130%
Toluene	8365440		< 0.08	< 0.08	NA	< 0.08	76%	60%	130%	118%	60%	130%	115%	60%	130%
Ethylbenzene	8365440		< 0.05	< 0.05	NA	< 0.05	76%	60%	130%	115%	60%	130%	113%	60%	130%
Xylene Mixture	8365440		< 0.05	< 0.05	NA	< 0.05	78%	60%	130%	114%	60%	130%	105%	60%	130%
F1 (C6 to C10)	8365440		< 5	< 5	NA	< 5	71%	60%	130%	88%	85%	115%	92%	70%	130%
F2 (C10 to C16)	8364406		< 10	< 10	NA	< 10	109%	60%	130%	80%	80%	120%	78%	70%	130%
F3 (C16 to C34)	8364406		< 50	< 50	NA	< 50	110%	60%	130%	81%	80%	120%	97%	70%	130%
F4 (C34 to C50)	8364406		< 50	< 50	NA	< 50	98%	60%	130%	101%	80%	120%	102%	70%	130%
O. Reg. 153(511) - PAHs (Soil)															
Naphthalene	8358141		< 0.05	< 0.05	NA	< 0.05	90%	50%	140%	92%	50%	140%	91%	50%	140%
Acenaphthylene	8358141		< 0.05	< 0.05	NA	< 0.05	95%	50%	140%	87%	50%	140%	88%	50%	140%
Acenaphthene	8358141		< 0.05	< 0.05	NA	< 0.05	97%	50%	140%	92%	50%	140%	92%	50%	140%
Fluorene	8358141		< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	98%	50%	140%	97%	50%	140%
Phenanthrene	8358141		< 0.05	< 0.05	NA	< 0.05	97%	50%	140%	101%	50%	140%	96%	50%	140%
Anthracene	8358141		< 0.05	< 0.05	NA	< 0.05	100%	50%	140%	107%	50%	140%	108%	50%	140%
Fluoranthene	8358141		< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	100%	50%	140%	106%	50%	140%
Pyrene	8358141		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	100%	50%	140%	98%	50%	140%
Benz(a)anthracene	8358141		< 0.05	< 0.05	NA	< 0.05	101%	50%	140%	98%	50%	140%	92%	50%	140%
Chrysene	8358141		< 0.05	< 0.05	NA	< 0.05	96%	50%	140%	91%	50%	140%	84%	50%	140%
Benzo(b)fluoranthene	8358141		< 0.05	< 0.05	NA	< 0.05	121%	50%	140%	105%	50%	140%	97%	50%	140%
Benzo(k)fluoranthene	8358141		< 0.05	< 0.05	NA	< 0.05	102%	50%	140%	94%	50%	140%	96%	50%	140%
Benzo(a)pyrene	8358141		< 0.05	< 0.05	NA	< 0.05	110%	50%	140%	105%	50%	140%	103%	50%	140%
Indeno(1,2,3-cd)pyrene	8358141		< 0.05	< 0.05	NA	< 0.05	113%	50%	140%	76%	50%	140%	72%	50%	140%
Dibenz(a,h)anthracene	8358141		< 0.05	< 0.05	NA	< 0.05	114%	50%	140%	83%	50%	140%	79%	50%	140%
Benzo(g,h,i)perylene	8358141		< 0.05	< 0.05	NA	< 0.05	104%	50%	140%	78%	50%	140%	79%	50%	140%
2-and 1-methyl Naphthalene	8358141		< 0.05	< 0.05	NA	< 0.05	112%	50%	140%	93%	50%	140%	94%	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: _____





Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD
PROJECT: 1670692
SAMPLING SITE:

AGAT WORK ORDER: 17Z211882
ATTENTION TO: Keith Holmes; Alyssa Troke
SAMPLED BY:

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
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
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
pH, 2:1 CaCl ₂ Extraction	INOR-93-6031	MSA part 3 & SM 4500-H+ B	pH METER
Electrical Conductivity	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER
Sodium Adsorption Ratio	INOR-93-6007	McKeague 4.12 & 3.26 & EPA SW-846 6010C	ICP/OES

Method Summary

CLIENT NAME: GOLDER ASSOCIATES LTD

AGAT WORK ORDER: 17Z211882

PROJECT: 1670692

ATTENTION TO: Keith Holmes; 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	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	BALANCE
Moisture Content	VOL-91-5009	CCME Tier 1 Method	BALANCE
Terphenyl	VOL-91-5009		GC/FID



AGAT Laboratories

Ubbie

Small blue

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)

Report Information:

Company: Golder
Contact: Keith Holmes
Address: _____
Phone: 592-9600 Fax: 592-9601
Reports to be sent to:
1. Email: kholmes@golder.com
2. Email: atroke@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

Laboratory Use Only

Work Order #: 172211882
Cooler Quantity: one-on ice
Arrival Temperatures: 4.2 | 3.8 | 4.1
LT-3.8 | 3.7 | 3.2
Custody Seal Intact: Yes No N/A
Notes: _____

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: 1670692
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	Metals and Inorganics	Metal Scan	Hydride Forming Metals	Client Custom Metals	(Check Applicable)	CCME Fractions 1 to 4	ABNS	PAHs	Chlorophenols	PCBs	Organochlorine Pesticides	TCLP Metals/Inorganics	Sewer Use					
17-05 SA7	05/05/17	12:00	3	S						ORP: <input type="checkbox"/> B-HWS <input type="checkbox"/> Cr <input type="checkbox"/> CN <input type="checkbox"/> Cu <input type="checkbox"/> EC <input type="checkbox"/> FOC <input type="checkbox"/> NO ₃ /NO ₂ <input type="checkbox"/> Total N <input type="checkbox"/> Hg <input type="checkbox"/> pH <input type="checkbox"/> SAR Nutrients: <input type="checkbox"/> TP <input type="checkbox"/> NH ₃ <input type="checkbox"/> TKN <input type="checkbox"/> NO ₃ <input type="checkbox"/> NO ₂ <input type="checkbox"/> NO ₂ /NO ₃ Volatiles: <input type="checkbox"/> VOC <input type="checkbox"/> BTEX <input type="checkbox"/> THM													
17-09 SA1	05/05/17	12:00	3	S																			
17-07 SA11	28/04/17	17:00	3	S																			
17-07 SA12	28/04/17	12:00	3	S																			

Metals and Inorganics
Metal Scan 153 Combiote

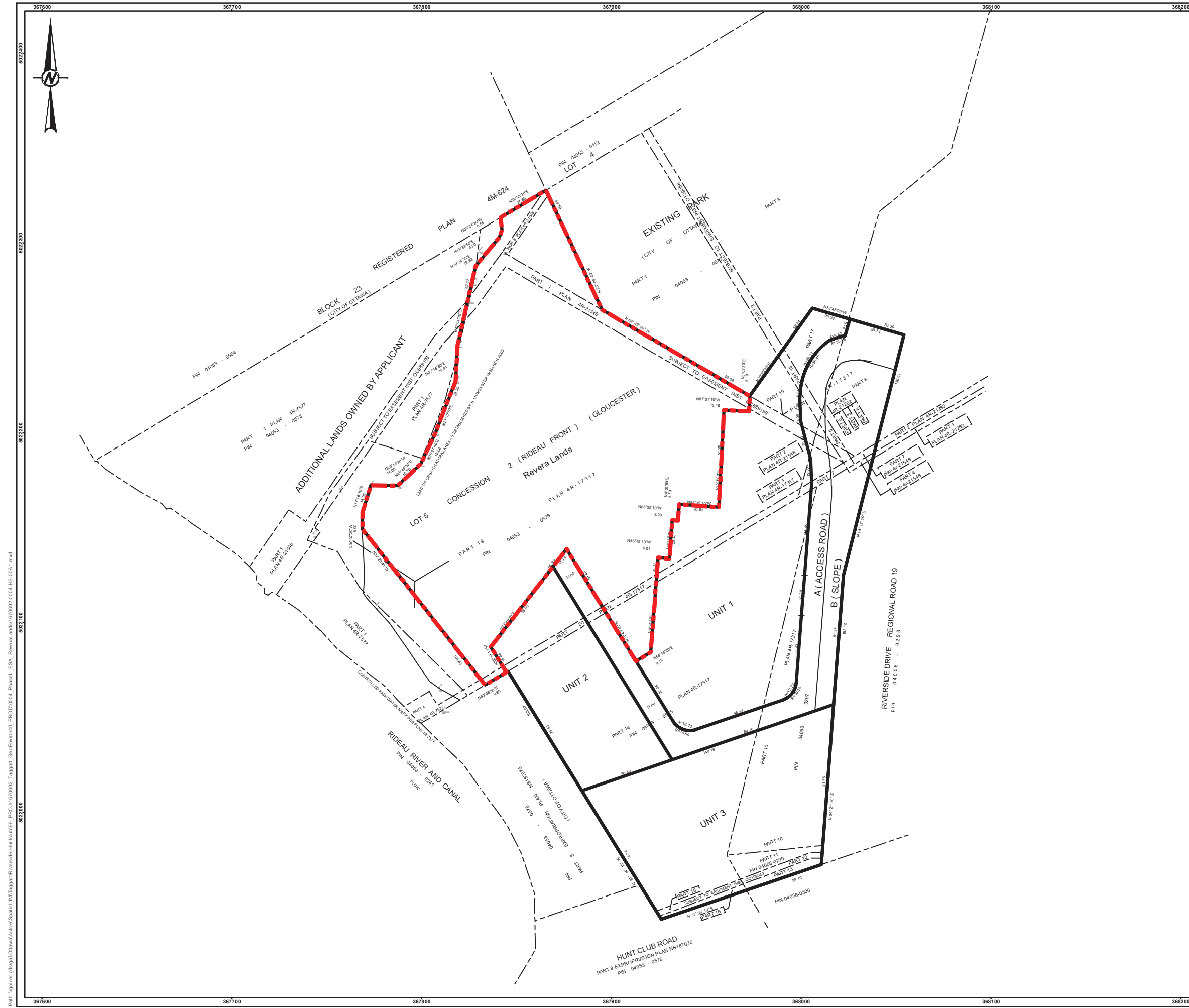
Sewer Use
XX PH, EC, SAR

Samples Relinquished By (Print Name and Sign): <u>Keith Holmes</u>	Date: <u>4/6/17</u>	Time: <u>3:00</u>	Samples Received By (Print Name and Sign): <u>CS/HD</u>	Date: <u>4 May 17/SHO</u>	Time: <u>8:40a</u>	Page <u>1</u> of <u>1</u>
Samples Relinquished By (Print Name and Sign): <u>CS/HD</u>	Date: <u>4 May 17</u>	Time: <u>16:00</u>	Samples Received By (Print Name and Sign): <u>sharmin & may 5 17</u>	Date: <u>4 May 17</u>	Time: <u>8:40a</u>	Nº: T 018593



APPENDIX A (iv)

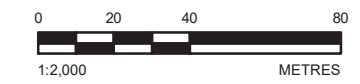
Plan of Survey



LEGEND
 APPROXIMATE PHASE TWO PROPERTY AND RSC BOUNDARY

NOTE(S)
 1. THIS FIGURE IS TO BE READ IN CONJUNCTION WITH THE ACCOMPANYING GOLDER ASSOCIATES LTD. REPORT NO. 1670692.

REFERENCE(S)
 1. PROJECTION: TRANSVERSE MERCATOR, DATUM: NAD 83,
 COORDINATE SYSTEM: MTM ZONE 9, VERTICAL DATUM: CGVD28



CLIENT
 REVERA INC.

PROJECT
 PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
 PART OF 3930 RIVERSIDE DRIVE, OTTAWA, ONTARIO

TITLE
SURVEY PLAN

CONSULTANT	YYYY-MM-DD	2017-10-18
DESIGNED	---	
PREPARED	JEM	
REVIEWED	AT	
APPROVED	KPH	

PROJECT NO. 1670692 CONTROL 0004 REV. 0 APPENDIX A

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IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM 29mm

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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