Phase Two Environmental Site Assessment
4190, 4200, 4210, 4236 Fallowfield Road and 2740 Cedarview Road, Ottawa, Ontario

Client:
DCR Phoenix Group of Companies
18 Bentley Avenue
Ottawa, Ontario K2E 6T8

Project Number:
OTT-00243143-B0

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Date Submitted:
April 10, 2018

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Legal Notification

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Executive Summary

EXP Services Inc. (EXP) was retained by DCR Phoenix Group of Companies to conduct a Phase Two Environmental Site Assessment (ESA) of the property located at 4190, 4200, 4210, 4236 Fallowfield Road and 2740 Cedarview Road in Ottawa, Ontario hereinafter referred to as the 'Site'. The objective of the Phase Two ESA was to address areas of potential environmental concern (APEC) identified in a Phase I ESA conducted at the Site by EXP. It is understood that this report is required as part of the permitting process with the City of Ottawa and Infrastructure Ontario. We understand that a Record of Site Condition (RSC) is not required.

The findings of a Phase One ESA were presented in a report entitled *Phase One Environmental Site Assessment,* 4190, 4200, 4210, 4236 Fallowfield Road and 2740 Cedarview Road*, Ottawa, Ontario* dated March 29, 2018. The Phase One ESA identified the following APECs:

Table EX.1: Areas of Potential Environmental Concern

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
APEC 1	Across all of site	PCA#30 – Importation of Fill Material of Unknown Quality	On-Site	Petroleum Hydrocarbons (PHCs), Benzene, Toluene, Ethylbenzene and Xylene (BTEX), and metals	Soil
APEC 2	Northeast part	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs, BTEX	Soil and groundwater
APEC 3	Central north part	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs, BTEX	Soil
APEC 4	Southeast part	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs, BTEX	Soil

Based on the Phase One ESA findings, EXP recommended conducting a Phase Two ESA at the Site. The Phase Two ESA consisted of advancing boreholes (BH17-1 to BH17-3, BH 4 – BH 7, and BH18-4 to BH18-11) and completing some of them with standpipes and groundwater monitoring wells. Soil and groundwater

samples were collected and submitted for laboratory analysis of one or more of the following parameters: metals, BTEX and/or PHC.

For assessment purposes, EXP selected the Site Condition Standards (SCS), provided in Table 3 of *Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act*, Ministry of the Environment (MOE), 2011 for residential land use at a site with fine textured soil in accordance with Ontario Regulation 153/04 (as amended).

Based on the Phase Two ESA results, the following summary is provided:

- Below the topsoil in most boreholes except in Borehole No. 3 where there was no topsoil, fill was encountered to a maximum depth of 1.0 m. Fill was not encountered in BH18-6, BH18-8 to BH18-10. The fill consisted of a mixture of brown to grey silty sand and silty clay to sand and gravel. No odours were observed in the fill material. Pieces of asphalt and concrete were found in the 0.5 m of fill in BH18-11. A 0.4 m to 0.7 m thick layer of silty sand was found under the topsoil at BH18-6 and BH18-9. The fill was underlain by glacial till which extends to a maximum depth of 5.3 m depth in Borehole No. 3. The till contains numerous cobbles and boulders and extended to the bedrock surface. There were no indications of impact to the native soil. There were no indications of impact to the fill material or native soil.
- Auger refusal was met in each of the boreholes from 1.9 m in the northeast corner of the site to 5.3 m in the southwest part of the site. The limestone bedrock was cored at BH3, BH18-7A, and BH18-10. Groundwater was encountered at a depth of 2.32 m bgs in MW18-9 to 5.53 m bgs in MW18-10. No petroleum sheens were observed in the monitoring wells during either sampling event. Based on the groundwater level measurements, the groundwater flow in the area of the boreholes is to the southwest.
- All of the soil and groundwater samples had concentrations of metals, PHC and/or BTEX that were less than the 2011 Ontario Ministry of Environment and Climate Change Table 3 site condition standards. No additional work is recommended to address the APECs identified in the previous Phase One ESA.
- If the wells are no longer needed, they should be decommissioned in accordance with Ontario Regulation 903.

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1 Introduction

EXP Services Inc. (EXP) was retained by DCR Phoenix Group of Companies to conduct a Phase Two Environmental Site Assessment (ESA) of the property located at 4190, 4200, 4210, 4236 Fallowfield Road and 2740 Cedarview Road in Ottawa, Ontario, hereinafter referred to as the 'Site'. The objective of the Phase Two ESA was to address areas of potential environmental concern (APEC) identified in a Phase One ESA conducted at the Site by EXP. It is understood that this report is required as part of the permitting process with the City of Ottawa and Infrastructure Ontario. We understand that a Record of Site Condition (RSC) is not required.

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

1.1 Site Description

The site has an area of approximately 2.43 hectares and is occupied four (4) residential structures and associated outbuildings with construction dates estimated between the early 1900's and 1960's. It is located at the southwest corner of Fallowfield Road and Cedarview Road in Ottawa as shown on Figure 1 in Appendix B. At the time of the investigation, the five parcels were owned by different parties.

The following describes each of the properties:

- 4190 Fallowfield Road: City of Ottawa PIN is 044670009 and legally described as CON 4 RF PT LOT 20 RP;4R13732 PART 1, City of Ottawa, occupied by a single family residence;
- 4200 Fallowfield Road: City of Ottawa PIN is 044670007 and legally described as CON 4RF PT LOT 20 PCL 3, City of Ottawa, occupied by a single family residence;
- 4210 Fallowfield Road: City of Ottawa PIN is 044670048 and legally described as CON 4 RF PT LT 20 RP4D-82; PARTS 1 AND 5, vacant and undeveloped;
- 4236 Fallowfield Road: City of Ottawa PIN is 044670292 and is legally described as CON 4RF PT LOT 20 RP 4R7681; PART 2 LESS 4R20148, occupied by a single family residence and several sheds and a barn; and,
- 2740 Cedarview Road: City of Ottawa PIN is 044670010 and legally described as CON 4RF PT LOT 20, City of Ottawa), occupied by a single family residence.

The properties are privately serviced with regards to sewage. All the residential houses have or previous had domestic water wells, however, the residence at 4190 Fallowfield Road has municipal water.

The local groundwater flow direction is unknown, although based on regional topography, groundwater flow is anticipated to be southwest. The closest body of water is the Jock River, located approximately 3 km south of the Site. Regional groundwater flow direction is inferred to be in the south direction towards the Jock River.

The approximate Universal Transverse Mercator (UTM) coordinates for the Site centroid is NAD83, Zone 18, 438732.3 m E, 5014084.2 m N. The UTM coordinates were based on an estimate derived using Google Earth™. The accuracy of the centroid is estimated to range from 5 to 50 m.

1.2 Current and Proposed Future Uses

At the time of the Phase Two ESA investigation, four of the five parcels were used for residential purposes with the fifth parcel being vacant. A site plan is included in Appendix B.

1.3 Applicable Site Condition Standards

Analytical results obtained for Site soil and groundwater samples were assessed against Site Condition Standards (SCS) as established under subsection 169.4(1) of the Environmental Protection Act, and presented in the document Ontario Ministry of Environment and Climate Change MOECC "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the *Environmental Protection Act*", ("SGWS" Standards), (MOE, 2011a). Tabulated background SCS (Table 1) applicable to environmentally sensitive Sites and effects based generic SCS (Tables 2 to 9) applicable to non-environmentally sensitive Sites are provided in MOE (2011a). The effects based SCS (Tables 2 to 9) are protective of human health and the environment for different groundwater conditions (potable and non-potable), land use scenarios (residential, parkland, institutional, commercial, industrial, community and agricultural/other), soil texture (coarse or medium/fine) and restoration depth (full or stratified).

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

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

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

For assessment purposes, EXP selected the MOE (2011) Table 2: Full Depth Generic Site Condition Standards (SCS) in a potable groundwater condition for a residential property use and coarse textured soil. The selection of this category was based on the following factors:

- The predominant soil type on the Site was considered to be coarse textured (refer to the results of the 6 grain size analyses as provided in Appendix A);
- There was no intention to carry out a stratified restoration at the Site;
- More than two-thirds of the Site has an overburden thickness greater than 2 m;

- The Site is not located within 30 m of a surface water body or an area of natural significance, and,
- The soil at the Site has a pH value between 5 and 9 for surficial soils; and, between 5 and 11 for subsurface soils.
- The property is not within an area of natural significance; does not include, nor is it adjacent to an area of natural significance, nor is it part of such an area; and, it does not include land that is within 30 m of an area of natural significance, nor is it part of such an area.
- Part of the Site is serviced by the City of Ottawa's water distribution system, however water wells were identified within the Site.
- The Site used for residential purposes, and will be residential in the future.

2 Background Information

2.1 Physical Setting

The site has an area of approximately 2.43 hectares and is occupied four (4) residential structures and associated outbuildings with construction dates estimated between the early 1900's and 1960's. It is located at the southwest corner of Fallowfield Road and Cedarview Road in Ottawa as shown on Figure 1 in Appendix B.

The site was occupied by four residences and one vacant parcel of land in the central part. The property is partly serviced by the City of Ottawa with regards to potable water, with two of the four parcels using private water wells. All of the parcels have private sewage systems.

A Preliminary Geotechnical Investigation by EXP determined that the site is underlain by a thin layer of topsoil (0.1 m), followed by fill (up to 0.8 m) which is underlain by progressively coarser glacial till to a maximum depth of 5.3 m.

The local groundwater flow direction is unknown, although based on regional topography, groundwater flow is anticipated to be southwest. The closest body of water is the Jock River, located approximately 3 km south of the Site. Regional groundwater flow direction is inferred to be in the south direction towards the Jock River.

2.2 Past Investigations

The findings of a Phase One ESA were presented in a report entitled *Phase One Environmental Site Assessment* as 4190, 4200, 4210, 4236 Fallowfield Road and 2740 Cedarview Road*, Ottawa, Ontario* dated March 29, 2018. The Phase One ESA identified the following APECs:

Table EX.1: Areas of Potential Environmental Concern

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
APEC 1	Across all of site	PCA#30 – Importation of Fill Material of Unknown Quality	On-Site	Petroleum Hydrocarbons (PHCs), Benzene, Toluene, Ethylbenzene and Xylene (BTEX), and metals	Soil
APEC 2	Northeast part	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs, BTEX	Soil and groundwater

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
APEC 3	Central north part	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs, BTEX	Soil
APEC 4	Southeast part	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs, BTEX	Soil

Based on the results of the Phase One ESA, EXP recommended that a Phase Two ESA be completed to assess the soil and groundwater quality at the Site.

3 Scope of the Investigation

3.1 Overview of Site Investigation

The purpose of the Phase Two ESA was to investigate the soil and groundwater quality at the Site and to obtain soil and groundwater data to characterize conditions in the surficial fill/shallow overburden soils.

It is understood that the site is to be re-developed with a residential land use. As part of the permitting process, the City of Ottawa requires that a Phase Two ESA be completed in accordance with Ontario Regulation 153/04 (as amended).

3.2 Scope of Work

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

- Request local utility locating companies (e.g., cable, telephone, gas, hydro) to mark any underground utilities present at the subject site;
- Retain a private utility locating company to mark any underground utilities present in the vicinity of the borehole locations and to clear the individual borehole locations;
- Advance a total of fifteen (15) boreholes and complete seven (7) with standpipes and one with a monitoring well;
- Attempt to collect representative soil samples for chemical analysis of PHC, BTEX, and metals;
- Attempt to collect representative groundwater samples for chemical analysis of PHC, BTEX, and/or metals;
- Measure groundwater levels in the monitoring wells;
- Complete a survey of the monitoring well locations relative to a geodetic or other permanent benchmark and in reference with the Universal Transverse Mercator (UTM) coordinate system for vertical and horizontal control; and
- Review the analytical data and prepare a report of the findings.

Jeff O.Banion conducted assessment work for this project and was supervised by Daniel Clarke P. Eng. and Mark McCalla, P.Geo., QP_{ESA}. Mark McCalla is a qualified person as defined by O. Reg. 153/04.

3.3 Media Investigated

The Phase Two ESA included the investigation of on-Site soil and groundwater. As there are no water bodies on the Site, no surface water or sediment sampling was required.

The potential contaminants of concern (PCOCs) identified in EXP's (2018) Phase One ESA were identified as target parameters for this Phase Two ESA. The areas of potential environmental concern (APEC) and PCOCs identified in the Phase One ESA are outlined in Table 3.1.

The rationale for the selection of borehole and monitoring well locations during this investigation are to place them at the APECs to assess the soil and groundwater conditions. A copy of the Sampling and Analysis Plan prepared for the site is provided in Appendix A.

3.4 Phase One ESA Conceptual Site Model

In order to develop a conceptual model for the subject site and surrounding study area, the following physical characteristics and pathways were considered.

3.4.1 Current and Past Uses

Based on a review of historical aerial photographs, chain of title for the property, historical maps, and other records review, it appears that the Site was developed as residential and commercial in the 1900s.

3.4.2 Summary of Potentially Contaminating Activities

As per Ontario Regulation (O.Reg.) 153/04, a Potential Contaminating Activity (PCA) is defined as one of fifty-nine (59) industrial operations set out in Table 2 of Schedule D that occurs or has occurred in a Phase One study area. The following PCAs were identified:

- PCA1 – Fill quality across the site. (PCA#30 – Importation of Fill Material of Unknown Quality).
- PCA2 – Possible former On-Site heating oil UST at 4190 Fallowfield Road. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks).
- PCA3 – On-Site heating oil AST located in basement at 4200 Fallowfield Road. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks). No evidence of impact was observed within the basement. Only possible minor spillage at fill pipe may have occurred.
- PCA4 –On-Site heating oil AST located in basement at 2740 Cedarview Road. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks). No evidence of impact was observed within the basement. Only possible minor spillage at fill pipe may have occurred.

Potentially contaminating activities that took place within the vicinity of the Site (approximately 250 m radius) include:

- PCA5 – Off-Site heating oil AST located in basement at 4192 Fallowfield Road. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks). This PCA is included in areas on the subject site that are addressed in the APECs listed below.

3.4.3 Areas of Potential Environmental Concern

As a result of the PCAs, the report identified the following APECs at the Site:

- APEC 1 – (entire Site) Potentially contaminated fill material. This APEC is associated with PCA4. The PCOCs include BTEX and PHC, and metals.
- APEC 2 – (northeast part of Site) Potentially contaminated soil and groundwater. This APEC is associated with PCA1. The potential contaminants of concern (PCOC) include PHC and BTEX. APEC 2 also includes area from PCA5.
- APEC 3 – (central north part of Site) Potentially contaminated soil and groundwater. This APEC is associated with PCA2. No evidence of impact was observed within the basement, possible minor spillage at fill pipe may have occurred therefore, soil was assessed near the fill pipe location. The PCOCs include BTEX and PHC. APEC 3 also includes area from PCA5.
- APEC 4 – (southeast part of Site) Potentially contaminated soil and groundwater. This APEC is associated with PCA3. No evidence of impact was observed within the basement, possible minor spillage at fill pipe may have occurred therefore, soil was assessed near the fill pipe location. The PCOCs include BTEX and PHC.

It is noted that any significant uncertainty or absence of information has the ability to affect the Phase One Conceptual Site Model. However, based on the information and findings presented within the Phase One ESA, it is EXP's opinion that any uncertainty would be minimal, and it would not alter the validity of the model presented above.

3.4.4 Topography and Geology

The local groundwater flow direction is unknown, although based on regional topography, groundwater flow is anticipated to be southwest. The closest body of water is the Jock River, located approximately 3 km south of the Site. Regional groundwater flow direction is inferred to be in the south direction towards the Jock River. A Preliminary Geotechnical Investigation by EXP determined that the site is underlain by a thin layer of topsoil (0.1 m), followed by fill (up to 0.8 m) which is underlain by progressively coarser glacial till to a maximum depth of 5.3 m.

3.4.5 Estimated Groundwater Flow Direction

The local groundwater flow direction is unknown, although based on regional topography, groundwater flow is anticipated to be southwest.

3.4.6 Underground Utilities

Currently, the only underground utilities are water and sewage (septic tank and bed). Electricity and telephone services were overhead.

3.5 Deviations from Sampling and Analysis Plan

The field investigative and sampling program was carried out following the requirements of the Site Sampling and Analysis Plan (SAAP in Appendix A). No significant deviations from the Sampling and Analysis Plan were reported that affected the sampling and data quality objectives for the Site. There was insufficient water in the standpipes to collect groundwater samples and monitoring well BH4 was dry.

3.6 Impediments

No physical impediments were encountered during the field investigation. The entire property was accessible at the time of the investigation.

4 Investigation Method

4.1 General

The Site investigative activities consisted of the drilling of boreholes to facilitate the collection of soil samples for chemical analysis and the installation of monitoring wells for hydrogeological property characterization and the collection of groundwater samples for chemical analysis.

4.2 Borehole Drilling

Prior to the commencement of drilling, the locations of underground public utilities including telephone, natural gas and electrical lines were marked at the Site by locating companies. A private utility locating contractor was also retained to clear the individual borehole locations.

On October 23, 2017, three boreholes (BH17-1 to BH17-3) were advanced at the Site using a CME-55 track mounted drill rig equipped with continuous flight hollow-stem augers under the full-time supervision of EXP staff. Standpipes were installed in the boreholes as part of a concurrent Geotechnical Investigation. A 19 mm diameter standpipe was installed in the overburden in BH1. Bedrock was cored in BH3 and a standpipe was installed within the bedrock at this location.

On November 20, 2017, four boreholes were completed (BH 4 – BH 7) using a direct push hollow tube sampler with plastic sleeves to drill the borehole and collect the soil samples. One monitoring well was installed (BH4). The boreholes were drilled at the fuel supply lines and the potential underground storage tank at 4190 Fallowfield Road. Borehole BH 4 and BH 5 were drilled to refusal at 2.52 mbgs (metres below ground surface), BH 6 and BH 7 were drilled to a depth of 0.9 and 1.5 mbgs.

On March 17, 2018, seven boreholes (BH18-4 to BH18-11) were drilled as part of a concurrent Geotechnical Investigation. Bedrock was cored in BH18-7 and BH18-10. Standpipes were installed in (BH18-4, BH18-8 to BH18-11). The locations of the boreholes and monitoring wells are presented on Figure 3 in Appendix B.

No petroleum-based greases or solvents were used during drilling activities. EXP staff continuously monitored the drilling activities and recorded the depth of soil sample collection and total depth of boring. Field observations are summarized on the borehole logs provided in Appendix C.

The core barrels were decontaminated between sampling intervals by the drilling contractor using a potable water/phosphate-free detergent solution followed by rinses with potable water.

4.3 Soil Sampling

The soil sampling during the completion of this Phase Two ESA was undertaken in general accordance with the SAAP presented in Appendix A.

Soil samples for geologic characterization were collected on a continuous basis in the overburden materials using 5 cm diameter, 0.6 m long split spoon samplers and 1.5 m long, lined tube samplers advanced into the subsurface using a pneumatic hammer. The soil cores were removed from the samplers upon retrieval by drilling personnel. Geologic details of the recovered cores were logged by EXP field staff. EXP staff continuously monitored the drilling activities to log the stratigraphy observed from the recovered soil cores, to record the depth of soil sample collection, to record total depths of borings, and to record visual or olfactory observations of potential impacts. Field observations are summarized on the borehole logs provided in Appendix C.

Soil samples identified for possible laboratory analysis were collected from the split-spoon sampler and placed directly into pre-cleaned, laboratory-supplied glass sample jars/vials. Samples to be analysed for PHC fraction F1 and BTEX were collected using a soil core sampler and placed in to vials containing methanol as a preservative. The jars and vials were sealed with Teflon-lined lids to minimize head-space and reduce the potential for induced volatilization during storage/transport prior to analysis. All soil samples were placed in clean coolers containing ice prior to and during transportation to the subcontract laboratory, Paracel Laboratories Ltd. (Paracel) of Ottawa, Ontario. Soil samples were also submitted to Maxxam Analytics Inc. in the fall of 2017. The samples were transported/submitted within 24 hours of collection to Paracel following chain of custody protocols for chemical analysis.

4.4 Field Screening Measurements

The remaining portion of each soil sample was placed in a sealed Ziploc plastic bag and allowed to reach ambient temperature prior to field screening with a combustible vapour meter (RKI Eagle model) calibrated to hexane gas prior to use. The field screening measurements were made by inserting the instrument's probe into the plastic bag while manipulating the sample to ensure volatilization of the soil gases. These 'headspace' readings provide a real-time indication of the relative concentration of combustible vapours encountered in the subsurface during drilling and are used to aid in the assessment of the vertical and horizontal extent of potential impacts and the selection of soil samples for analysis. The field screening measurements, in parts per million (ppm) hexane equivalents, are presented with the borehole logs provided in Appendix C.

4.5 Soil Sample Submission

Soil samples were selected for laboratory analysis based on combustible vapour measurements and visual and olfactory evidence of impacts, where observed. A total of four soil samples were selected from BH-1 and BH-2 (two from the fill material and two from the underlying native material). Four additional worst case soil samples plus one duplicate were selected from BH 4 to BH 7. The samples were submitted to a certified laboratory for analysis of petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene and xylene (BTEX), and/or metals. Three soil samples were also submitted for grain size analysis and pH.

4.6 Groundwater: Monitoring Well Installation

Groundwater monitoring wells were installed in borehole BH 4. The monitoring well was installed in general accordance with the Ontario Water Resources Act - R.R.O. 1990, Regulation 903 (as-amended).

The monitoring well consisted of a 1.5 m length of 31 mm diameter Schedule 40 PVC screen and an appropriate length of PVC riser pipe. The annular space around the well was backfilled with sand to an average height of 0.3 m above the top of the screen. A bentonite seal was added from the top of the sand pack to approximately 0.3 m below ground surface. The monitoring well was completed with flush mount protector at the ground surface. Details of the monitoring well installation is shown on the Borehole Logs provided in Appendix C.

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

4.7 Groundwater: Field Measurement of Water Quality Parameters

The static water level was measured and the depth of the well and standpipe was recorded. There was no water in the well so the well was not sampled. EXP used an interface probe to measure the possible presence of light non-aqueous phase liquid (LNAPL) in the monitoring well.

4.8 Groundwater: Sampling

Groundwater samples were not collected from the monitoring well on November 23, 2017 since monitoring well (BH4) was dry. On March 27, 2018, a groundwater sample was collected from BH18-4. The remaining monitoring well and standpipes were dry or had insufficient groundwater to collect samples.

4.9 Sediment: Sampling

As no water body was present at the Site, sediment sampling was not part of the Phase Two ESA.

4.10 Analytical Testing

The contracted laboratory selected to perform chemical analysis on all soil and water samples were Maxxam Analytics Inc. in the fall of 2017 and Paracel Laboratories Ltd. in March 2018 Paracel and Maxxam are accredited laboratories under the Standards Council of Canada/Canadian Association for Laboratory Accreditation in accordance with ISO/IEC 17025:1999- *General Requirements for the Competence of Testing and Calibration Laboratories*.

4.11 Elevation Survey

An elevation survey was conducted to obtain vertical control of the borehole and monitoring well locations. The top of casing and ground surface elevation of each monitoring well location was surveyed using a high precision GPS unit relative to mean sea level.

4.12 Residue Management

The minor amount of drill cuttings were spread around the ground surface near the borehole locations.

Due to the low flow sampling method, purged water from groundwater sampling was stored in a pail. Since there were no visual or olfactory evidence of impact, the water was disposed of on the grass at the Site.

4.13 Quality Assurance and Quality Control Measures

A QA/QC program was also implemented to ensure that the analytical results received are accurate and dependable. A QA/QC program is a system of documented checks that validate the reliability of the data collected regarding any given Site. Quality Assurance is a system that ensures that quality control procedures are correctly performed and documented. Quality Control refers to the established procedures observed both in the field and in the laboratory, designed to ensure that the resulting end data meet intended quality objectives. The QA/QC program implemented by EXP incorporated the following components:

- Collection and analysis of blind duplicate soil samples to ensure analytical precision;
- Using dedicated and/or disposal sampling equipment;
- Following proper decontamination protocols to minimize cross-contamination;

- Maintaining field notes and completing field forms to document on-Site activities; and,
- Using only laboratory supplied sample containers and following prescribed sample protocols, including proper preservation, meeting sample hold times, proper chain of custody documentation, to ensure integrity of the samples.

Paracel's QA/QC program involved the systematic analysis of control standards for the purpose of optimizing the measuring system as well as establishing system precision and accuracy and included calibration standards, method blanks, reference standards, spiked samples, surrogates and duplicates.

5 Review and Evaluation

5.1 Geology

The detailed soil profiles encountered in the borehole are provided on the attached borehole logs (Appendix C). Boundaries of soils indicated on the logs are intended to reflect transition zones for the purpose of environmental assessment and should not be interpreted as exact planes of geological change. A brief description of the soil stratigraphy at the Site, in order of depth, is summarized in the following sections. The interpreted Site geology is shown on the enclosed cross section (Figures 5A and 5B, Appendix B).

5.1.1 Fill Material

Below the topsoil in most boreholes except in Borehole No. 3 where there was no topsoil, fill was encountered to a maximum depth of 1.0 m. Fill was not encountered in BH18-6, BH18-8 to BH18-10. The fill consisted of a mixture of brown to grey silty sand and silty clay to sand and gravel. No odours were observed in the fill material. Pieces of asphalt and concrete were found in the 0.5 m of fill in BH18-11.

5.1.2 Native Material

A 0.4 m to 0.7 m thick layer of silty sand was found under the topsoil at BH18-6 and BH18-9. The fill was underlain by glacial till which extends to a maximum depth of 5.3 m depth in Borehole No. 3. The till contains numerous cobbles and boulders and extended to the bedrock surface. There were no indications of impact to the native soil.

The results of the six grain-size analyses performed on selected samples of the glacial till are shown on the grain size distribution curves in Appendix A. Based on the results of the grain size analysis, the glacial till may be described as a silty gravelly sand till. The grain size analyses showed that less than 50% of the soil had a grain size of silt or finer. This indicates that the native soil is coarse grained. The results of the grain size analyses are found in Appendix E.

5.1.3 Bedrock

Auger refusal was met in each of the boreholes from 1.9 m in the northeast corner of the site to 5.3 m in the southwest part of the site. The limestone bedrock was cored at BH3, BH18-7A, and BH18-10.

5.2 Aquifers

In the Ottawa area, the regional aquifers consist of both bedrock and overburden sources, with the two key aquifers consisting of the highly weathered and fractured portion of the upper bedrock surface and overlying sand and gravel deposits (contact zone aquifer) and deeper bedrock aquifers.

In southeastern Ontario, there are four main bedrock aquifers (Singer et al., 2003):

- Nepean-March-Oxford Aquifer
- Rockcliffe Aquifer
- Ottawa Group Aquifer
- Billing-Carlsbad-Queenston Aquifer

In the vicinity of the Site, the primary bedrock aquifer is the Ottawa Group. This aquifer is considered to have good water yielding capacity with generally fair to good water quality (RRCA and SNCA, 2008).

The contact zone aquifer, which generally includes the sand and gravel deposits and underlying fractured bedrock, is present across the Ottawa region, with more than 90% of the water extracted in eastern Ontario is extracted from the Contact Zone Aquifer (RRCA and SNCA, 2008). The contact zone aquifer varies in thickness across the region due to the large variation in the zone of upper bedrock fracturing.

Regional groundwater flow in the area have been interpreted to be to the south towards the Jock River, generally following the topography.

Recharge of aquifers regionally is limited due to the confining silty clay layer resulting from the former Champlain Sea. It has been estimated that only 10% of precipitation that falls in the Ottawa region infiltrates into the ground to recharge the aquifers, with the remainder of the precipitation being lost to evapotranspiration or runoff to rivers and lakes (City of Ottawa, 2011).

5.3 Groundwater: Elevations and Flow Direction

The monitoring well network advanced as part of this Phase Two ESA consists of one (1) monitoring well (BH 4) and seven (7) standpipes screened within the geologic overburden and shallow fractured bedrock at the Site.

Groundwater elevations and water levels were measured at the Site on March 27, 2018. Groundwater was encountered at a depth of 2.32 m bgs in MW18-9 to 5.53 m bgs in MW18-10. No petroleum sheens were observed in the monitoring wells during either sampling event.

A summary of the elevation survey and groundwater levels for each well are shown on Table 5.1.

Table 5.1: Groundwater Elevations

Monitoring Well ID	Top of Well Casing (m)	March 27, 2018	
		Water Level (mbtoc)	Water Level (MASL)
BH17-1	103.07	1.31	101.76
BH17-3	102.20	2.06	100.14
BH4	104.25	Dry ()	<101.85
BH18-4	105.30	2.86	102.44
BH-7A	102.39	0.43	101.96
BH18-8	102.53	2.76	99.77
BH18-9	103.01	1.52	101.58
BH18-10	102.80	Dry (<5.53)	<97.27
BH18-11	102.06	2.70	99.36

Note: Elevations were collected using a high precision GPS unit with an geodetic elevation relative to mean sea level.
mbtoc – metres below top of plastic well casing
mASL – metres above sea level
NA – not applicable

Based on the groundwater level measurements, the groundwater flow in the area of the boreholes is to the southwest as shown on Figure 4 in Appendix B. EXP notes that the groundwater flow direction and levels

can be influenced by utility trenches and other subsurface structures and may migrate in the bedding stone of nearby subsurface utility trenches.

5.4 Groundwater: Hydraulic Gradients

Horizontal hydraulic gradients were estimated for the groundwater flow components identified in the overburden aquifer (i.e. southwest flow) based on the March 2018 groundwater elevations.

The horizontal hydraulic gradient, between each monitoring well pair, is calculated using the following equation:

$$i = \Delta h/\Delta s$$

Where,
i = horizontal hydraulic gradient;
Δh (m) = groundwater elevation difference; and,
Δs (m) = separation distance.

The horizontal hydraulic gradient, based on the groundwater elevations, is estimated to average about 0.029 m/m. The maximum horizontal gradient was 0.065 and was found in the west part of the Site. The minimum horizontal gradient was 0.005 and was found in the east central part of the Site.

5.5 Groundwater: Hydraulic Conductivity

The horizontal hydraulic conductivity in the overburden unit was estimated from the analysis of the soil types observed during the drilling activities and from a review of the grain size analysis. The majority of the native soils consisted of silty gravelly sand till. Based on estimates provided by *Freeze and Cherry (1979)* the approximate horizontal hydraulic conductivity for silt and fine sand is 10^{-7} m/s to 10^{-5} m/s.

5.6 Soil Texture

Based on the grain size analysis of the soil sample, the soil texture at the water table at the Site was assessed to be coarse textured (refer to the results in Appendix E). Therefore, the soil texture is coarse grained.

5.7 Soil: Field Screening

Inspection of the soil cores retrieved from the boreholes did not indicate the presence of sheen, the presence of a separate organic phase, or other evidence of a non-aqueous phase liquid (NAPL) either in the surficial fill or overburden soil materials. No petroleum staining or odours were observed in any of the soil samples.

5.8 Soil Quality

In accordance with the scope of work, chemical analyses were performed on selected soil samples recovered from the boreholes. The selection of representative “worst case” soil samples from each borehole was based on field visual or olfactory evidence of impacts and/or presence of potential water bearing zones. Summaries of the soil analytical results from are found in Appendix D. Copies of the laboratory Certificates of Analysis for the tested soil samples are provided in Appendix E.

The MOECC Table 3 SCS are applicable if soil pH is in the range of 5 to 11 for subsurface soil (greater than 1.5 m below soil surface). The Certificates of Analysis includes a pH measurement taken from the subsurface. Four soil samples were submitted for pH analysis with results of 7.75 to 8.34. The pH values are within the acceptable range for the application of MOECC Table 2 SCS.

5.8.1 Petroleum Hydrocarbons

The concentrations of PHC and BTEX measured in the analysed soil samples were less than the MOECC 2011 Table 2 SCS and the MOECC Table 1 background concentrations, as shown in Table 1 in Appendix D.

5.8.2 Metals

The concentrations of metals measured in the analysed soil samples were less than the MOECC 2011 Table 2 SCS, and the Table 1 background concentrations, as shown in Table 2 in Appendix D.

5.8.3 Chemical Transformation and Soil Contaminant Sources

Based on the above results, if excess soil is generated at the site, the following two options are considered suitable for soil management:

1. Assuming the soil is acceptable from a geotechnical perspective, the soil is suitable for on-site use and may be left in place or used as fill material for construction and/or backfilling purposes.
2. Alternatively, if there is no space available on site, the soil is suitable for unrestricted off-site disposal.

5.8.4 Evidence of Non-Aqueous Phase Liquid

Inspection of the soil cores retrieved from the boreholes did not indicate the presence of non-aqueous phase liquid (NAPL), staining or sheen. Odours were not observed during soil sampling activities. NAPLs are not expected to be present at the Phase Two property.

5.9 Groundwater Quality

Representative groundwater samples were collected from the monitoring wells to assess groundwater quality at the Site. Evidence of free phase product (i.e. visible film or sheen), and odour was not noted during well development or purging.

The groundwater analytical results are summarized on Table 3 in Appendix D and the Certificates of Analysis are enclosed in Appendix E.

5.9.1 Petroleum Hydrocarbons

One (1) groundwater sample was submitted for the chemical analysis of PHC and BTEX. The remaining standpipes were essentially dry so no groundwater samples could be collected from them. As shown in Table 3 in Appendix D, the concentrations of PHC and BTEX parameters in the groundwater samples were below the MOECC Table 2 SCS.

5.9.2 Chemical Transformation and Contaminant Sources

There were no exceedences of the MOECC Table 3 SCS.

5.9.3 Evidence of Non-Aqueous Phase Liquid

Inspection of the groundwater monitoring wells did not indicate the presence of non-aqueous phase liquid (NAPL), staining or sheen. Odours were not observed during groundwater sampling activities. NAPLs are not expected to be present at the Phase Two property.

5.10 Sediment Quality

As there were no water bodies on-Site, surface water and sediment sampling was not required.

5.11 Quality Assurance and Quality Control Results

Quality assurance and quality control measures were taken during the field activities to meet the objectives of the sampling and quality assurance plan to collect unbiased and representative samples to characterize existing conditions in the fill/upper overburden materials and groundwater at the Site. QA/QC measures, as described in Section 4.12, included:

- Using dedicated and/or disposal sampling equipment;
- Following proper decontamination protocols to minimize cross-contamination;
- Maintaining field notes and completing field forms to document on-Site activities; and,
- Using only laboratory supplied sample containers and following prescribed sample protocols, including proper preservation, meeting sample hold times, proper chain of custody documentation, to ensure integrity of the samples.

Review of field activity documentation indicated that recommended sample volumes were collected from groundwater for each analytical test group into appropriate containers and preserved with proper chemical reagents in accordance with the protocols set out in the *Protocol for Analytical Methods used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act* (MOE, 2004). Samples were preserved at the required temperatures in insulated coolers and met applicable holding time requirements, when relinquished to the receiving laboratory.

Certificates of Analysis were received from the laboratory reporting the results of all the chemical analyses performed on the submitted soil and groundwater samples. Copies of the laboratory Certificates of Analysis are provided in Appendix E. A review of the Certificates of Analysis prepared by the laboratory indicates that they were in compliance with the requirements set out under subsection 47(3) of O.Reg. 511/09.

The analytical program conducted by the laboratory included analytical test group specific QA/QC measures to evaluate the accuracy and precision of the analytical results and the efficiency of analyte recovery during solute extraction procedures. The laboratory QA/QC program consisted of the preparation and analysis of laboratory duplicate samples to assess precision and sample homogeneity, method blanks to assess analytical bias, spiked blanks and QC standards to evaluate analyte recovery, matrix spikes to evaluate matrix interferences and surrogate compound recoveries to evaluate extraction efficiency. The laboratory QA/QC results are presented in the Quality Assurance Report provided in the Certificate of Analysis prepared by the laboratory. The QA/QC results are reported as percent recoveries for matrix spikes, spike blanks and QC standards, relative percent difference for laboratory duplicates and analyte concentrations for method blanks.

The laboratory QA/QC results were assessed against test group control limits in the case of spiked blanks, matrix spikes and surrogate recoveries and alert criteria in the case of method blanks and laboratory duplicates. Review of the laboratory QA/QC results reported by the laboratory indicated that they were within acceptable control limits or below applicable alert criteria for the sampled media and analytical test groups. Based on the assessment of the QA/QC, the analytical results reported by the laboratory are of acceptable quality and data qualifications are not required.

5.12 Phase Two Conceptual Site Model

This section presents a Conceptual Site Model (CSM) providing a narrative, graphical and tabulated description integrating information related to the Site's geologic and hydrogeological conditions, areas of potential environmental concern/potential contaminating activities, the presence and distribution of contaminants of concern, contaminant fate and transport, and potential exposure pathways.

For the purposes of this Phase Two CSM, the information relied upon was taken from all current and previous environmental reports conducted for the Site. However, the data relied upon was limited to the most recent information to convey the current Site conditions.

5.12.1 Site Identification Information

The Site is currently vacant and has an area of 2.43 hectares. It is located at the southwest corner of Fallowfield Road and Cedarview Road in Ottawa as shown on Figure 1 in Appendix B. The site was occupied by four residences and one vacant parcel of land in the central part. The property is partly serviced by the City of Ottawa with regards to potable water, with two of the four parcels using private water wells. All of the parcels have private sewage systems.

The local groundwater flow direction is unknown, although based on regional topography, groundwater flow is anticipated to be southwest. The closest body of water is the Jock River, located approximately 3 km south of the Site. Regional groundwater flow direction is inferred to be in the south direction towards the Jock River.

Refer to the following table for the Site identification information.

Civic Address	4190, 4200, 4210, 4236 Fallowfield Road and 2740 Cedarview Road, Ottawa, ON
Current Land Use	Residential
Proposed Land Use	Residential
Legal Description	CON 4 RF PT LOT 20 RP;4R13732 PART 1; CON 4RF PT LOT 20 PCL 3; CON 4 RF PT LT 20 RP4D-82; PARTS 1 AND 5; CON 4RF PT LOT 20 RP 4R7681; PART 2 LESS 4R20148; CON 4RF PT LOT 20.
Property Identification Number	044670009, 044670007, 044670048, 044670292, 044670010
UTM Coordinates	438732.3 m E, 5014084.2 m N NAD 83, Zone 18
Site Area	2.43 ha
Property Owner	Various

5.12.2 Physical Site Description

The Phase Two CSM provides a narrative and graphical interpretation of the Site surface features, near surface geologic and hydrogeologic conditions, PCOCs, contaminant fate and transport mechanisms, and relevant receptors and exposure pathways. These components are discussed in the following sections and summarized in Table 1 in the Tables appendix.

The Site is located in a partly developed residential area of Ottawa where potable water is supplied by the City of Ottawa and therefore the MOECC Table 2 Site Condition Standard (SCS) is applied to the Site. The City of Ottawa obtains its water from the Ottawa River, located approximately 18 km northwest of the Site.

In accordance with Section 41 of the Ontario Regulation 153/04 (as amended), the Site is not an environmentally sensitive area. The Site is not located within an area of natural significance and it does not include land that is within 30 metres of an area of natural significance.

Based on the Phase Two ESA investigation, the Site is not a shallow soil property as defined in Section 43.1 of the regulation, nor does it include all or part of a water body or is adjacent to a water body or includes land that is within 30 metres of a water body.

5.12.3 Geological and Hydrogeological Setting

A Preliminary Geotechnical Investigation by EXP determined that the site is underlain by a thin layer of topsoil (0.1 m), followed by fill (up to 0.8 m) which is underlain by progressively coarser glacial till to a maximum depth of 5.3 m.

Based on the Phase Two ESA, below the topsoil in most boreholes except in Borehole No. 3 where there was no topsoil, fill was encountered to a maximum depth of 1.0 m. Fill was not encountered in BH18-6, BH18-8 to BH18-10. The fill consisted of a mixture of brown to grey silty sand and silty clay to sand and gravel. No odours were observed in the fill material. Pieces of asphalt and concrete were found in the 0.5 m of fill in BH18-11. A 0.4 m to 0.7 m thick layer of silty sand was found under the topsoil at BH18-6 and BH18-9. The fill was underlain by glacial till which extends to a maximum depth of 5.3 m depth in Borehole No. 3. The till contains numerous cobbles and boulders and extended to the bedrock surface. There were no indications of impact to the native soil. There were no indications of impact to the fill material or native soil.

Auger refusal was met in each of the boreholes from 1.9 m in the northeast corner of the site to 5.3 m in the southwest part of the site. The limestone bedrock was cored at BH3, BH18-7A, and BH18-10. Groundwater was encountered at a depth of 2.32 m bgs in MW18-9 to 5.53 m bgs in MW18-10. No petroleum sheens were observed in the monitoring wells during either sampling event.

The geologic cross-section prepared from Site boreholes is presented on Figure 4 in Appendix B.

Based on the groundwater level measurements, the groundwater flow in the area of the boreholes is to the southwest.

5.12.4 Underground Utilities

Currently, the only underground utilities are water and sewage (septic tank and bed). Electricity and telephone services were formerly overhead.

5.12.5 Potentially Contaminating Activities

The Phase One ESA conducted by EXP (March, 2018). The following PCAs were identified:

- PCA1 – Fill quality across the site. (PCA#30 – Importation of Fill Material of Unknown Quality).
- PCA2 – Possible former On-Site heating oil UST at 4190 Fallowfield Road. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks).
- PCA3 – On-Site heating oil AST located in basement at 4200 Fallowfield Road. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks). No evidence of impact was observed within the basement. Possible minor spillage at fill pipe may have occurred. Therefore, soil was assessed at the fill pipe location.

- PCA4 –On-Site heating oil AST located in basement at 2740 Cedarview Road. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks). No evidence of impact was observed within the basement. Only possible minor spillage at fill pipe may have occurred.

Potentially contaminating activities that took place within the vicinity of the Site (approximately 250 m radius) include:

- PCA5 – Off-Site heating oil AST located in basement at 4192 Fallowfield Road. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks). This PCA is included in areas on the subject site that are addressed in the APECs listed below.

5.12.6 Areas of Potential Environmental Concern / Potential Contaminants of Concern

As per Ontario Regulation 153/04 (as amended), Potential Contaminating Activity (PCA) is defined as one of the 59 industrial operations set out in Table 2 of Schedule D that occurs or has occurred on the Site or within the Phase One ESA study area. Based on Phase One ESA, the identified areas of potential environmental concern (APEC) and potential contaminants of concern (PCOC) are summarized in the table below and are shown on Figure 3 in Appendix B.

Table 5.2: Areas of Potential Environmental Concern

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
APEC 1	Across all of site	PCA#30 – Importation of Fill Material of Unknown Quality	On-Site	Petroleum Hydrocarbons (PHCs), Benzene, Toluene, Ethylbenzene and Xylene (BTEX), and metals	Soil
APEC 2	Northeast part	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs, BTEX	Soil and groundwater
APEC 3	Central north part	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs, BTEX	Soil
APEC 4	Southeast part	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	PHCs, BTEX	Soil

5.12.7 Investigation and Remediation

The Phase Two ESA was conducted to assess the soil and groundwater quality at the Site. As indicated in the APEC and PCOC Table (above), the analytical program of the Phase Two ESA included testing of soil and groundwater for metals, PHC and/or BTEX from the monitoring wells installed on the Site. The borehole and monitoring well locations are shown on Figure 3 in Appendix B.

Based on the results of the investigation, all of the soil and groundwater samples had concentrations of metals, PHC and/or BTEX that were less than the 2011 MOECC Table 3 SCS.

5.12.8 Contaminants of Concern (COC)

Based on the results of the investigation, there are no contaminants of concern in soil at the Site. There are no COC in groundwater at the site.

5.12.9 Contaminant Fate and Transport

Soil COCs

There are no COC in soil at the site.

Groundwater COCs

There are no COC in groundwater at the site.

6 Conclusions and Recommendations

Based on the Phase Two ESA results, the following summary is provided:

- Below the topsoil in most boreholes except in Borehole No. 3 where there was no topsoil, fill was encountered to a maximum depth of 1.0 m. Fill was not encountered in BH18-6, BH18-8 to BH18-10. The fill consisted of a mixture of brown to grey silty sand and silty clay to sand and gravel. No odours were observed in the fill material. Pieces of asphalt and concrete were found in the 0.5 m of fill in BH18-11. A 0.4 m to 0.7 m thick layer of silty sand was found under the topsoil at BH18-6 and BH18-9. The fill was underlain by glacial till which extends to a maximum depth of 5.3 m depth in Borehole No. 3. The till contains numerous cobbles and boulders and extended to the bedrock surface. There were no indications of impact to the native soil. There were no indications of impact to the fill material or native soil.
- Auger refusal was met in each of the boreholes from 1.9 m in the northeast corner of the site to 5.3 m in the southwest part of the site. The limestone bedrock was cored at BH3, BH18-7A, and BH18-10. Groundwater was encountered at a depth of 2.32 m bgs in MW18-9 to 5.53 m bgs in MW18-10. No petroleum sheens were observed in the monitoring wells during either sampling event. Based on the groundwater level measurements, the groundwater flow in the area of the boreholes is to the southwest.
- All of the soil and groundwater samples had concentrations of metals, PHC and/or BTEX that were less than the 2011 MOECC Table 3 SCS. No additional work is recommended to address the APECs identified in the previous Phase One ESA.
- If the wells are no longer needed, they should be decommissioned in accordance with Ontario Regulation 903.

7 General Limitations

The information presented in this report is based on a limited investigation designed to provide information to support an assessment of the current environmental conditions within the subject property. The conclusions and recommendations presented in this report reflect Site conditions existing at the time of the investigation.

More specific information with respect to the conditions between samples, or the lateral and vertical extent of materials may become apparent during excavation operations. The interpretation of the borehole information must, therefore, be validated during any such excavation operations. Consequently, during the future development of the property, conditions not observed during this investigation may become apparent. Should this occur, EXP Services Inc. should be contacted to assess the situation, and the need for additional testing and reporting. EXP has qualified personnel to provide assistance in regards to any future geotechnical and environmental issues related to this property.

The environmental investigation was carried out to address the intent of applicable provincial Regulations, Guidelines, Policies, Standards, Protocols and Objectives administered by the Ministry of Environment. It should also be noted that current environmental Regulations, Guidelines, Policies, Standards, Protocols and Objectives are subject to change, and such changes, when put into effect, could alter the conclusions and recommendations noted throughout this report. Achieving the study objectives stated in this report has required us to arrive at conclusions based upon the best information presently known to us. No investigative method can completely eliminate the possibility of obtaining partially imprecise or incomplete information; it can only reduce the possibility to an acceptable level. Professional judgment was exercised in gathering and analyzing the information obtained and in the formulation of the conclusions. Like all professional persons rendering advice we do not act as absolute insurers of the conclusions we reach, but we commit ourselves to care and competence in reaching those conclusions.

Our undertaking at EXP, therefore, is to perform our work within limits prescribed by our clients, with the usual thoroughness and competence of the engineering profession. It is intended that the outcome of this investigation assist in reducing the client's risk associated with environmental impairment. Our work should not be considered 'risk mitigation'. No other warranty or representation, either expressed or implied, is included or intended in this report.

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We trust this report satisfies your immediate requirements. If you have any questions regarding the information in this report, please do not hesitate to contact this office.

8 References

This study was conducted in general accordance with the applicable Regulations, Guidelines, Policies, Standards, Protocols and Objectives administered by the Ministry of the Environment. Specific reference is made to the following:

- Environmental Protection Act, R.S.O. 1990, Chapter E.19, as amended, September 2004.
- Ministry of the Environment [MOE] (1996) Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario. Ontario Ministry of the Environment, December 1996.
- MOE (2011) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Ontario Ministry of the Environment, April 15, 2011.
- MOE (2011) Guide for Completing Phase Two Environmental Site Assessments under Ontario Regulation 153/04. Ontario Ministry of the Environment, June 2011.
- MOE (2011) Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Ontario Ministry of the Environment, March 2004, amended as of July 1, 2011.
- Ontario Regulation 153/04, made under the Environmental Protection Act, May 2004, last amended to O.Reg.333/13.
- Ontario Water Resources Act – R.R.O. 1990, Regulation 903, amended to O.Reg. 128/03, August 2003.
- Groundwater, Freeze and Cheery 1979. Prentice Hall.
- EXP Services Inc., *Preliminary Geotechnical Investigation,* Fallowfield and Cedarview Roads*, Ottawa, Ontario* dated October 30, 2017.
- EXP Services Inc., *Phase One Environmental Site Assessment,* 4190, 4200, 4210, 4236 Fallowfield Road and 2740 Cedarview Road*, Ottawa, Ontario* dated March 29, 2018.

Tables

Table 1

Characteristic	Description
Minimum Depth to Bedrock	1.9 m
Minimum Depth to Overburden Groundwater	0.43 m March 27, 2018
Shallow Soil Property	No, greater than 2.0 m
Proximity to water body or ANSI	3 km south
Soil pH	7.75 to 8.34
Soil Texture	Coarse
Current Property Use	Residential
Future Property Use	Residential
Proposed Future Building	Residential buildings on all of site
Areas where soil has been brought to the Site	None identified

Appendix A – Sampling and Analysis Plan

1 Introduction

This appendix presents the Sampling and Analysis Plan (SAAP) that was developed in support of the Phase Two Environmental Site Assessment (ESA) for the property located at 4190, 4200, 4210, 4236 Fallowfield Road and 2740 Cedarview Road in Ottawa, Ontario (hereinafter referred to as the 'site'). The SAAP presents the procedures and measures that will be undertaken during field investigative activities to characterize the site conditions and meet the data quality objectives of the Phase Two ESA.

The SAAP presents the sampling program proposed for the site, the recommended procedures and protocols for sampling and related field activities, the data quality objectives, and the quality assurance/ quality control measures that will be undertaken to provide for the collection of accurate, reproducible and representative data. These components are described in further detail below.

2 Field Sampling Program

The field sampling program was developed to provide for the collection of samples of the soil and groundwater for chemical analysis of petroleum hydrocarbons (PHC), benzene, toluene, ethylbenzene and xylenes (collectively known as 'BTEX') and metals. The soil sampling media is to consist of the overburden materials (depths up to 5 m of overburden beneath site). The soil sampling will be location-specific to assess for the potential presence of PHC, BTEX and metals based on the identification of potential areas of potential environmental concern identified in a Phase One ESA completed by EXP in 2017. Vapour readings will also be taken in the field to determine samples to be submitted for BTEX and PHC F1-F2 analysis.

Each of the groundwater samples will be submitted for analysis of PHC and BTEX. The monitoring well network is to comprise of one newly installed well. This work is being completed concurrently with a Geotechnical Investigation where several standpipes are being installed to measure the groundwater elevations.

Vertical control of the boreholes and monitoring wells will be obtained through the completion of an elevation survey with reference to a geodetic or assumed benchmark. Groundwater flow and direction at the site will also be determined through groundwater level measurements and the elevations established in the site elevation survey.

3 Field Methods

To meet the requirements of the field sampling program, the following field investigative methods will be undertaken:

- Borehole Drilling;
- Soil Sampling;
- Monitoring Well Installation;
- Groundwater Level Measurements;
- Elevation Survey; and,
- Groundwater Sampling.

The field investigative methods will be performed following the procedures and protocols set out in EXP's standard operating procedures and are outlined below:

3.1 Borehole Drilling

Boreholes will be advanced at the site to facilitate the collection of soil samples for chemical analysis and geologic characterization; and, for the installation of groundwater monitoring wells. A total of seven (7) boreholes are proposed to be advanced at the site, up to a maximum overburden depth of approximately 5 m below grade, to provide for the collection of samples of the surficial and overburden materials beneath the site. The borehole locations will be selected to delineate the extent and magnitude of PCOC related impacts to the soils and the groundwater.

Prior to borehole drilling, utility clearances will be obtained from public and private locators, as required. The borehole drilling program will be conducted by a licensed driller under the oversight of EXP field staff. All drilling equipment will be cleaned prior to the commencement of drilling at each borehole location.

3.2 Soil Sampling

Soil samples will be collected for chemical analysis and geologic property characterization. The soil samples will be collected using 5 cm diameter, 60 cm long, stainless steel split-spoon sampling devices advanced ahead of the direct push drilling equipment at continuous intervals. The split spoon sampling devices will be attached to drill rods and advanced into the soil by means of a direct push hammer. Upon retrieval from the boreholes, the split-spoon samplers will be placed on a flat surface and disassembled by drilling personnel to provide access of the recovered cores. Geologic and sampling details of the recovered cores will be logged and the samples will be assessed for the potential presence of non-aqueous phase liquids. Samples for chemical analysis will be selected on the basis of visual and olfactory evidence of impacts and at specific intervals to define the lateral and vertical extent of known impacts.

Recommended volumes of soil samples selected for chemical analysis will be collected into pre-cleaned, laboratory supplied, analytical test group specific containers. The samples will be placed into clean insulated coolers chilled with ice for storage and transport. Samples intended for analysis of BTEX and PHC F1-F2 will be collected into 40 ml vials. The samples will be assigned unique identification numbers, and the date, time, location, and requested analyses for each sample will be documented in a bound field note book. The samples will be submitted to the contract laboratory within analytical test group holding times under Chain of Custody (COC) protocols. New disposable chemical resistant gloves will be used for each soil core to prevent sample cross-contamination.

3.3 Monitoring Well Installation

It is proposed that all boreholes will be instrumented as groundwater monitoring wells installed with slotted screens intercepting either the native overburden material or the shallow bedrock, where the water table aquifer is expected, extending to depths of approximately 1 to 3 m below grade. The monitoring wells will be constructed using 37 mm diameter, Schedule 40, PVC riser pipe and number 10 slot size (0.25 mm) well screens. The base of the well screens will be sealed with threaded flush PVC end caps. All well pipe connections will be factory machined threaded flush couplings. The annular space around the well screens will be backfilled with silica sand, to an average height of 0.3 m above the top of the screen. Granular bentonite will be placed in the borehole annulus from the top of the sand pack to approximately 0.3 m below grade. The monitoring wells will be completed with either a flush-mounted protective steel casing or above ground protective casings cemented into place.

3.4 Monitoring Well Development

The newly installed monitoring wells will be developed to remove fine sediment particles potentially lodged in the sand pack and well screen to enhance hydraulic communication with the surrounding formation waters.

Standing water volumes will be determined by means of an electronic water level meter. Prior to collecting groundwater samples, the monitoring wells will be developed using low flow sampling techniques to reduce the amount of sediment in the samples. Well development details will be documented on a well development log sheet or in a bound hard cover notebook. All development waters will be collected and stored in labeled, sealed containers.

3.5 Groundwater Level Measurements

Groundwater level measurements will be recorded for all monitoring wells and standpipes to determine groundwater flow and direction in the water table aquifer beneath the site. Water levels will be measured with respect to the top of the casing by means of an electronic water level meter. The water levels will be recorded on water level log sheets. The water level meter probe will be decontaminated between monitoring well locations.

3.6 Elevation Survey

An elevation survey will be conducted to obtain vertical control of all monitoring well locations. The top of casing and ground surface elevation of each monitoring well location will be surveyed against a known geodetic benchmark, or if unavailable, against a suitable arbitrary benchmark. Elevations measured against using a laser level and a benchmark with an assigned elevation will be recorded as meters above mean sea level (m AMSL. The elevation survey will be accurate to within ± 0.5 cm.

3.7 Groundwater Sampling

Groundwater samples will be collected from all monitoring wells for chemical analysis. The wells will be sampled using a “low flow” technique whereby the wells are continuously purged using an electric pump (equipped with dedicated tubing) and parameters within the purged water are monitored using a groundwater chemistry multi-meter at 3 minute intervals. These parameters include: pH, conductivity, temperature, and salinity. Once these parameters are found to deviate less than 10% over three testing events, equilibrium is deemed to have occurred and a sample of the groundwater will be collected. The purge water will also be continuously monitored for visual and olfactory evidence of petroleum and solvent impact (sheen and odour).

Recommended groundwater sample volumes will be collected into pre-clean laboratory-supplied vials or bottles provided with analytical test group specific preservatives, as required. The samples will be placed in an insulated cooler chilled with ice for storage and transport. Each VOC vial will be inverted and inspected for gas bubbles prior to being placed in the cooler to ensure that no head-space is present. All groundwater samples will be assigned unique identification numbers, and the date, time, project number, company name, location and requested analyses for each sample will be documented in a bound hard cover notebook. The samples will be submitted to the contractual laboratory within analytical test group holding times under COC protocols. New disposable chemical resistant gloves will be used for each sampling location to prevent sample cross-contamination.

4 Field Quality Assurance/Quality Control Program

The objective of the field quality assurance/quality control (QA/QC) program is to obtain soil and groundwater samples and other field measurements that provide data of acceptable quality that meets the objectives of the Phase Two ESA. The objectives of the QA/QC program will be achieved through the implementation of procedures for the collection of unbiased (i.e. non-contaminated) samples, sample documentation and the collection of appropriate QC samples to provide a measure of sample reproducibility and accuracy. The field QA/QC measures will comprise:

- Decontamination Protocols;
- Equipment Calibration;
- Sample Preservation;
- Sample Documentation; and,
- Field Quality Control Samples.

Details on the field QA/QC measures are provided below.

4.1 Decontamination Protocols

Decontamination protocols will be followed during field sampling where non-dedicated sampling equipment is used to prevent sample cross contamination. The split spoon soil sampling device will be cleaned/decontaminated between sampling intervals in according with SOP requirements. For the monitoring well installation, well components are not to come into contact with the ground surface prior to insertion into boreholes. Electronic water level meters will be decontaminated between monitoring well locations during well development, and purging activities. For hydraulic conductivity tests, the electronic water level meters will be decontaminated between sampling locations. All decontamination fluids will be collected and stored in sealed, labeled containers.

4.2 Equipment Calibration

All equipment requiring calibration will be calibrated in the field according to manufacturer's requirements using analytical grade reagents, or by the supplier prior to conducting field activities, and subsequently checked in the field. The calibration of all pre-calibrated instruments will be checked in the field using analytical grade reagents and re-calibrated as required. For multiple day sampling events, equipment calibration will be checked prior to the beginning of sampling activities. All calibration data will be documented in a bound hard cover notebook.

4.3 Sample Preservation

All samples will be preserved using appropriate analytical test group specific reagents, as required, and upon collection placed in pre-chilled insulated coolers packed with ice for storage and transport.

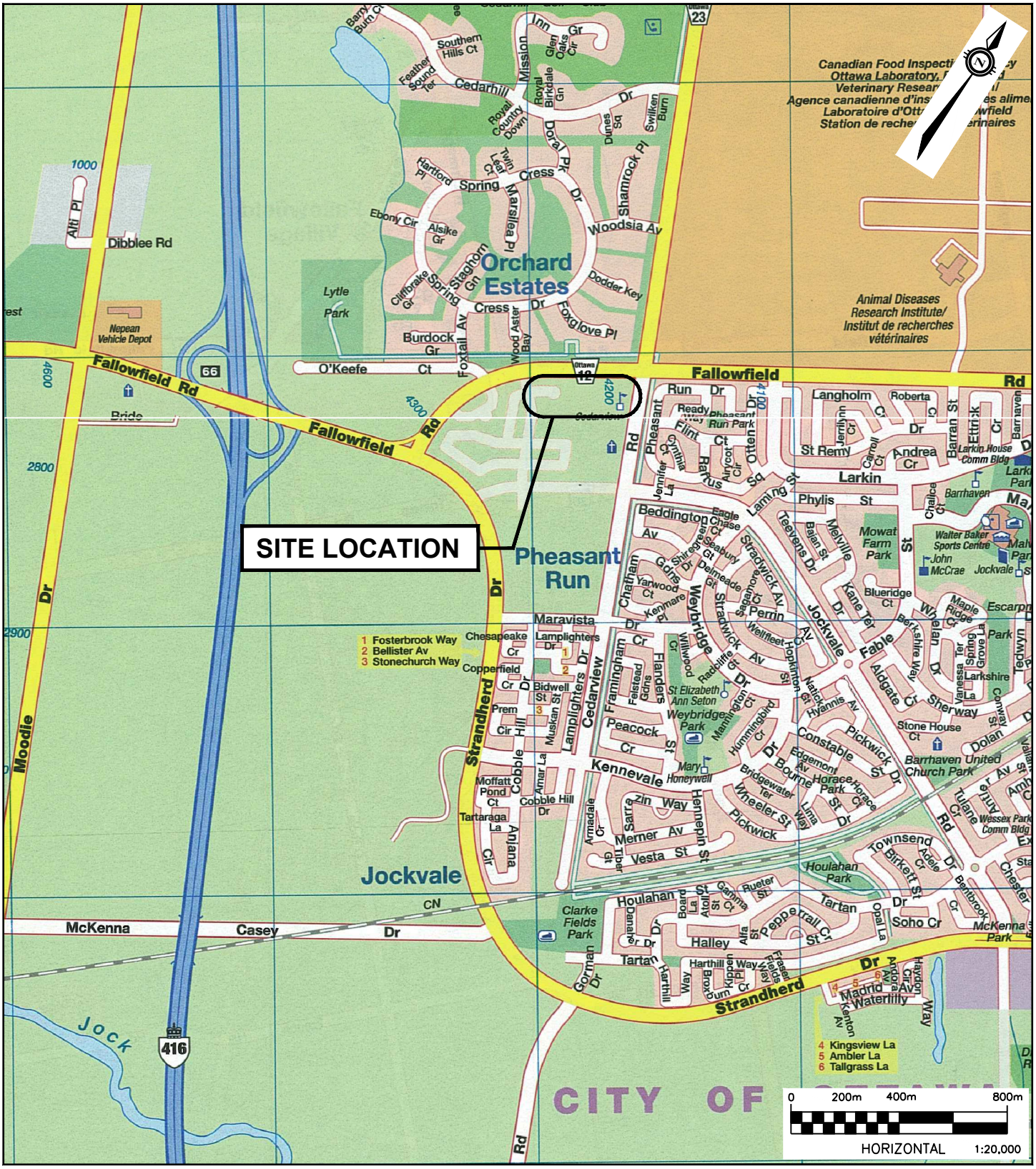
4.4 Sample Documentation

All samples will be assigned a unique identification number, which is to be recorded along with the date, time, project number, company name, location and requested analysis in a bound field notebook. All samples will be handled and transported following COC protocols.

4.5 Field Quality Control

Field quality controls samples will be collected to evaluate the accuracy and reproducibility of the field sampling procedures. For soil and groundwater sampling, one (1) field duplicate is to be collected for every ten (10) samples submitted for chemical analysis. The field duplicate samples will be assessed by calculating the relative percent difference and comparing to the analytical test group specific acceptance criteria.

Appendix B – Figures



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date: APRIL 2018	TITLE: SITE LOCATION PLAN 4190, 4200, 4210, 4236 FALLOWFIELD ROAD & 2740 CEDARVIEW ROAD, NEPEAN, ON	FIG 1
drawn by: J.R.		

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date APRIL 2018		
drawn by J.R.	TITLE: PIESA STUDY AREA	FIG 2

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APEC LEGEND

- APEC #1 - FILL OF UNKNOWN QUALITY
- APEC #2 - POTENTIAL UST
- APEC #3 - EXISTING UST
- APEC #4 - EXISTING UST

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date APRIL 2018		
drawn by J.R.	TITLE: PCA & APEC PLAN	FIG 3

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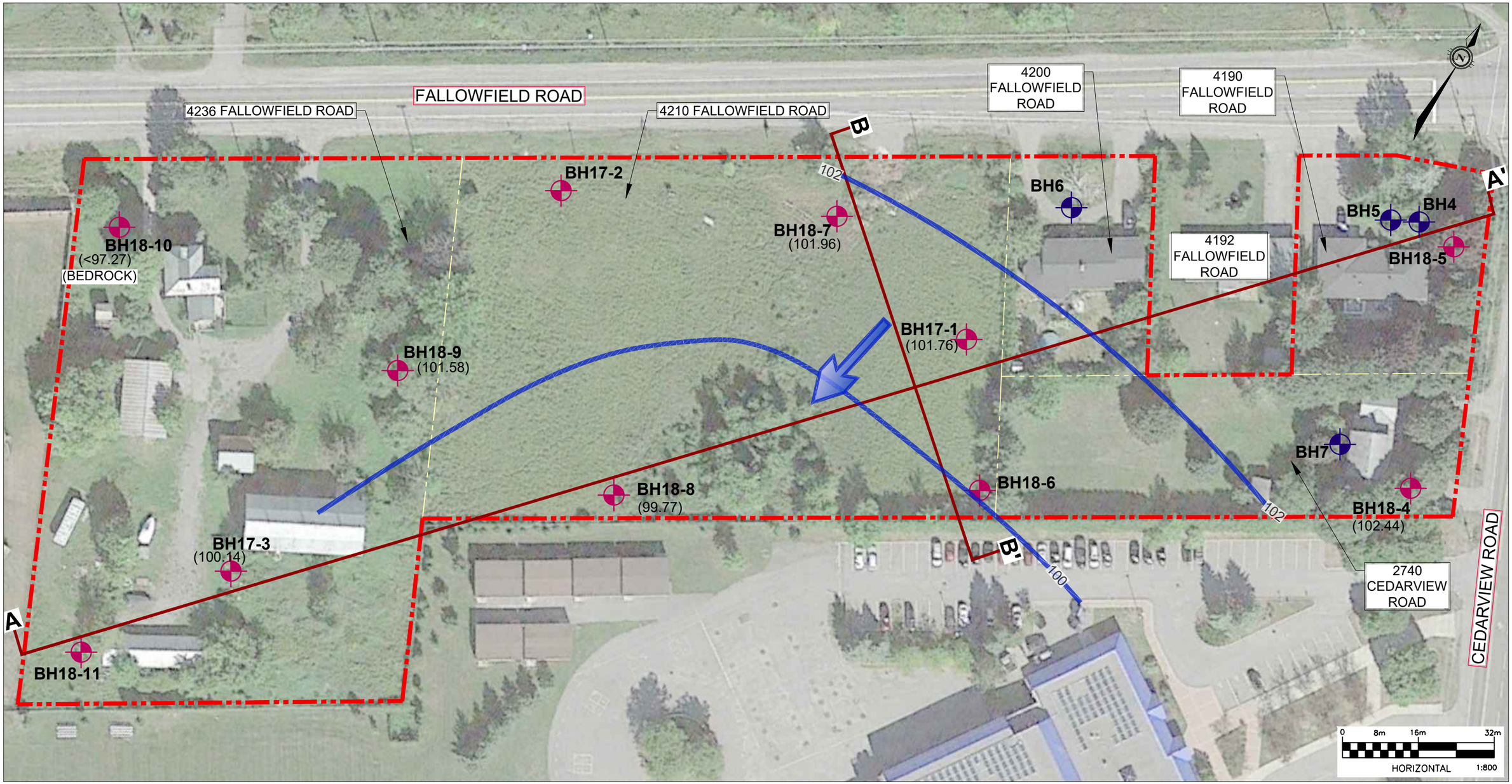

LEGEND

BH18-8 (99.77) BH6 — APPROXIMATE PROPERTY LIMITS

GEOTECHNICAL BOREHOLE LOCATION & NUMBER

GROUNDWATER ELEVATION MEASURED ON MARCH 27, 2018

ENVIROMENTAL BOREHOLE LOCATION & NUMBER

A/B A'/B' — GEOLOGICAL CROSS-SECTION PLACEMENT

GW CONTOUR

CALCULATED DIRECTION OF GROUNDWATER FLOW

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date APRIL 2018		
drawn by J.R.	TITLE: BOREHOLE LOCATION PLAN	FIG 4

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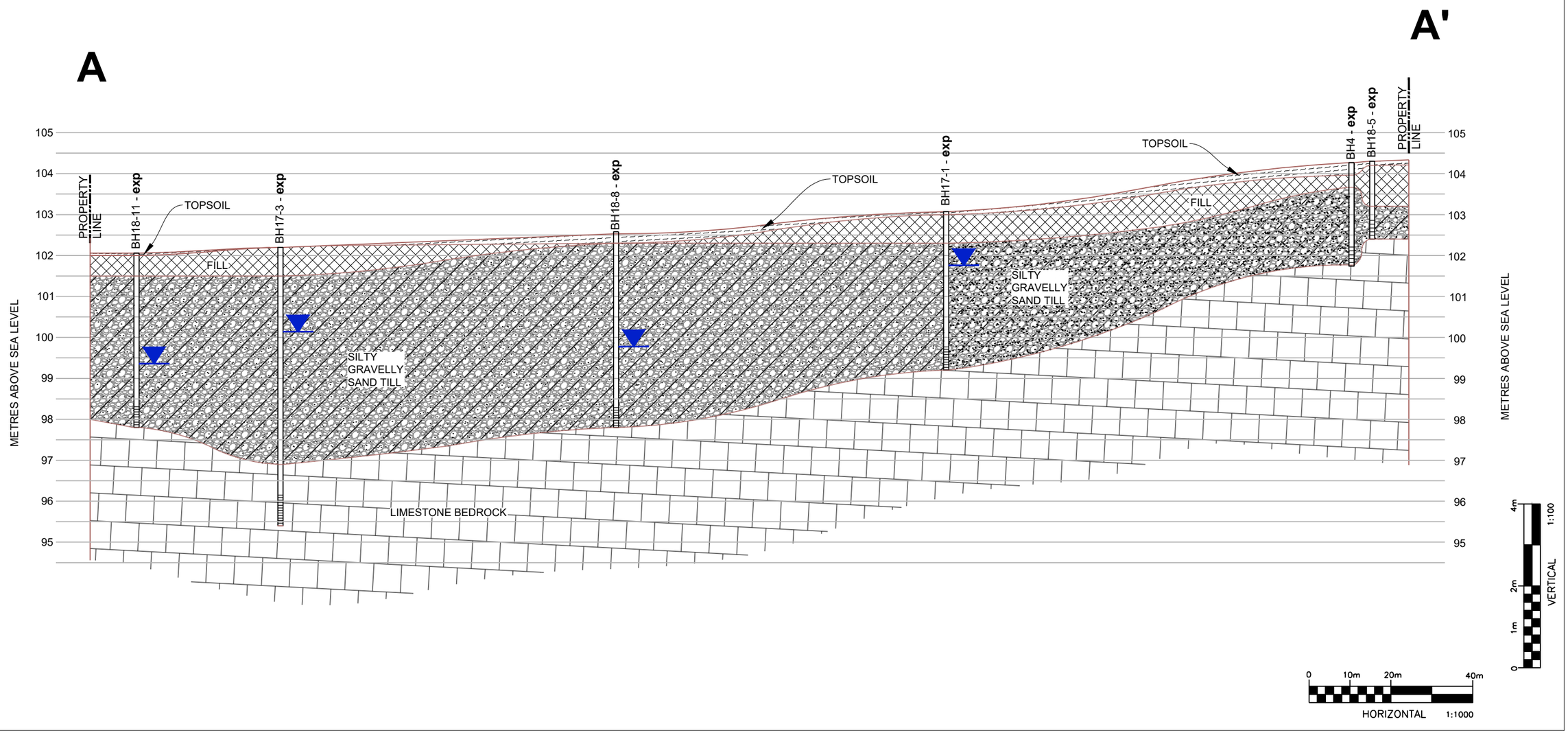

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date: APRIL 2018		
drawn by: J.R.	TITLE: GEOLOGICAL CROSS-SECTION A-A'	FIG 5A

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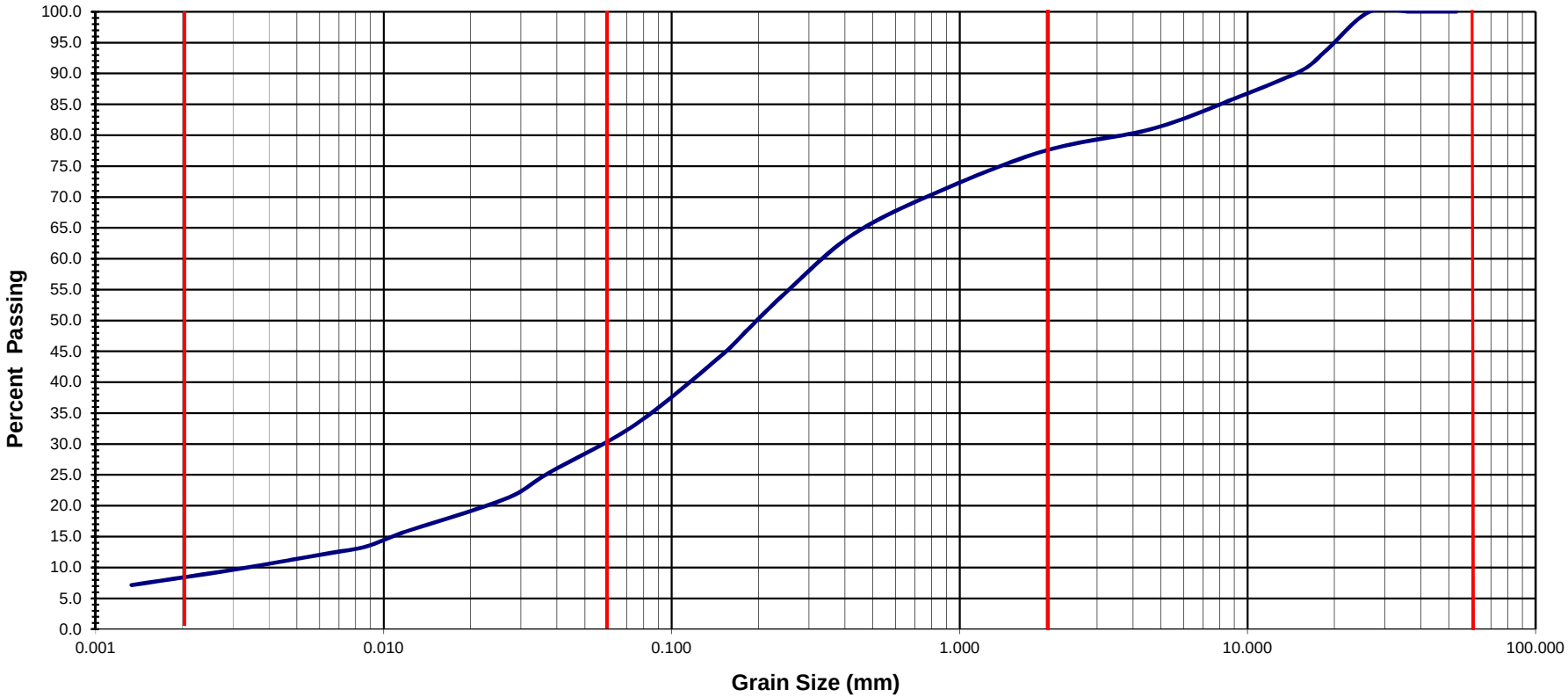
Grain-Size Distribution Curve

Method of Test for Particle Size Analysis of Soil

MTO Test Method LS - 702, Rev. No. 19

Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL			
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	



Exp Project No.:	**OTT-00243143-A0**	**Project Name :**	**Preliminary Geotechnical Investigation. Proposed Residential Development**		
Client :	**Phoenix Homes Group of Companies**	**Project Location :**	**Fallowfield & Cedarview Road, Ottawa, ON**		
Date Sampled :	**October 23, 2017**	**Bore Hole/Test Pit No.:**	**1**	**Sample No.:** **SS4**	**Depth (m) :** **2.3-2.9**
Sample Description :		**Silty to Gravelly Sand, Trace Clay**			**Figure :** **6**

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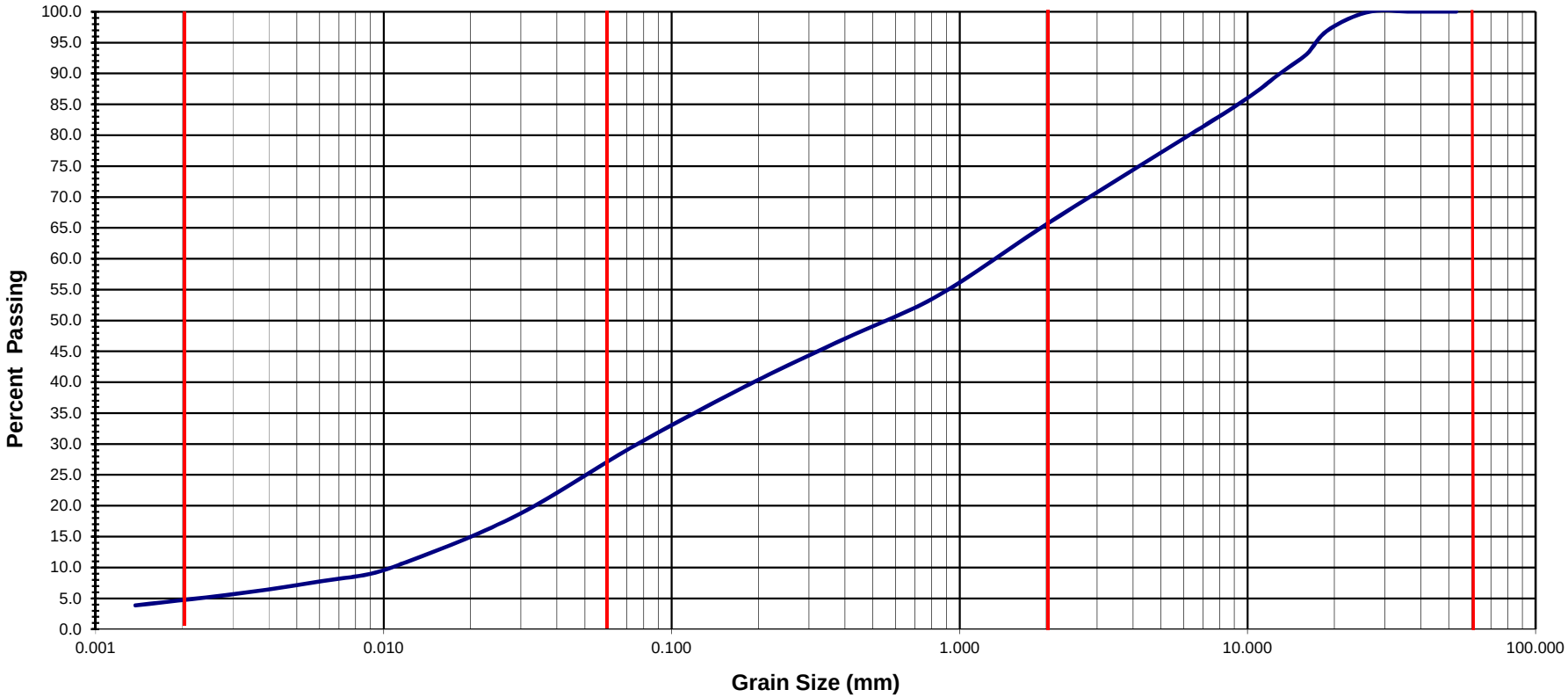
Grain-Size Distribution Curve

Method of Test for Particle Size Analysis of Soil

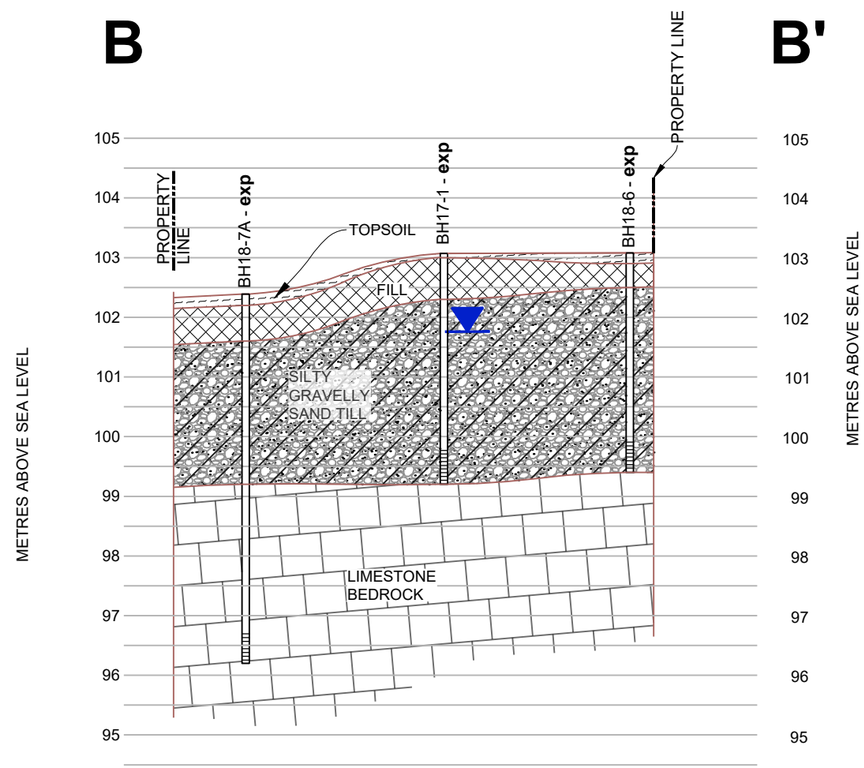
ASTM D-422

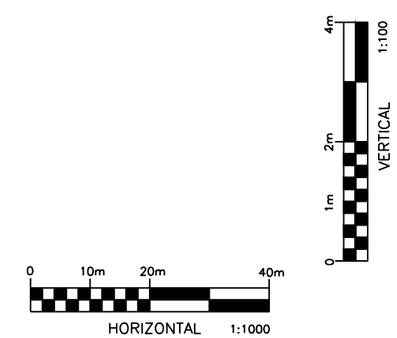
Modified M.I.T. Classification

CLAY	SILT			SAND			GRAVEL			
	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	



Exp Project No.:	**OTT-00243143-A0**	**Project Name :**	**Preliminary Geotechnical Investigation. Proposed Residential Development**		
Client :	**DCR Phoenix Group of Companies**	**Project Location :**	**Fallowfield & Cedarview Road, Ottawa, ON**		
Date Sampled :	**October 23, 2017**	**Bore Hole/Test Pit No.:**	**3**	**Sample No.:** **SS6**	**Depth (m) :** **3.8-4.4**
Sample Description :		**Silty Gravelly Sand, Trace Clay**			**Figure :** **7**





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date: APRIL 2018		
drawn by: J.R.	TITLE: GEOLOGICAL CROSS-SECTION B-B'	FIG 5B

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Appendix C: Borehole Logs

Explanation of Terms Used on Borehole Records

SOIL DESCRIPTION

Terminology describing common soil genesis:

Topsoil: mixture of soil and humus capable of supporting good vegetative growth.

Peat: fibrous fragments of visible and invisible decayed organic matter.

Fill: where fill is designated on the borehole log it is defined as indicated by the sample recovered during the boring process. The reader is cautioned that fills are heterogeneous in nature and variable in density or degree of compaction. The borehole description may therefore not be applicable as a general description of site fill materials. All fills should be expected to contain obstruction such as wood, large concrete pieces or subsurface basements, floors, tanks, etc.; none of these may have been encountered in the boreholes. Since boreholes cannot accurately define the contents of the fill, test pits are recommended to provide supplementary information. Despite the use of test pits, the heterogeneous nature of fill will leave some ambiguity as to the exact composition of the fill. Most fills contain pockets, seams, or layers of organically contaminated soil. This organic material can result in the generation of methane gas and/or significant ongoing and future settlements. Fill at this site may have been monitored for the presence of methane gas and, if so, the results are given on the borehole logs. The monitoring process does not indicate the volume of gas that can be potentially generated nor does it pinpoint the source of the gas. These readings are to advise of the presence of gas only, and a detailed study is recommended for sites where any explosive gas/methane is detected. Some fill material may be contaminated by toxic/hazardous waste that renders it unacceptable for deposition in any but designated land fill sites; unless specifically stated the fill on this site has not been tested for contaminants that may be considered toxic or hazardous. This testing and a potential hazard study can be undertaken if requested. In most residential/commercial areas undergoing reconstruction, buried oil tanks are common and are generally not detected in a conventional geotechnical site investigation.

Till: the term till on the borehole logs indicates that the material originates from a geological process associated with glaciation. Because of this geological process the till must be considered heterogeneous in composition and as such may contain pockets and/or seams of material such as sand, gravel, silt or clay. Till often contains cobbles (60 to 200 mm) or boulders (over 200 mm). Contractors may therefore encounter cobbles and boulders during excavation, even if they are not indicated by the borings. It should be appreciated that normal sampling equipment cannot differentiate the size or type of any obstruction. Because of the horizontal and vertical variability of till, the sample description may be applicable to a very limited zone; caution is therefore essential when dealing with sensitive excavations or dewatering programs in till materials.

Terminology describing soil structure:

Desiccated: having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.

Stratified: alternating layers of varying material or color with the layers greater than 6 mm thick.

Laminated: alternating layers of varying material or color with the layers less than 6 mm thick.

Fissured: material breaks along plane of fracture.

Varved: composed of regular alternating layers of silt and clay.

Slickensided: fracture planes appear polished or glossy, sometimes striated.

Blocky: cohesive soil that can be broken down into small angular lumps which resist further breakdown.

Lensed: inclusion of small pockets of different soil, such as small lenses of sand scattered through a mass of clay; not thickness.

Seam: a thin, confined layer of soil having different particle size, texture, or color from materials above and below.

Homogeneous: same color and appearance throughout.

Well Graded: having wide range in grain sized and substantial amounts of all predominantly on grain size.

Uniformly Graded: predominantly on grain size.

All soil sample descriptions included in this report follow the ASTM D2487-11 Standard Practice for Classification of Soils for Engineering Purposes (Unified Soil Classification System). The system divides soils into three major categories: (1) coarse grained, (2) fine-grained, and (3) highly organic. The soil is then subdivided based on either gradation or plasticity characteristics. The system provides a group symbol (e.g. SM) and group name (e.g. silty sand) for identification. The classification excludes particles larger than 76 mm. Please note that, with the exception of those samples where a grain size analysis has been made, all samples are classified visually in accordance with ASTM D2488-09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure). Visual classification is not sufficiently accurate to provide exact grain sizing or precise differentiation between size classification systems. Others may use different classification systems; one such system is the ISSMFE Soil Classification.

ISSMFE SOIL CLASSIFICATION

CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		

0.002 0.006 0.02 0.06 0.2 0.6 2.0 6.0 20 60 200

EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

CLAY (PLASTIC) TO	FINE	MEDIUM	CRS.	FINE	COARSE
SILT (NONPLASTIC)	SAND			GRAVEL	

UNIFIED SOIL CLASSIFICATION

Terminology describing materials outside the USCS, (e.g. particles larger than 76 mm, visible organic matter, construction debris) is based upon the proportion of these materials present and as described below in accordance with Note 16 in ASTM D2488-09a:

Table a: Percent or Proportion of Soil, Pp

	Criteria
Trace	Particles are present but estimated to be less than 5%
Few	5≤Pp≤10%
Little	15≤Pp≤25%
Some	30≤Pp≤45%
Mostly	50≤Pp≤100%

The standard terminology to describe cohesionless soils includes the compactness as determined by the Standard Penetration Test 'N' value:

Table b: Apparent Density of Cohesionless Soil

	'N' Value (blows/0.3 m)
Very Loose	N<5
Loose	5≤N<10
Compact	10≤N<30
Dense	30≤N<50
Very Dense	50≤N

Log of Borehole BH17-1

Project No: OTT-00243143-A0

Project: Phase Two Environmental Site Assessment

Location: 4190, 4200, 4210, 4236 Fallowfield Rd and 2740 Cedarview Rd, Ottawa

Figure No. 3

Page. 1 of 1

Date Drilled: 'October 23, 2017

Drill Type: CME-55 Trackmount

Datum: Depth Below Grade

Logged by: M.L. Checked by: I.T.

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Depth Below Grade m	Natural Unit Wt. kN/m³
		TOPSOIL ~100 mm	0 / -0.1	
		FILL Mixture of silty sand and silty clay, some gravel, grey and brown, moist, (compact)	-0.8	
		SILTY GRAVELLY SAND TILL Trace clay, occasional boulders and cobbles, brownish grey to grey, moist to wet (compact)	-1.31	23.1
				23.3
		Borehole Terminated at 3.9 m Depth Upon Auger Refusal	-3.9	

Standard Penetration Test N Value (20, 40, 60, 80); Shear Strength (50, 100, 150, 200 kPa); Depth (0, 1, 2, 3)

Combustible Vapour Reading (ppm) (250, 500, 750); Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20, 40, 60)

SAMPLES

Observed values: 10, 25, 31, 29, 15, 50 for 100 mm

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	4.0
Oct 30, 2017	1.0	
March 27, 2018	1.3	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

Log of Borehole BH17-2

Project No: OTT-00243143-A0

Project: Phase Two Environmental Site Assessment

Location: 4190, 4200, 4210, 4236 Fallowfield Rd and 2740 Cedarview Rd, Ottawa

Figure No. 4

Page. 1 of 1

Date Drilled: 'October 23, 2017

Drill Type: CME-55 Trackmount

Datum: Depth Below Grade

Logged by: M.L. Checked by: I.T.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊢—⊖
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Depth Below Grade m	Depth	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~100 mm	0	0				
		FILL Mixture of silty sand and silty clay, trace gravel, grey and brown, moist, (loose)	-0.1		8	×		
		SILTY GRAVELLY SAND TILL Trace clay, cobbles and boulders throughout, grey-brown to grey, moist to wet (compact to very dense)	-0.8	1	28	×		
				2	31	×		
					66	×		
				3	50 for 100 mm	×		
			-3.9					
		Borehole Terminated at 3.9 m Depth Upon Auger Refusal						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	3.4

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

Log of Borehole BH17-3

Project No: OTT-00243143-A0

Project: Phase Two Environmental Site Assessment

Location: 4190, 4200, 4210, 4236 Fallowfield Rd and 2740 Cedarview Rd, Ottawa

Figure No. 5

Page. 1 of 1

Date Drilled: 'October 23, 2017

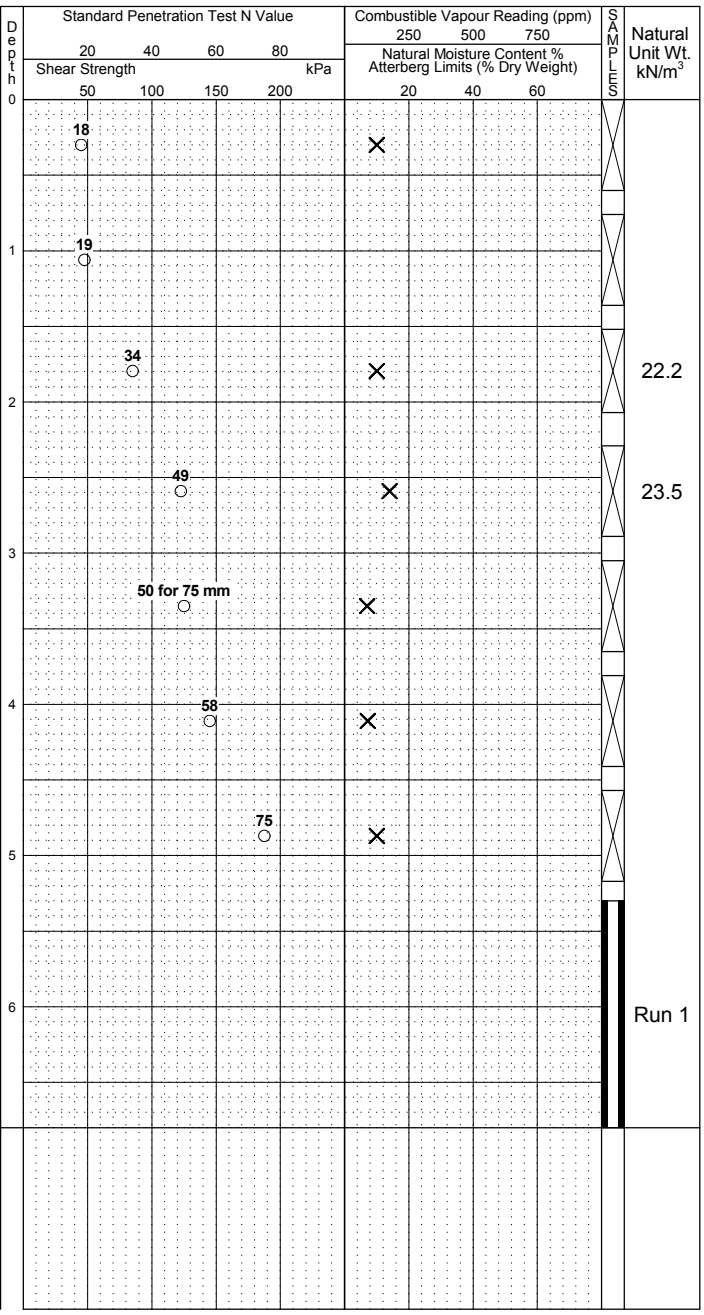
Drill Type: CME-55 Trackmount

Datum: Depth Below Grade

Logged by: M.L. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test + S
Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢—⊖
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Depth Below Grade m	Natural Unit Wt. kN/m³
		FILL Mixture of sand and gravel, trace silt, brown, moist, (compact)	0	
		SILTY GRAVELLY SAND TILL Trace clay, cobbles and boulders throughout, brown to grey, moist to wet (compact to very dense)	-0.8	
▼			-2.06	22.2
				23.5
			-5.3	
		LIMESTONE BEDROCK Thin shale partings, grey (excellent quality)		Run 1
			-6.8	
		Borehole Terminated at 6.8 m Depth		



NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Core Water	6.8
Oct 30, 2017	2.1	
March 27, 2018	2.1	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	5.3 - 6.8	100	94

Log of Borehole BH-4

Project No: OTT-00243143-A0

Project: Phase Two Environmental Site Assessment

Location: 4190, 4200, 4210, 4236 Fallowfield Rd and 2740 Cedarview Rd, Ottawa

Figure No. 6

Page. 1 of 1

Date Drilled: November 20, 2017

Drill Type: Electric Jack Hammer

Datum: Depth Below Grade

Logged by: J.O. Checked by: D.C.

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Depth Below Grade m	Depth	Standard Penetration Test N Value 20 40 60 80 / Shear Strength kPa 50 100 150 200	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL	0	0				
			-0.3					
		FILL Mixture of silty sand and silty clay, some gravel, brown, moist, (compact)	-0.6					
		SILTY GRAVELLY SAND TILL Trace clay, occasional boulders and cobbles, brownish grey to grey, moist to wet (compact)		1				
				2				
			-2.5					
		Borehole Terminated at 2.5 m Depth Upon Sampler Refusal						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Nov. 27, 2017	Dry	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

Log of Borehole BH-5

Project No: OTT-00243143-A0

Project: Phase Two Environmental Site Assessment

Location: 4190, 4200, 4210, 4236 Fallowfield Rd and 2740 Cedarview Rd, Ottawa

Figure No. 7

Page. 1 of 1

Date Drilled: November 20, 2017

Drill Type: Electric Jack Hammer

Datum: Depth Below Grade

Logged by: J.O. Checked by: D.C.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊖
Dynamic Cone Test	—	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Depth Below Grade m	Depth	Standard Penetration Test N Value 20 40 60 80 / Shear Strength kPa 50 100 150 200	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL	0	0				
			-0.3					
		FILL Mixture of silty sand and silty clay, some gravel, brown, moist, (compact)	-0.6					
		SILTY GRAVELLY SAND TILL Trace clay, occasional boulders and cobbles, brownish grey to grey, moist to wet (compact)		1				
				2				
			-2.3					
		Borehole Terminated at 2.29 m Depth Upon Sampler Refusal						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 243143 - FALLOWFIELD CEDARVIEW ENV BH.GPJ TROW OTTAWA.GDT 4/3/18

Log of Borehole BH-6

Project No: OTT-00243143-A0

Project: Phase Two Environmental Site Assessment

Location: 4190, 4200, 4210, 4236 Fallowfield Rd and 2740 Cedarview Rd, Ottawa

Figure No. 8

Page. 1 of 1

Date Drilled: 'November 20, 2017

Drill Type: Electric Jack Hammer

Datum: Depth Below Grade

Logged by: J.O. Checked by: D.C.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊢—⊖
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Depth Below Grade m	Depth	Standard Penetration Test N Value 20 40 60 80 / Shear Strength kPa 50 100 150 200	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		FILL Mixture of silty sand and silty clay, some gravel, brown, moist, (compact)	0	0				
			-0.9					
		SILTY GRAVELLY SAND TILL Trace clay, occasional boulders and cobbles, brownish grey to grey, moist to wet (compact)	-1.5	1				
		Borehole Terminated at 1.52 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 243143 - FALLOWFIELD CEDARVIEW ENV BH.GPJ TROW OTTAWA.GDT 4/3/18

Log of Borehole BH-7

Project No: OTT-00243143-A0

Project: Phase Two Environmental Site Assessment

Location: 4190, 4200, 4210, 4236 Fallowfield Rd and 2740 Cedarview Rd, Ottawa

Figure No. 9

Page. 1 of 1

Date Drilled: 'November 20, 2017

Drill Type: Electric Jack Hammer

Datum: Depth Below Grade

Logged by: J.O. Checked by: D.C.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊢—⊖
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Depth Below Grade m	Depth 0	Standard Penetration Test N Value 20 40 60 80 / Shear Strength kPa 50 100 150 200	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		FILL Mixture of silty sand, some gravel, brown, moist, (compact)	105.3					
			104.4					
		Borehole Terminated at 0.91 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 243143 - FALLOWFIELD CEDARVIEW ENV BH.GPJ TROW OTTAWA.GDT 4/5/18

Log of Borehole BH18-4

Project No: OTT-00243143-A0

Project: Preliminary Geotechnical Investigation. Proposed Residential Development

Location: Fallowfield and Cedarview Roads, City of Ottawa, Ontario

Figure No. 6

Page. 1 of 1

Date Drilled: 'March 6, 2018

Drill Type: CME-55 Trackmount

Datum: Geodetic

Logged by: A.N. Checked by: I.T.

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Natural Unit Wt. kN/m³
		TOPSOIL ~ 200 mm	105.3	0	
		FILL Mixture of sand and gravel, trace silt, brown, moist, (compact to loose)	105.1		
		SILTY GRAVELLY SAND TILL **Trace clay, cobbles and boulders throughout, brown to grey, moist, (compact to very dense)**	104.1	1	18.6
				2	23.8
			102.54	3	
				4	
			99.8	5	
		Borehole Terminated at 5.5 m Depth Upon Auger Refusal			

Standard Penetration Test N Value (20, 40, 60, 80): 12, 5, 15, 75, 60/100 mm, 50/75 mm, 63

Shear Strength (50, 100, 150, 200 kPa)

Combustible Vapour Reading (ppm) (250, 500, 750)

Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20, 40, 60)

SAMPLES

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	5.5
March 27, 2018	2.8	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 243143 - FALLOWFIELD CEDARVIEW GEOTECH.GPJ TROW OTTAWA.GDT 4/3/18

Log of Borehole BH18-5

Project No: OTT-00243143-A0

Project: Preliminary Geotechnical Investigation. Proposed Residential Development

Location: Fallowfield and Cedarview Roads, City of Ottawa, Ontario

Figure No. 7

Page. 1 of 1

Date Drilled: 'March 6, 2018

Drill Type: CME-55 Trackmount

Datum: Geodetic

Logged by: A.N. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test + S
Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢—⊖
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~ 150 mm	104.3	0				
		FILL Mixture of sand and gravel, brown, moist, (loose)	104.2		6			
		SILTY GRAVELLY SAND TILL **With cobbles and boulders, (loose)**	103.2	1	7			19.8
			102.4		8			22.3
		Borehole Terminated at 1.9 m Depth Upon Auger Refusal						

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	1.9

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

Log of Borehole BH18-6

Project No: OTT-00243143-A0

Project: Preliminary Geotechnical Investigation. Proposed Residential Development

Location: Fallowfield and Cedarview Roads, City of Ottawa, Ontario

Figure No. 8

Page. 1 of 1

Date Drilled: 'March 5, 2018

Drill Type: CME-55 Trackmount

Datum: Geodetic

Logged by: A.N. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S
Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢—⊖
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % / Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~200 mm	103.08	0	5	×		
		SILTY SAND Brown, moist, (loose)	102.9					
		SILTY GRAVELLY SAND TILL Trace clay, possible cobbles and boulders, brown, moist to wet, (compact to dense)	102.5	1	13	×		
				2	25	×		23.5
				3	23	×		23.6
					36	×		
			99.4					
		Borehole Terminated at 3.7 m Depth Upon Auger Refusal						

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	3.7

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

Log of Borehole BH18-7

Project No: OTT-00243143-A0

Project: Preliminary Geotechnical Investigation. Proposed Residential Development

Location: Fallowfield and Cedarview Roads, City of Ottawa, Ontario

Figure No. 9

Page. 1 of 1

Date Drilled: 'March 5, 2018

Drill Type: CME-55 Trackmount

Datum: Geodetic

Logged by: A.N. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S
Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢—⊖
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % / Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~200 mm	102.39	0				
		FILL Mixture of sand and gravel, grey, moist to wet, (loose)	102.2		4	×		
				1	4	×		18.5
				2	4	×		
		SILTY GRAVELLY SAND TILL Trace silt and clay, brown, wet, (compact to very dense)	99.9		12	×		
				3	50/50 mm	×		
		Borehole Terminated at 3.2 m Depth Upon Auger Refusal	99.2					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	At surface	3.2

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

Log of Borehole BH18-7A

Project No: OTT-00243143-A0

Project: Preliminary Geotechnical Investigation. Proposed Residential Development

Location: Fallowfield and Cedarview Roads, City of Ottawa, Ontario

Figure No. 10

Page. 1 of 1

Date Drilled: 'March 6, 2018

Drill Type: CME-55 Trackmount

Datum: Geodetic

Logged by: A.N. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test + S
Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢—⊖
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~250 mm	102.39	0				
		FILL Mixture of sand and gravel, moist, (loose)	102.1		4	×		
		SILTY GRAVELLY SAND TILL Trace clay, cobbles and boulders throughout, brown to grey, moist, (very dense)	101.96	1	60/100 mm	×		22.8
			101.6	2	60/100 mm	×		
				3	47	×		23.8
					50/75 mm	×		
		LIMESTONE BEDROCK Thin shale partings, grey (excellent quality)	99.2	4				Run 1
				5				Run 2
			96.2	6				
		Borehole Terminated at 6.2 m Depth Upon Auger Refusal						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	3.0	6.2
March 27, 2018	0.4	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	3.2 - 4.7	100	100
2	4.7 - 6.2	100	100

Log of Borehole BH18-8

Project No: OTT-00243143-A0

Project: Preliminary Geotechnical Investigation. Proposed Residential Development

Location: Fallowfield and Cedarview Roads, City of Ottawa, Ontario

Figure No. 11

Page. 1 of 1

Date Drilled: 'March 5, 2018

Drill Type: CME-55 Trackmount

Datum: Geodetic

Logged by: A.N. Checked by: I.T.

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test + S
Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢—⊖
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Natural Unit Wt. kN/m³
		TOPSOIL ~200 mm	102.53	0	
		GRAVELLY SAND TILL Some silt trace clay, cobbles and boulders throughout, brown, moist, (loose to very dense)	102.3		
			99.77	3	22.6
			97.8	4	23.5
		Borehole Terminated at 4.7 m Depth Upon Auger Refusal			

Standard Penetration Test N Value (20, 40, 60, 80); Shear Strength (50, 100, 150, 200 kPa); Combustible Vapour Reading (ppm) (250, 500, 750); Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20, 40, 60); SAMPLES

Standard Penetration Test N Value: 6, 17, 41, 22, 75, 91, 66/75 mm

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	4.7
March 27, 2018	2.8	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

Log of Borehole BH18-9

Project No: OTT-00243143-A0

Project: Preliminary Geotechnical Investigation. Proposed Residential Development

Location: Fallowfield and Cedarview Roads, City of Ottawa, Ontario

Figure No. 12

Page. 1 of 1

Date Drilled: 'March 5, 2018

Drill Type: CME-55 Trackmount

Datum: Geodetic

Logged by: A.N. Checked by: I.T.

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Natural Unit Wt. kN/m³
		TOPSOIL ~200 mm	103.01	0	
		SILTY SAND Grey, moist to wet, rootlets present, (loose)	102.8		
		SILTY GRAVELLY BOULDERLY TILL Brown-grey to brown, wet to moist, (very loose to very dense)	102.1	1	
			101.49	2	23.3
		Borehole Terminated at 2.6 m Depth Upon Auger Refusal	100.4		

Standard Penetration Test N Value (20, 40, 60, 80); Shear Strength (50, 100, 150, 200 kPa); Combustible Vapour Reading (ppm) (250, 500, 750); Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20, 40, 60); SAMPLES

Observed values: 6, 2, 39, 50/75 mm

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	2.6	2.6
March 27, 2018	1.5	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

Log of Borehole BH18-10

Project No: OTT-00243143-A0

Project: Preliminary Geotechnical Investigation. Proposed Residential Development

Location: Fallowfield and Cedarview Roads, City of Ottawa, Ontario

Figure No. 13

Page. 1 of 1

Date Drilled: 'March 5, 2018

Drill Type: CME-55 Trackmount

Datum: Geodetic

Logged by: A.N. Checked by: I.T.

Split Spoon Sample	⊠	Combustible Vapour Reading	□
Auger Sample	◧	Natural Moisture Content	×
SPT (N) Value	○	Atterberg Limits	⊢—⊖
Dynamic Cone Test	——	Undrained Triaxial at % Strain at Failure	⊕
Shelby Tube	■	Shear Strength by Penetrometer Test	▲
Shear Strength by Vane Test	+ S		

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Natural Unit Wt. kN/m³
		TOPSOIL ~300 mm	102.8	0	
		SILTY GRAVELLY TILL With boulders and cobbles, grey, moist, (loose to very dense)	102.5		
				1	21.2
				2	22.9
		WEATHERED TO BOULDERLY TILL	100.6		
				3	
		LIMESTONE BEDROCK With horizontal and vertical fractures, thin shale partings, grey (excellent quality)	99.5	4	Run 1
				5	Run 1
				6	
		Borehole Terminated at 6.3 m Depth Upon Auger Refusal	96.5		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750

Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

SAMPLES

Observed values: SPT N = 5 (0.1 m), 23 (1.1 m), 54 (2.1 m), 84 (3.1 m)

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	2.2

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	3.3 - 4.8	80	40
2	4.8 - 6.3	91	55

Log of Borehole BH18-11

Project No: OTT-00243143-A0

Project: Preliminary Geotechnical Investigation. Proposed Residential Development

Location: Fallowfield and Cedarview Roads, City of Ottawa, Ontario

Figure No. 15

Page. 1 of 1

Date Drilled: 'March 5, 2018

Drill Type: CME-55 Trackmount

Datum: Geodetic

Logged by: A.N. Checked by: I.T.

Split Spoon Sample
Auger Sample
SPT (N) Value
Dynamic Cone Test
Shelby Tube
Shear Strength by Vane Test
Combustible Vapour Reading
Natural Moisture Content
Atterberg Limits
Undrained Triaxial at % Strain at Failure
Shear Strength by Penetrometer Test

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Natural Unit Wt. kN/m³
		TOPSOIL ~50 mm	102.06	0	
		FILL Mixture of sand and gravel, pieces of concrete and asphalt, moist, (compact)	102.0		
		GRAVELLY SAND TILL **Some silt trace clay, cobbles and boulders throughout, brown to grey, moist to wet, (compact to very dense)**	101.5	1	21.9
				2	22.0
				3	
				4	
		Borehole Terminated at 4.3 m Depth Upon Auger Refusal	97.8		

Standard Penetration Test N Value: 20 40 60 80
Shear Strength kPa: 50 100 150 200
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % / Atterberg Limits (% Dry Weight): 20 40 60

Standard Penetration Test N Value: 16, 11, 58, 56, 40, 60/125 mm

SAMPLES

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. 19 mm standpipe installed upon completion
3. Field work supervised by an **exp** representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00243143-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	3.0	4.3

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %

LOG OF BOREHOLE BH LOGS - 243143 - FALLOWFIELD CEDARVIEW GEOTECH.GPJ TROW OTTAWA.GDT 4/3/18

The standard terminology to describe cohesive soils includes consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer tests, unconfined compression tests or similar field and laboratory analysis, Standard Penetration Test 'N' values can also be used to provide an approximate indication of the consistency and shear strength of fine grained, cohesive soils:

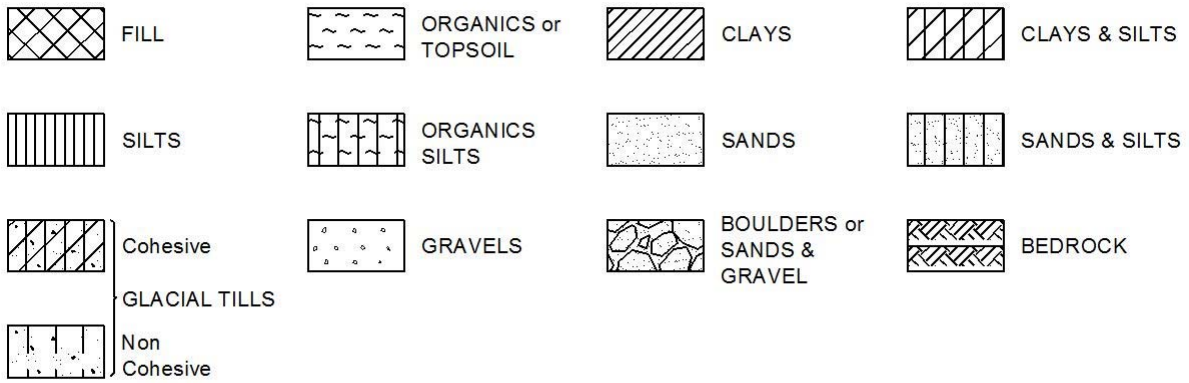
Table c: Consistency of Cohesive Soil

Consistency	Vane Shear Measurement (kPa)	'N' Value
Very Soft	<12.5	<2
Soft	12.5-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

Note: 'N' Value - The Standard Penetration Test records the number of blows of a 140 pound (64kg) hammer falling 30 inches (760mm), required to drive a 2 inch (50.8mm) O.D. split spoon sampler 1 foot (305mm). For split spoon samples where full penetration is not achieved, the number of blows is reported over the sampler penetration in meters (e.g. 50/0.15).

STRATA PLOT

Strata plots symbolize the soil or bedrock description. They are combinations of the following basic symbols:



WATER LEVEL MEASUREMENT

Appendix D - Analytical Summary Tables

TABLE 1 SOIL ANALYTICAL RESULTS *(µg/g)*
Petroleum Hydrocarbons (PHCs), and Benzene, Toluene, Ethylbenzene and Xylene (BTEX)
4190, 4200, 4210, 4236 Fallowfield Road and 2740 Cedarview Road, Ottawa, Ontario

Parameter	MOECC Table 1[1]	MOECC Table 2[2]	BH 1-SS1	BH 1-SS2	BH 2-SS1	BH 2-SS2	BH 4-2
Sample Date (d/m/y)	Background	Residential	23-Oct-17	23-Oct-17	23-Oct-17	23-Oct-17	20-Nov-17
Sample Depth (mbsg)			0.0 - 0.6	0.75 - 1.35	0.0 - 0.6	0.75 - 1.35	1.5 - 2.5
Benzene	0.02	0.21	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05	1.1	<0.05	<0.05	<0.05	<0.05	<0.02
Toluene	0.2	2.3	<0.05	<0.05	<0.05	<0.05	<0.02
Total Xylenes	0.05	26	<0.05	<0.05	<0.05	<0.05	<0.04
F1 (C6-C10)	25	55	<7	<7	<7	<7	<10
F2 (C10-C16 Hydrocarbons)	10	98	<4	<4	<4	<4	<10
F3 (C16-C34 Hydrocarbons)	240	300	<8	<8	<8	<8	<50
F4 (C34-C50 Hydrocarbons)	120	2800	<6	<6	<6	<6	<50

Parameter	MOECC Table 1[1]	MOECC Table 2[2]	BH 5-1	BH 5-11 (Dup of BH 5-1)	BH 6-1	BH 7-1
Sample Date (d/m/y)	Background	Residential	20-Nov-17	20-Nov-17	20-Nov-17	20-Nov-17
Sample Depth (mbsg)			0.0 - 1.5	0.0 - 1.5	0.75 - 1.5	0 - 0.9
Benzene	0.02	0.21	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05	1.1	<0.02	<0.02	<0.02	<0.02
Toluene	0.2	2.3	<0.02	<0.02	<0.02	<0.02
Total Xylenes	0.05	26	<0.04	<0.04	<0.04	<0.04
F1 (C6-C10)	25	55	<10	<10	<10	<10
F2 (C10-C16 Hydrocarbons)	10	98	<10	<10	<10	<10
F3 (C16-C34 Hydrocarbons)	240	300	<50	<50	<50	<50
F4 (C34-C50 Hydrocarbons)	120	2800	<50	<50	<50	<50

NOTES:

1	MOECC *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 1 background concentrations.*
2	MOECC *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 2 Potable Residential SCS, coarse grained soil.*
Bold	Concentration exceeds MOECC Table 1 Background Concentrations.
Shaded	Concentration exceeds MOECC Table 2 Residential SCS.

TABLE 2 SOIL ANALYTICAL RESULTS *(µg/g)*
METALS
4190, 4200, 4210, 4236 Fallowfield Road and 2740 Cedarview Road, Ottawa, Ontario

Parameter	**MOECC Table 1[1]**	**MOECC Table 2[2]**	**BH 1-SS1**	**BH 1-SS2**	**BH 2-SS1**	**BH 2-SS2**
Sample Date (d/m/y)	**Background**	**Residential**	23-Oct-17	23-Oct-17	23-Oct-17	23-Oct-17
Sample Depth (mbsg)			0.0 - 0.6	0.75 - 1.35	0.0 - 0.6	0.75 - 1.35
Antimony	1.3	7.5	< 1.0	< 1.0	< 1.0	< 1.0
Arsenic	18	18	< 1.0	< 1.0	< 1.0	< 1.0
Barium	220	390	121	101	117	57.5
Beryllium	2.5	4	< 1.0	< 1.0	< 1.0	< 1.0
Boron	36	120	8.1	6.9	9.3	5.4
Cadmium	1.2	1.2	< 0.5	< 0.5	< 0.5	< 0.5
Chromium	70	160	22.5	13.4	21.9	10.2
Cobalt	21	22	7.3	4.9	4.7	3.0
Copper	92	140	14.7	13.8	8.8	9.2
Lead	120	120	8.7	6.2	8.1	4.6
Molybdenum	2	6.9	< 1.0	< 1.0	< 1.0	< 1.0
Nickel	82	100	13.1	9.4	10.0	5.5
Selenium	1.5	2.4	< 1.0	< 1.0	< 1.0	< 1.0
Silver	0.5	20	< 0.5	< 0.5	< 0.5	< 0.5
Thallium	1	1	< 1.0	< 1.0	< 1.0	< 1.0
Uranium	2.5	23	< 1.0	< 1.0	< 1.0	< 1.0
Vanadium	86	86	34.6	22.9	31.1	16.5
Zinc	290	340	22.2	13.6	27.3	7.9

NOTES:

1	MOECC *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 1 background concentrations.*
2	MOECC *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 2 Potable Residential SCS, coarse grained soil.*
Bold	Concentration exceeds MOECC Table 1 Background Concentrations.
Shaded	Concentration exceeds MOECC Table 2 Residential SCS.

TABLE 3 GROUNDWATER ANALYTICAL RESULTS *(µg/L)*
Petroleum Hydrocarbons (PHCs), and Benzene, Toluene, Ethylbenzene and Xylene (BTEX
4190, 4200, 4210, 4236 Fallowfield Road and 2740 Cedarview Road, Ottawa, Ontario

Parameter	**MOECC Table 2[1]**	**BH18-4**
Sample Date (d/m/y)		27/3/18
Benzene	5	<0.50
Ethylbenzene	2.4	<0.50
Toluene	24	<0.50
Xylenes	300	<0.50
PHC F_1 (C_6-C_{10})	750	<25
PHC F_2 (>C_{10}-C_{16})	150	<100
PHC F_3 (>C_{16}-C_{34})	500	<100
PHC F_4 (>C_{34}-C_{50})	500	<100

NOTES:

1 MOECC *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 2 potable groundwater standards.*

Shaded Concentration exceeds MOECC Table 2 groundwater quality standard.

Appendix E – Laboratory Certificates of Analysis

PARACEL LABORATORIES LTD.
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300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

exp Services Inc. (Ottawa)

100-2650 Queensview Dr.
Ottawa, ON K2B 8K2
Attn: Daniel Clarke

Client PO: Fallowfield
Project: OTT000243143A
Custody: 40172

Report Date: 7-Nov-2017
Order Date: 1-Nov-2017

Order #: 1744312

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1744312-01	BH1-SS1
1744312-02	BH1-SS2
1744312-03	BH2-SS1
1744312-04	BH2-SS2

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Any use of these results implies your agreement that our total liabilty in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO: Fallowfield

Report Date: 07-Nov-2017
Order Date: 1-Nov-2017
Project Description: OTT000243143A

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	3-Nov-17	6-Nov-17
PHC F1	CWS Tier 1 - P&T GC-FID	3-Nov-17	6-Nov-17
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	2-Nov-17	5-Nov-17
REG 153: Metals by ICP/OES, soil	based on MOE E3470, ICP-OES	7-Nov-17	7-Nov-17
Solids, %	Gravimetric, calculation	7-Nov-17	7-Nov-17

PARACEL LABORATORIES LTD.

Order #: 1744312

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO: Fallowfield

Report Date: 07-Nov-2017
Order Date: 1-Nov-2017
Project Description: OTT000243143A

	Client ID:	BH1-SS1	BH1-SS2	BH2-SS1	BH2-SS2
	Sample Date:	23-Oct-17	23-Oct-17	23-Oct-17	23-Oct-17
	Sample ID:	1744312-01	1744312-02	1744312-03	1744312-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	86.9	92.0	85.7	90.3
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Barium	1.0 ug/g dry	121	101	117	57.5
Beryllium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Boron	1.0 ug/g dry	8.1	6.9	9.3	5.4
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	1.0 ug/g dry	22.5	13.4	21.9	10.2
Cobalt	1.0 ug/g dry	7.3	4.9	4.7	3.0
Copper	1.0 ug/g dry	14.7	13.8	8.8	9.2
Lead	1.0 ug/g dry	8.7	6.2	8.1	4.6
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	1.0 ug/g dry	13.1	9.4	10.0	5.5
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	1.0 ug/g dry	34.6	22.9	31.1	16.5
Zinc	1.0 ug/g dry	22.2	13.6	27.3	7.9
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene-d8	Surrogate	101%	94.3%	107%	98.1%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	1.0	ug/g						
Boron	ND	1.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	1.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	1.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	1.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.5	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	1.0	ug/g						
Zinc	ND	1.0	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*8.74*		*ug/g*		*109*	*50-140*			

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO: Fallowfield

Report Date: 07-Nov-2017
Order Date: 1-Nov-2017
Project Description: OTT000243143A

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Metals									
Antimony	ND	1.0	ug/g dry	ND			0.0	30	
Arsenic	3.15	1.0	ug/g dry	ND			0.0	30	
Barium	21.5	1.0	ug/g dry	22.5			4.6	30	
Beryllium	ND	1.0	ug/g dry	ND			0.0	30	
Boron	10.5	1.0	ug/g dry	12.1			14.1	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	10.3	1.0	ug/g dry	11.1			7.0	30	
Cobalt	1.93	1.0	ug/g dry	2.18			12.2	30	
Copper	5.95	1.0	ug/g dry	6.67			11.4	30	
Lead	11.8	1.0	ug/g dry	13.1			10.6	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	5.19	1.0	ug/g dry	5.01			3.4	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	ND	0.5	ug/g dry	ND			0.0	30	
Thallium	1.06	1.0	ug/g dry	ND			0.0	30	
Uranium	ND	1.0	ug/g dry	ND				30	
Vanadium	7.87	1.0	ug/g dry	8.50			7.7	30	
Zinc	32.6	1.0	ug/g dry	36.5			11.3	30	
Physical Characteristics									
% Solids	86.0	0.1	% by Wt.	85.7			0.4	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	*7.97*		*ug/g dry*		*107*	*50-140*			

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO: Fallowfield

Report Date: 07-Nov-2017
Order Date: 1-Nov-2017
Project Description: OTT000243143A

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	194	7	ug/g		97.1	80-120			
F2 PHCs (C10-C16)	129	4	ug/g	ND	114	60-140			
F3 PHCs (C16-C34)	299	8	ug/g	ND	128	60-140			
F4 PHCs (C34-C50)	177	6	ug/g	ND	114	60-140			
Metals									
Antimony	244		ug/L	5.71	95.2	70-130			
Arsenic	281		ug/L	ND	112	70-130			
Barium	647		ug/L	450	78.9	70-130			
Beryllium	237		ug/L	2.16	93.9	70-130			
Boron	439		ug/L	241	79.0	70-130			
Cadmium	239		ug/L	3.97	94.0	70-130			
Chromium	411		ug/L	222	75.6	70-130			
Cobalt	247		ug/L	43.7	81.2	70-130			
Copper	370		ug/L	133	94.8	70-130			
Lead	449		ug/L	262	74.6	70-130			
Molybdenum	227		ug/L	14.7	84.9	70-130			
Nickel	307		ug/L	100	82.6	70-130			
Selenium	221		ug/L	16.3	82.0	70-130			
Silver	242		ug/L	7.49	93.7	70-130			
Thallium	207		ug/L	ND	82.6	70-130			
Uranium	268		ug/L	ND	107	70-130			
Vanadium	384		ug/L	170	85.8	70-130			
Zinc	1250		ug/L	1030	89.4	70-130			
Volatiles									
Benzene	4.10	0.02	ug/g		102	60-130			
Ethylbenzene	4.01	0.05	ug/g		100	60-130			
Toluene	4.37	0.05	ug/g		109	60-130			
m,p-Xylenes	8.54	0.05	ug/g		107	60-130			
o-Xylene	4.52	0.05	ug/g		113	60-130			
Surrogate: Toluene-d8	*8.04*		*ug/g*		*100*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Container(s) - Bottle and COC sample ID don't match - Vial read as BH2-SS1 on label, but lid reads as BH2-SS2.

Applies to samples: BH2-SS2

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

Head Office

PARACEL LABORATORIES LTD. | TRUSTED . RESPONSI\ RELIABLE .

Paracel ID: 1744312

Chain of Custody (Lab Use Only)

№ 40172

Page 1 of 1

Client Name: exp	Project Reference: OTT-00243143-A
Contact Name: Daniel Clarke/Chris Kimmerly	Quote #:
Address: 100-2650 Queensview Drive, Ottawa	PO #: Fallow Field
	Email Address: Daniel.Clarke@exp.com chris.Kimmerly@exp.com
Telephone: 613-688-1899	

Turnaround Time: ☐ 1 Day ☐ 3 Day ☐ 2 Day ☒ Regular Date Required: _____

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 1 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: _____ ☐ Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number: 1744312

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHC F1-F4	BTEX	metals ICP-MS							
1	BH1-SS1	S		2	Oct 23, 2017		X	X	X		250 ml + MEOH vial					
2	BH1-SS2	↓		↓	↓		↓	↓	↓			↓				
3	BH2-SS1															
4	BH2-SS2												vial reads BH2-SS1, lid read BH2-SS2			
5																
6	↳ Go with SS2 on lid per Daniel Clarke. SC															
7																
8																
9																
10																

Comments: ~~Client to confirm metals parameters required.~~

Method of Delivery: Walk-in

Relinquished By (Sign): [signature]	Received by Driver/Depot: Karen Cull	Received at Lab: Rachel Subject	Verified By: [signature]
Relinquished By (Print): Jeff O.	Date/Time: Nov 1/17 1:13	Date/Time: NOV 1/17.	Date/Time: NOV 1/17 5:27p
Date/Time: Nov. 1. 2017	Temperature: 7.4 °C	Temperature: 11.1 °C 4:53	pH Verified [ ] By:

Maxxam
A Bureau Veritas Group Company

Your Project #: OTT-00243143
Your C.O.C. #: 102536

Attention:Daniel Clarke

exp Services Inc
Ottawa Branch
100-2650 Queensview Drive
Ottawa, ON
K2B 8H6

Report Date: 2017/11/23
Report #: R4872488
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B7Q0802
Received: 2017/11/20, 13:10

Sample Matrix: Soil
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Petroleum Hydro. CCME F1 & BTEX in Soil (1)	1	N/A	2017/11/22	OTT SOP-00002	CCME CWS
Petroleum Hydro. CCME F1 & BTEX in Soil (1)	4	N/A	2017/11/23	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil (2)	5	2017/11/21	2017/11/21	OTT SOP-00001	CCME CWS
Moisture	5	N/A	2017/11/21	CAM SOP-00445	McKeague 2nd ed 1978

Remarks:

Maxxam Analytics' laboratories are accredited to ISO/IEC 17025:2005 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by Maxxam are based upon recognized Provincial, Federal or US method compendia such as CCME, MDDELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and Maxxam in writing). All data is in statistical control and has met quality control and method performance criteria unless otherwise noted. All method blanks are reported: unless indicated otherwise, associated sample data are not blank corrected.

Maxxam Analytics' liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. Maxxam has been retained to provide analysis of samples provided by the Client using the testing methodology referenced in this report. Interpretation and use of test results are the sole responsibility of the Client and are not within the scope of services provided by Maxxam, unless otherwise agreed in writing.

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.

Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.

* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

(1) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is the date sampled unless otherwise stated.
(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

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Your Project #: OTT-00243143
Your C.O.C. #: 102536

Attention:Daniel Clarke

exp Services Inc
Ottawa Branch
100-2650 Queensview Drive
Ottawa, ON
K2B 8H6

Report Date: 2017/11/23
Report #: R4872488
Version: 3 - Revision

CERTIFICATE OF ANALYSIS – REVISED REPORT

MAXXAM JOB #: B7Q0802
Received: 2017/11/20, 13:10

Encryption Key

Jonathan Urben
Senior Project Manager
23 Nov 2017 11:31:52

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alison Cameron, Project Manager
Email: ACameron@maxxam.ca
Phone# (613) 274-0573

==========

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B7Q0802
Report Date: 2017/11/23

exp Services Inc
Client Project #: OTT-00243143
Sampler Initials: JO

RESULTS OF ANALYSES OF SOIL

Maxxam ID		FOY587	FOY588	FOY589	FOY590	FOY591		
Sampling Date		2017/11/20	2017/11/20	2017/11/20	2017/11/20	2017/11/20		
COC Number		102536	102536	102536	102536	102536		
	UNITS	**BH 4-2**	**BH 5-1**	**BH 5-11**	**BH 6-1**	**BH 7-1**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	10	19	11	10	13	0.2	5275884

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B7Q0802
Report Date: 2017/11/23

exp Services Inc
Client Project #: OTT-00243143
Sampler Initials: JO

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID			FOY587			FOY587			FOY588		
Sampling Date			2017/11/20			2017/11/20			2017/11/20		
COC Number			102536			102536			102536		
	UNITS	**Criteria**	**BH 4-2**	**RDL**	**QC Batch**	**BH 4-2 Lab-Dup**	**RDL**	**QC Batch**	**BH 5-1**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons											
Benzene	ug/g	**0.32**	<0.02	0.02	5278479	<0.02	0.02	5278479	<0.02	0.02	5278479
Toluene	ug/g	**68**	<0.02	0.02	5278479	<0.02	0.02	5278479	<0.02	0.02	5278479
Ethylbenzene	ug/g	**9.5**	<0.02	0.02	5278479	<0.02	0.02	5278479	<0.02	0.02	5278479
o-Xylene	ug/g	**-**	<0.02	0.02	5278479	<0.02	0.02	5278479	<0.02	0.02	5278479
p+m-Xylene	ug/g	**-**	<0.04	0.04	5278479	<0.04	0.04	5278479	<0.04	0.04	5278479
Total Xylenes	ug/g	**26**	<0.04	0.04	5278479	<0.04	0.04	5278479	<0.04	0.04	5278479
F1 (C6-C10)	ug/g	**55**	<10	10	5278479	<10	10	5278479	<10	10	5278479
F1 (C6-C10) - BTEX	ug/g	**55**	<10	10	5278479	<10	10	5278479	<10	10	5278479
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/g	**230**	<10	10	5275886				<10	10	5275886
F3 (C16-C34 Hydrocarbons)	ug/g	**1700**	<50	50	5275886				<50	50	5275886
F4 (C34-C50 Hydrocarbons)	ug/g	**3300**	<50	50	5275886				<50	50	5275886
Reached Baseline at C50	ug/g	**-**	Yes		5275886				Yes		5275886
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	**-**	89		5278479	81		5278479	76		5278479
4-Bromofluorobenzene	%	**-**	104		5278479	96		5278479	91		5278479
D10-Ethylbenzene	%	**-**	125		5278479	128		5278479	122		5278479
D4-1,2-Dichloroethane	%	**-**	105		5278479	104		5278479	87		5278479
o-Terphenyl	%	**-**	93		5275886				96		5275886

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
Soil - Industrial/Commercial/Community- Coarse Texture

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Maxxam Job #: B7Q0802
Report Date: 2017/11/23

exp Services Inc
Client Project #: OTT-00243143
Sampler Initials: JO

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID			FOY589	FOY590			FOY590			FOY591		
Sampling Date			2017/11/20	2017/11/20			2017/11/20			2017/11/20		
COC Number			102536	102536			102536			102536		
	UNITS	**Criteria**	**BH 5-11**	**BH 6-1**	**RDL**	**QC Batch**	**BH 6-1 Lab-Dup**	**RDL**	**QC Batch**	**BH 7-1**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons												
Benzene	ug/g	**0.32**	<0.02	<0.02	0.02	5278479				<0.02	0.02	5278479
Toluene	ug/g	**68**	<0.02	<0.02	0.02	5278479				<0.02	0.02	5278479
Ethylbenzene	ug/g	**9.5**	<0.02	<0.02	0.02	5278479				<0.02	0.02	5278479
o-Xylene	ug/g	**-**	<0.02	<0.02	0.02	5278479				<0.02	0.02	5278479
p+m-Xylene	ug/g	**-**	<0.04	<0.04	0.04	5278479				<0.04	0.04	5278479
Total Xylenes	ug/g	**26**	<0.04	<0.04	0.04	5278479				<0.04	0.04	5278479
F1 (C6-C10)	ug/g	**55**	<10	<10	10	5278479				<10	10	5278479
F1 (C6-C10) - BTEX	ug/g	**55**	<10	<10	10	5278479				<10	10	5278479
F2-F4 Hydrocarbons												
F2 (C10-C16 Hydrocarbons)	ug/g	**230**	<10	<10	10	5275890	<10	10	5275890	<10	10	5275890
F3 (C16-C34 Hydrocarbons)	ug/g	**1700**	<50	<50	50	5275890	<50	50	5275890	<50	50	5275890
F4 (C34-C50 Hydrocarbons)	ug/g	**3300**	<50	<50	50	5275890	<50	50	5275890	<50	50	5275890
Reached Baseline at C50	ug/g	**-**	Yes	Yes		5275890	Yes		5275890	Yes		5275890
Surrogate Recovery (%)												
1,4-Difluorobenzene	%	**-**	85	90		5278479				95		5278479
4-Bromofluorobenzene	%	**-**	97	106		5278479				108		5278479
D10-Ethylbenzene	%	**-**	117	124		5278479				129		5278479
D4-1,2-Dichloroethane	%	**-**	97	101		5278479				112		5278479
o-Terphenyl	%	**-**	91	91		5275890	91		5275890	91		5275890

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate
Criteria: Ontario Reg. 153/04 (Amended April 15, 2011)
Table 3: Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition
Soil - Industrial/Commercial/Community- Coarse Texture

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Maxxam Job #: B7Q0802
Report Date: 2017/11/23

exp Services Inc
Client Project #: OTT-00243143
Sampler Initials: JO

TEST SUMMARY

Maxxam ID: FOY587
Sample ID: BH 4-2
Matrix: Soil

Collected: 2017/11/20
Shipped:
Received: 2017/11/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5278479	N/A	2017/11/22	Lyndsey Hart
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5275886	2017/11/21	2017/11/21	Arezoo Habibagahi
Moisture	BAL	5275884	N/A	2017/11/21	Arezoo Habibagahi

Maxxam ID: FOY587 Dup
Sample ID: BH 4-2
Matrix: Soil

Collected: 2017/11/20
Shipped:
Received: 2017/11/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5278479	N/A	2017/11/23	Lyndsey Hart

Maxxam ID: FOY588
Sample ID: BH 5-1
Matrix: Soil

Collected: 2017/11/20
Shipped:
Received: 2017/11/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5278479	N/A	2017/11/23	Lyndsey Hart
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5275886	2017/11/21	2017/11/21	Arezoo Habibagahi
Moisture	BAL	5275884	N/A	2017/11/21	Arezoo Habibagahi

Maxxam ID: FOY589
Sample ID: BH 5-11
Matrix: Soil

Collected: 2017/11/20
Shipped:
Received: 2017/11/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5278479	N/A	2017/11/23	Lyndsey Hart
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5275890	2017/11/21	2017/11/21	Arezoo Habibagahi
Moisture	BAL	5275884	N/A	2017/11/21	Arezoo Habibagahi

Maxxam ID: FOY590
Sample ID: BH 6-1
Matrix: Soil

Collected: 2017/11/20
Shipped:
Received: 2017/11/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5278479	N/A	2017/11/23	Lyndsey Hart
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5275890	2017/11/21	2017/11/21	Arezoo Habibagahi
Moisture	BAL	5275884	N/A	2017/11/21	Arezoo Habibagahi

Maxxam ID: FOY590 Dup
Sample ID: BH 6-1
Matrix: Soil

Collected: 2017/11/20
Shipped:
Received: 2017/11/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5275890	2017/11/21	2017/11/21	Arezoo Habibagahi

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Maxxam Job #: B7Q0802
Report Date: 2017/11/23

exp Services Inc
Client Project #: OTT-00243143
Sampler Initials: JO

TEST SUMMARY

Maxxam ID: FOY591
Sample ID: BH 7-1
Matrix: Soil

Collected: 2017/11/20
Shipped:
Received: 2017/11/20

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5278479	N/A	2017/11/23	Lyndsey Hart
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5275890	2017/11/21	2017/11/21	Arezoo Habibagahi
Moisture	BAL	5275884	N/A	2017/11/21	Arezoo Habibagahi

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Maxxam Job #: B7Q0802
Report Date: 2017/11/23

exp Services Inc
Client Project #: OTT-00243143
Sampler Initials: JO

GENERAL COMMENTS

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

Package 1	8.3°C

Revised Report (2017/11/23): Client sample IDs changed as per client request.

Results relate only to the items tested.

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Maxxam Job #: B7Q0802
Report Date: 2017/11/23

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-00243143
Sampler Initials: JO

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5275886	o-Terphenyl	2017/11/21	88	30 - 130	94	30 - 130	89	%		
5275890	o-Terphenyl	2017/11/21	99	30 - 130	96	30 - 130	91	%		
5278479	1,4-Difluorobenzene	2017/11/22	71	60 - 140	84	60 - 140	87	%		
5278479	4-Bromofluorobenzene	2017/11/22	80	60 - 140	101	60 - 140	103	%		
5278479	D10-Ethylbenzene	2017/11/22	112	30 - 130	116	30 - 130	122	%		
5278479	D4-1,2-Dichloroethane	2017/11/22	83	60 - 140	101	60 - 140	97	%		
5275884	Moisture	2017/11/21							1.0	50
5275886	F2 (C10-C16 Hydrocarbons)	2017/11/21	74	50 - 130	81	80 - 120	<10	ug/g	4.3	50
5275886	F3 (C16-C34 Hydrocarbons)	2017/11/21	74	50 - 130	81	80 - 120	<50	ug/g	NC	50
5275886	F4 (C34-C50 Hydrocarbons)	2017/11/21	74	50 - 130	81	80 - 120	<50	ug/g	NC	50
5275890	F2 (C10-C16 Hydrocarbons)	2017/11/21	87	50 - 130	87	80 - 120	<10	ug/g	NC	50
5275890	F3 (C16-C34 Hydrocarbons)	2017/11/21	87	50 - 130	87	80 - 120	<50	ug/g	NC	50
5275890	F4 (C34-C50 Hydrocarbons)	2017/11/21	87	50 - 130	87	80 - 120	<50	ug/g	NC	50
5278479	Benzene	2017/11/23	99	60 - 140	110	60 - 140	<0.02	ug/g	NC	50
5278479	Ethylbenzene	2017/11/23	102	60 - 140	110	60 - 140	<0.02	ug/g	NC	50
5278479	F1 (C6-C10) - BTEX	2017/11/23					<10	ug/g	NC	50
5278479	F1 (C6-C10)	2017/11/23	104	60 - 140	104	80 - 120	<10	ug/g	NC	50
5278479	o-Xylene	2017/11/23	102	60 - 140	110	60 - 140	<0.02	ug/g	NC	50
5278479	p+m-Xylene	2017/11/23	103	60 - 140	111	60 - 140	<0.04	ug/g	NC	50
5278479	Toluene	2017/11/23	94	60 - 140	100	60 - 140	<0.02	ug/g	NC	50
5278479	Total Xylenes	2017/11/23					<0.04	ug/g	NC	50

Duplicate: Paired analysis of a separate portion of the same sample. Used to evaluate the variance in the measurement.

Matrix Spike: A sample to which a known amount of the analyte of interest has been added. Used to evaluate sample matrix interference.

Spiked Blank: A blank matrix sample to which a known amount of the analyte, usually from a second source, has been added. Used to evaluate method accuracy.

Method Blank: A blank matrix containing all reagents used in the analytical procedure. Used to identify laboratory contamination.

Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

NC (Duplicate RPD): The duplicate RPD was not calculated. The concentration in the sample and/or duplicate was too low to permit a reliable RPD calculation (absolute difference <= 2x RDL).

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Maxxam Job #: B7Q0802
Report Date: 2017/11/23

exp Services Inc
Client Project #: OTT-00243143
Sampler Initials: JO

VALIDATION SIGNATURE PAGE

The analytical data and all QC contained in this report were reviewed and validated by the following individual(s).

Steve Roberts, Ottawa Lab Manager

Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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6740 Campobello Road, Mississauga, Ontario L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5779 Toll Free: 800-563-6266
CAM FCD-01191/3

CHAIN OF CUSTODY RECORD 102536

Page ____ of ____

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	Exp Services	Company Name:	Exp Services	Quotation #:	Stream 3	☐ Regular TAT (5-7 days) Most analyses
Contact Name:		Contact Name:	Dan Clarke	P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	2610 Queensview Dr	Address:		Project #:	OTT-00243143	Rush TAT (Surcharges will be applied)
				Site Location:		☐ 1 Day ☒ 2 Days ☐ 3-4 Days
Phone:	613-688-1899	Phone:	Fax:	Site #:		
Email:		Email:	~~Dan.cl~~ Daniel.Clarke@exp.com	Sampled By:	Jeff O	Date Required:

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

Rush Confirmation #:

Regulation 153: ☐ Table 1 ☐ Res/Park ☐ Med/ Fine; ☐ Table 2 ☐ Ind/Comm ☐ Coarse; ☒ Table 3 ☐ Agri/ Other; ☐ Table ____; FOR RSC (PLEASE CIRCLE) Y / N

Other Regulations: ☐ CCME ☐ Sanitary Sewer Bylaw; ☐ MISA ☐ Storm Sewer Bylaw; ☐ PWQO Region ____; ☐ Other (Specify) ____; ☐ REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

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

LABORATORY USE ONLY

CUSTODY SEAL Y / N Present	Intact	COOLER TEMPERATURES
Y	Y	8.9

COOLING MEDIA PRESENT: (Y) / N

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	HOLD- DO NOT ANALYZE	COMMENTS
1	BH1-2	2017/11/20		Soil	4		✓	✓						
2	BH2-1				4									
3	BH2-11				4									
4	BH3-1		See Bottle(s)		4									
5	BH4				4									On ice
6														
7														
8														
9														
10														

RECEIVED IN OTTAWA
20-Nov-17 13:10
Alison Cameron
B7Q0802
MVA OTT-001

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
[signature]	2017.11.20	1:10	Mariana Kasion Kasion	2017/11/20	13:10	
Jeff O.						

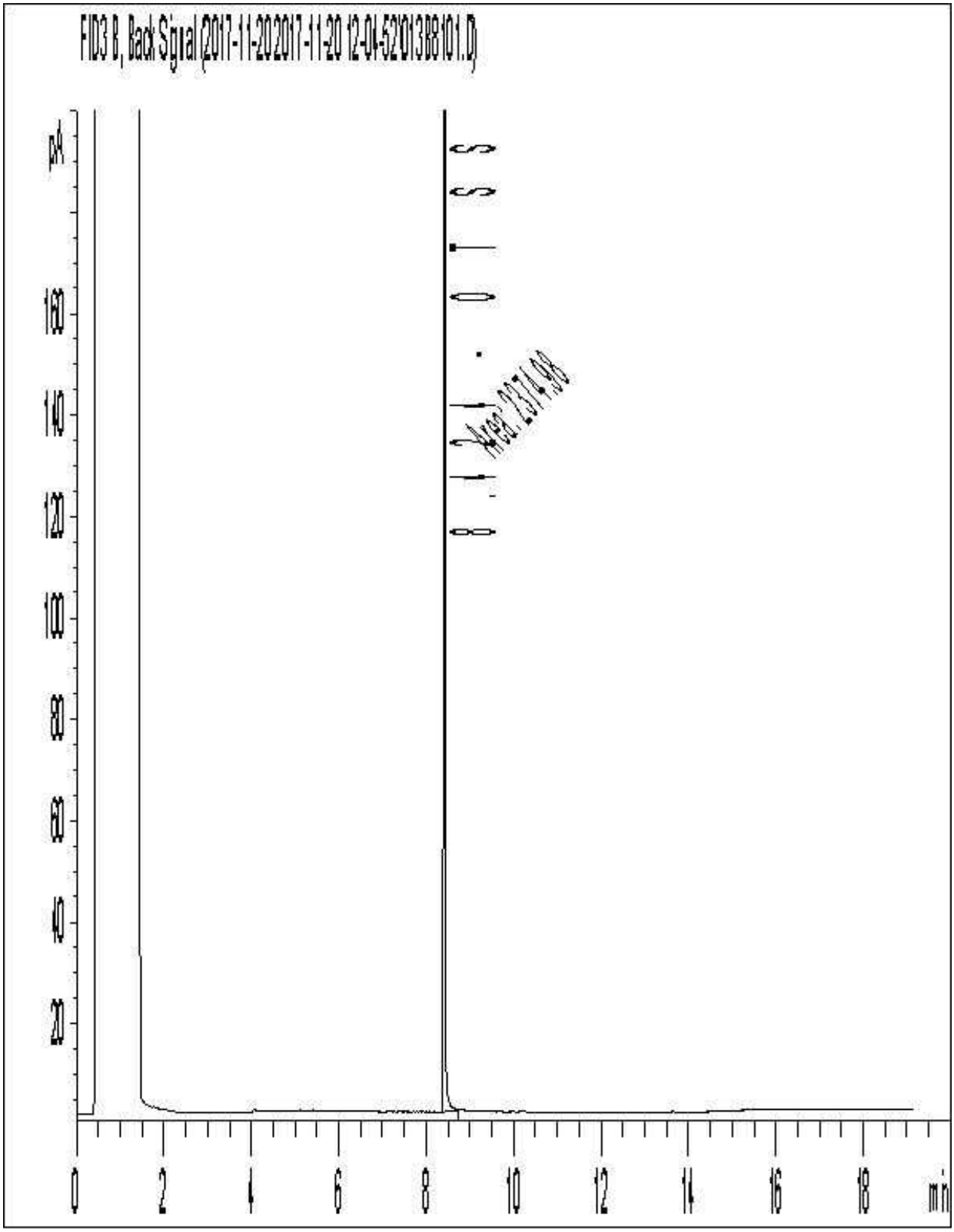
Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms. Sample container, preservation, hold time and packages information can be viewed at http://maxxam.ca/wp-content/uploads/Ontario-COC.pdf.

COC-1004 (03/17) White: Maxxam – Yellow: Client

Maxxam Job #: B7Q0802
Report Date: 2017/11/23
Maxxam Sample: FOY587

exp Services Inc
Client Project #: OTT-00243143
Client ID: BH 4-2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

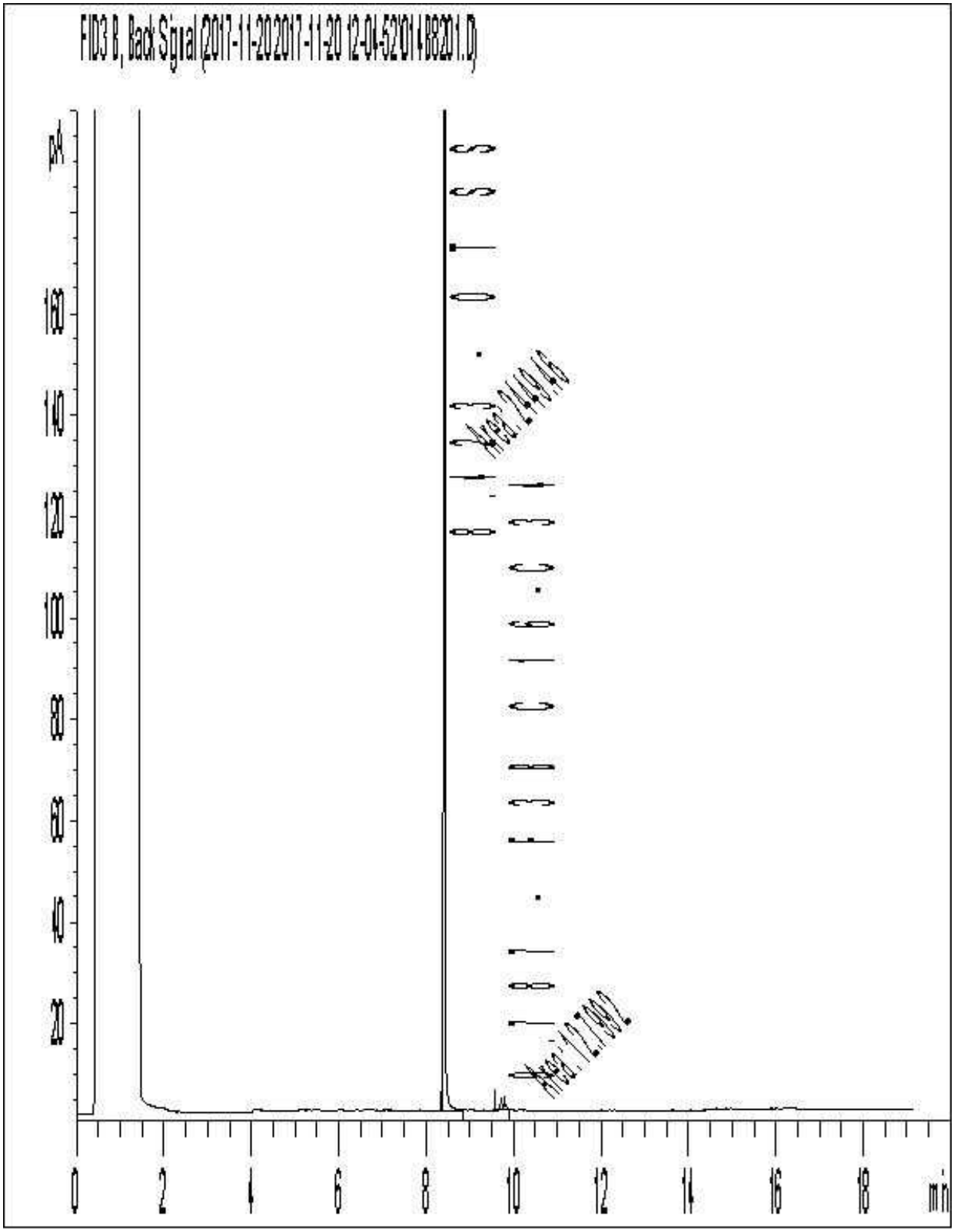


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7Q0802
Report Date: 2017/11/23
Maxxam Sample: FOY588

exp Services Inc
Client Project #: OTT-00243143
Client ID: BH 5-1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

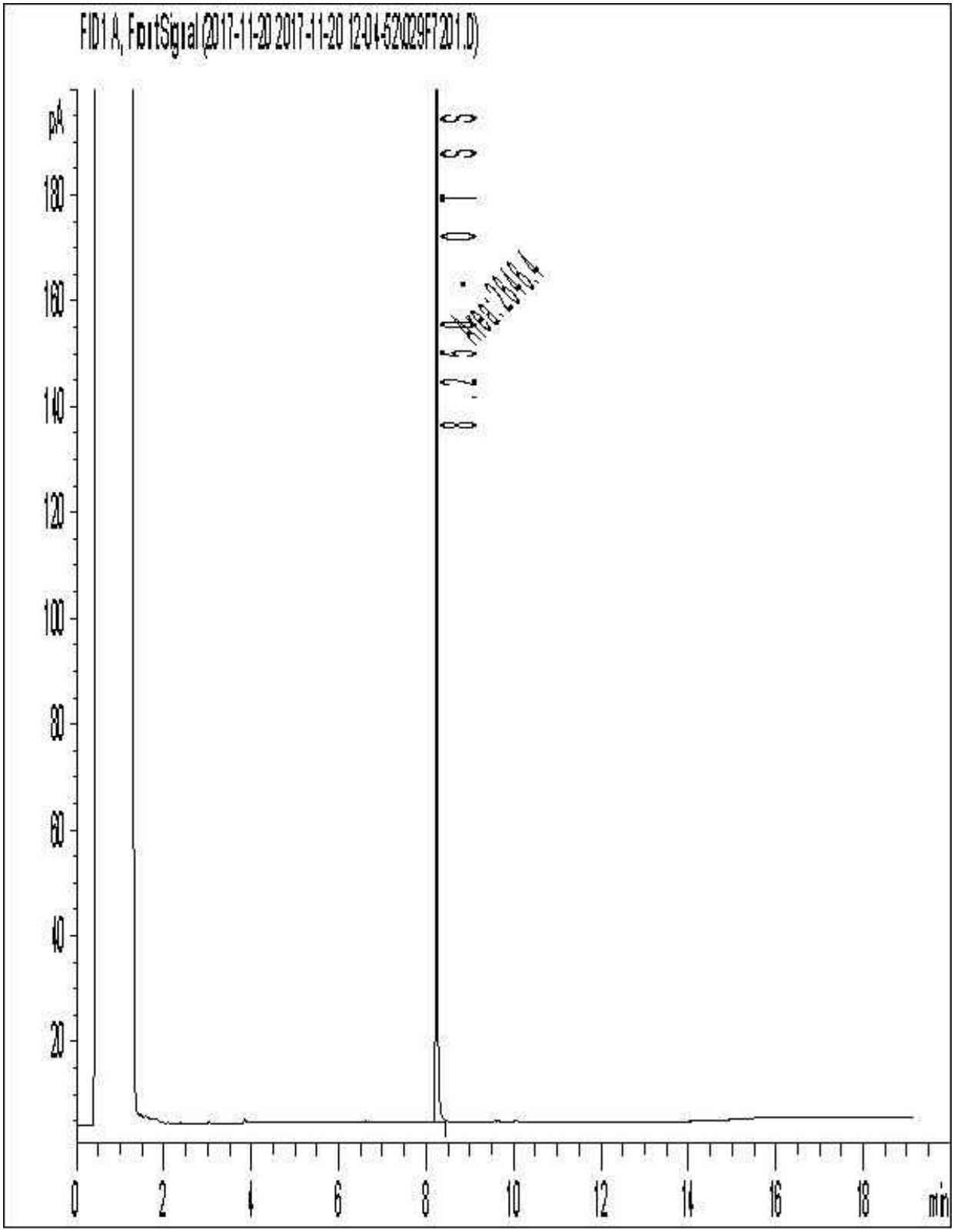


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7Q0802
Report Date: 2017/11/23
Maxxam Sample: FOY589

exp Services Inc
Client Project #: OTT-00243143
Client ID: BH 5-11

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

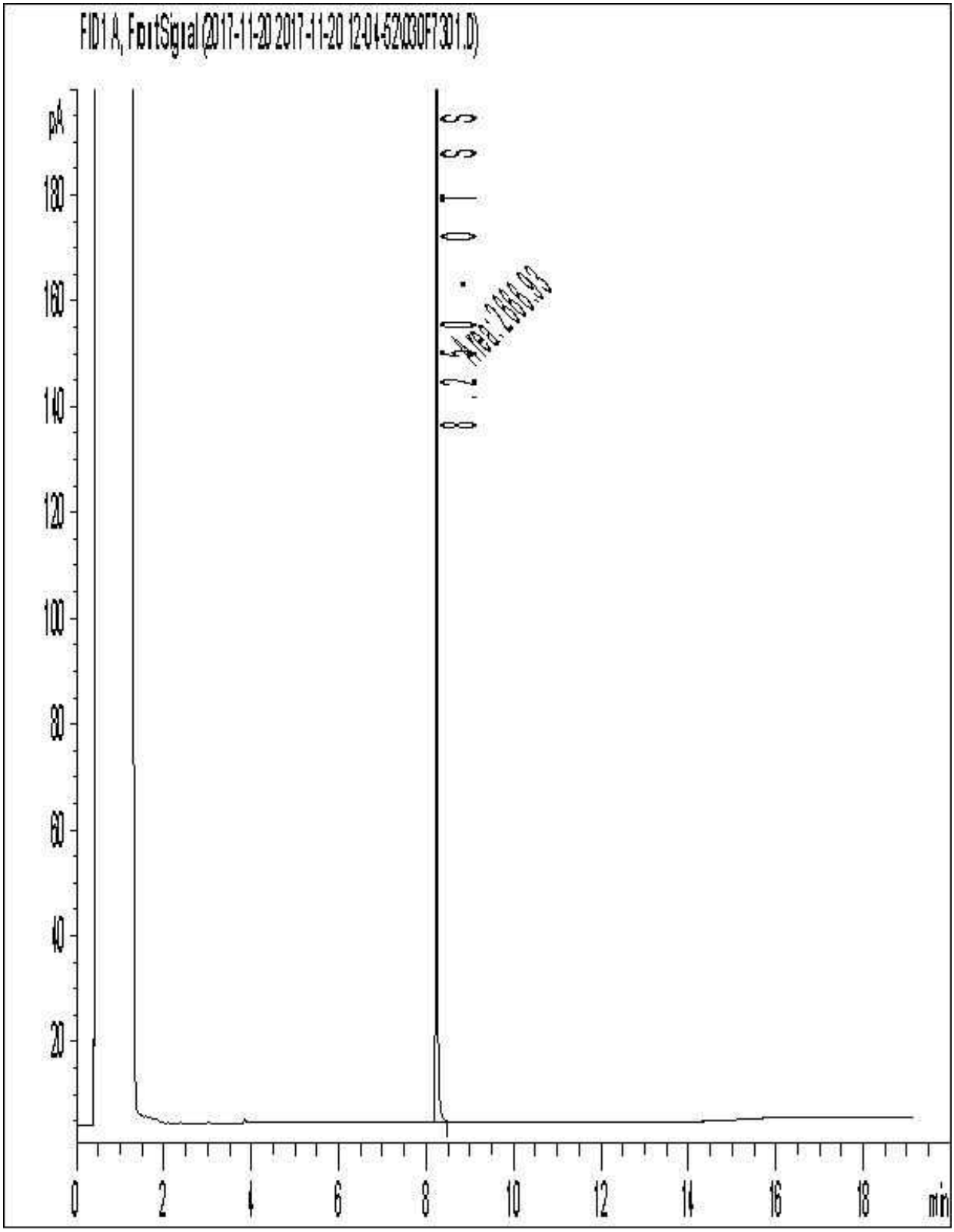


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7Q0802
Report Date: 2017/11/23
Maxxam Sample: FOY590

exp Services Inc
Client Project #: OTT-00243143
Client ID: BH 6-1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

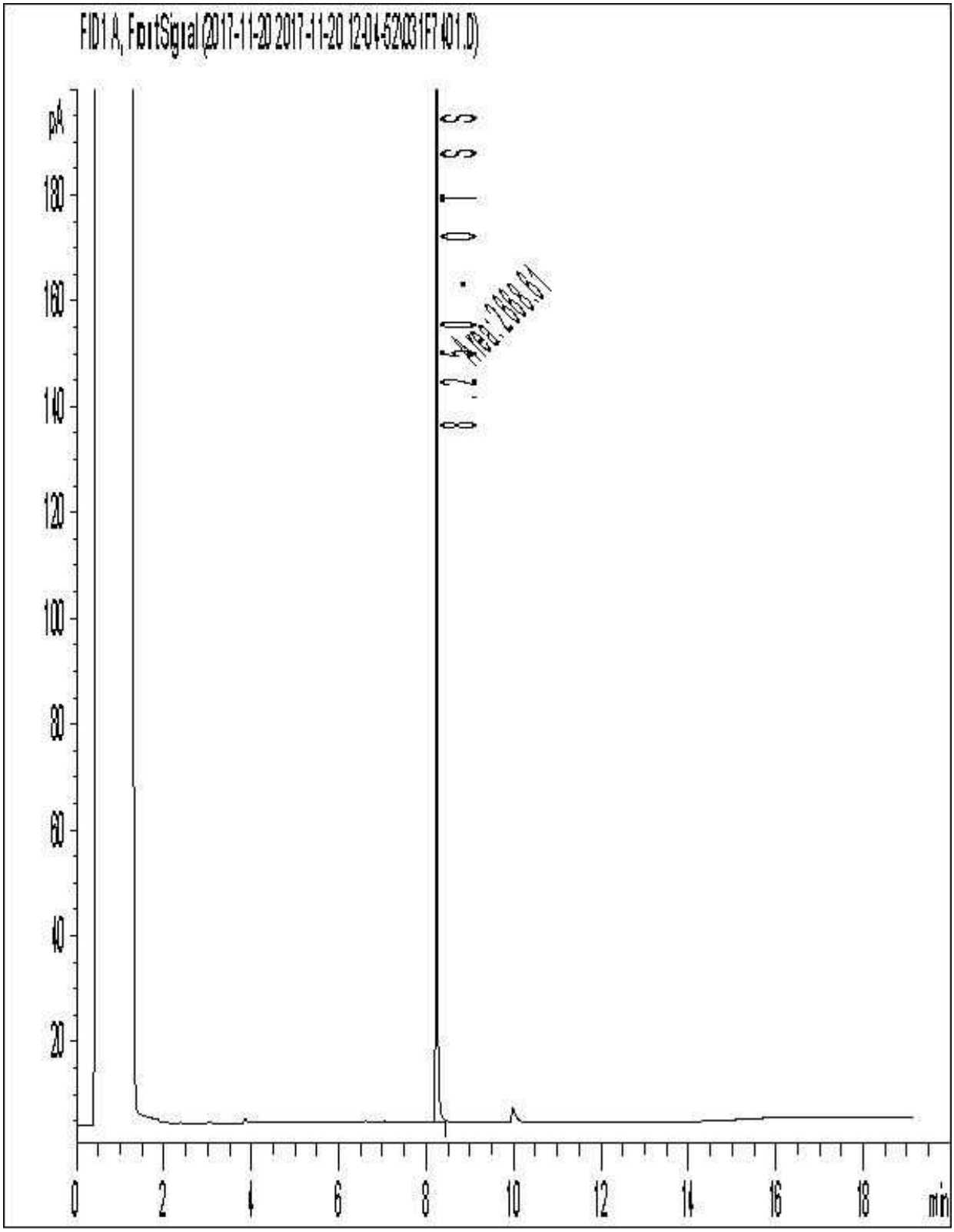


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7Q0802
Report Date: 2017/11/23
Maxxam Sample: FOY590 Lab-Dup

exp Services Inc
Client Project #: OTT-00243143
Client ID: BH 6-1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

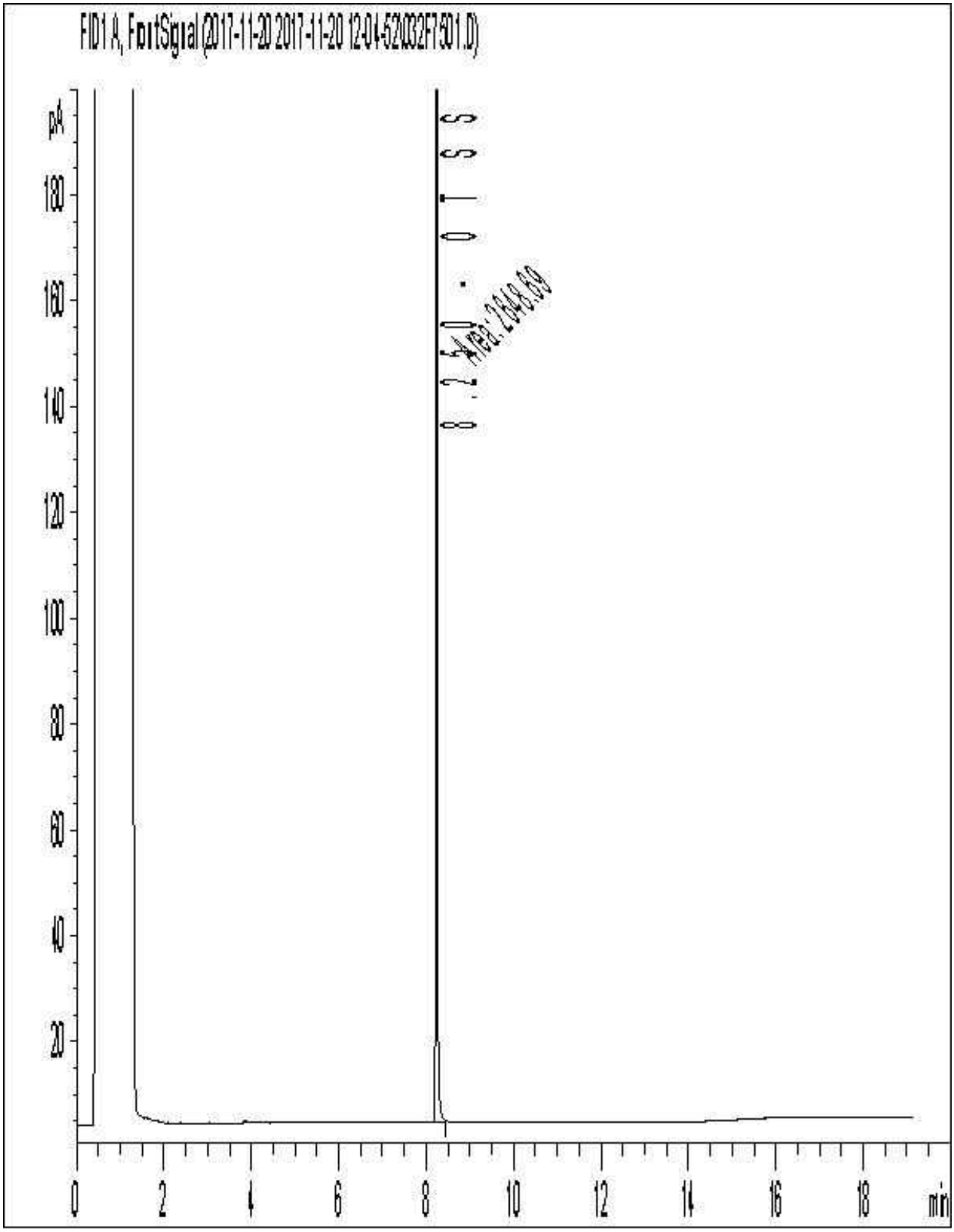


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B7Q0802
Report Date: 2017/11/23
Maxxam Sample: FOY591

exp Services Inc
Client Project #: OTT-00243143
Client ID: BH 7-1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

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

CLIENT NAME: **EXP SERVICES INC**
2650 QUEENSVIEW DRIVE, UNIT 100
OTTAWA, ON K2B8H6
(613) 688-1899

ATTENTION TO: **Ismail M. Taki**

PROJECT: **OTT-243143-AO**

AGAT WORK ORDER: **18Z319208**

SOIL ANALYSIS REVIEWED BY: **Amanjot Bhela, Inorganic Coordinator**

DATE REPORTED: **Mar 16, 2018**

PAGES (INCLUDING COVER): **5**

VERSION*: **1**

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

NOTES

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

Member of: Association of Professional Engineers and Geoscientists of Alberta (APEGA)
Western Enviro-Agricultural Laboratory Association (WEALA)
Environmental Services Association of Alberta (ESAA)

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

Results relate only to the items tested and to all the items tested
All reportable information as specified by ISO 17025:2005 is available from AGAT Laboratories upon request

AGAT Laboratories

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

Certificate of Analysis

AGAT WORK ORDER: 18Z319208

PROJECT: OTT-243143-AO

CLIENT NAME: EXP SERVICES INC

ATTENTION TO: Ismail M. Taki

SAMPLING SITE:Fallowfield Rd.

SAMPLED BY:exp

Inorganic Chemistry (Soil)

DATE RECEIVED: 2018-03-12 **DATE REPORTED: 2018-03-16**

				BH4 SS4 7.	BH8 SS4 7.		
		SAMPLE DESCRIPTION:		5'-9.5'	5'-9.5'	BH9 SS3 5'-7'	BH11 SS3 5'-7'
		SAMPLE TYPE:		Water	Water	Water	Water
		DATE SAMPLED:		2018-03-06	2018-03-06	2018-03-06	2018-03-06
Parameter	**Unit**	**G / S**	**RDL**	**9118773**	**9118774**	**9118775**	**9118776**
pH (2:1)	pH Units		N/A	8.03	7.75	8.05	8.34
Sulphate (2:1)	µg/g		2	5	4	14	20
Electrical Conductivity (2:1)	mS/cm		0.005	0.101	0.151	0.168	0.106

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

9118773-9118776 EC, Sulphate and pH were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil).

Certified By: Amanjot Bhela

Results relate only to the items tested and to all the items tested

AGAT Laboratories

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

Quality Assurance

CLIENT NAME: EXP SERVICES INC

PROJECT: OTT-243143-AO

SAMPLING SITE:Fallowfield Rd.

AGAT WORK ORDER: 18Z319208

ATTENTION TO: Ismail M. Taki

SAMPLED BY:exp

Soil Analysis

RPT Date: Mar 16, 2018			DUPLICATE				REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD	Method Blank	Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Inorganic Chemistry (Soil)															
pH (2:1)	9118773	9118773	8.03	8.10	0.9%	N/A	99%	90%	110%	NA			NA		
Sulphate (2:1)	9118773	9118773	5	5	NA	< 2	104%	70%	130%	105%	70%	130%	94%	70%	130%
Electrical Conductivity (2:1)	9118773	9118773	0.101	0.102	1.0%	< 0.005	97%	90%	110%	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: Amanjot Bhela

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

Results relate only to the items tested and to all the items tested

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

Method Summary

CLIENT NAME: EXP SERVICES INC

AGAT WORK ORDER: 18Z319208

PROJECT: OTT-243143-AO

ATTENTION TO: Ismail M. Taki

SAMPLING SITE:Fallowfield Rd.

SAMPLED BY:exp

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
pH (2:1)	INOR 93-6031	MSA part 3 & SM 4500-H+ B	PH METER
Sulphate (2:1)	INOR-93-6004	McKeague 4.12 & SM 4110 B	ION CHROMATOGRAPH
Electrical Conductivity (2:1)	INOR-93-6036	McKeague 4.12, SM 2510 B	EC METER

Results relate only to the items tested and to all the items tested

AGAT Laboratories

1 small blue

5835 Coopers Avenue
Mississauga, Ontario L4Z 1Y2
Ph: 905.712.5100 Fax: 905.712.5122
webearth.agatlabs.com

Laboratory Use Only

Work Order #: 1823192 08

Cooler Quantity: one-on ice

Arrival Temperatures: 15.3 | 15.3 | 15.4

CT- 6.9 | 7.4 | 7.7

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 consumed by humans)

Report Information:

Company: Exp

Contact: Ismail Tak:

Address: 100-2650 Queensview Drive
Ottawa Ont K2B 8H6

Phone: 613-688-1899 Fax:

Reports to be sent to:

1. Email: Ismail.Tak:@exp.com
2. Email:

Regulatory Requirements: ☐ No Regulatory Requirement

(Please check all applicable boxes)

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

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

☐ Sewer Use
☐ Sanitary
☐ Storm

Region _____ *Indicate One*
☐ MISA

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

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

Report Guideline on Certificate of Analysis ☐ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

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

OR Date Required (Rush Surcharges May Apply):

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

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

Project Information:

Project: OTT-247143-A0

Site Location: Fallowfield Rd

Sampled By: exp

AGAT Quote #: PO:

Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☒ No ☐

Company:

Contact:

Address:

Email:

Sample Matrix Legend

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

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Y/N)	O. Reg 153: Metals and Inorganics (☐ All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals ☐ 153 Metals (incl. Hydrides))	ORPs: ☐ B-HWS ☐ Cl- ☐ CN ☐ Cr^{6+} ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_2+NO_3	Volatiles: ☐ VOC ☐ BTEX ☐ THM	PHCs F1 - F4	ABNs	PAHs	PCBs: ☐ Total ☐ Aroclors	Organochlorine Pesticides	TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Sewer Use	pH	Sulphate	Electro Conductivity
BH4 SS4 7.5'-9.5'	Mar 6/18																		✓	✓	✓		
BH8 SS4 7.5'-9.5'	Mar 5/18																		✓	✓	✓		
BH9 SS3 5'-7'	Mar 5/18																		✓	✓	✓		
BH11 SS3 5'-7'	Mar 5/18																		✓	✓	✓		

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Ryan DiGiuseppe	Mar 9/18	6:30pm	Linda Bethelet	12 Mar 18	8h06
Samples Relinquished By (Print Name and Sign): FedEx	12 Mar 18	16h00	Samples Received By (Print Name and Sign):		
Samples Relinquished By (Print Name and Sign):			Samples Received By (Print Name and Sign): Shannon	Mar 13/18	8:50am

Page 1 of 1

Nº: T 063373

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Certificate of Analysis

exp Services Inc. (Ottawa)

100-2650 Queensview Dr.
Ottawa, ON K2B 8K2
Attn: Jeff O'Banion

Client PO: Fallowfield
Project: OTT00243143A0
Custody: 116334

Report Date: 2-Apr-2018
Order Date: 28-Mar-2018

Order #: 1813243

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1813243-01	BH4

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Any use of these results implies your agreement that our total liabilty in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO: Fallowfield

Report Date: 02-Apr-2018
Order Date: 28-Mar-2018
Project Description: OTT00243143A0

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	30-Mar-18	30-Mar-18
PHC F1	CWS Tier 1 - P&T GC-FID	29-Mar-18	30-Mar-18
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	29-Mar-18	29-Mar-18

Certificate of Analysis

Client: exp Services Inc. (Ottawa)

Client PO: Fallowfield

Report Date: 02-Apr-2018

Order Date: 28-Mar-2018

Project Description: OTT00243143A0

	Client ID:	BH4	-	-	-
	Sample Date:	03/27/2018 12:00	-	-	-
	Sample ID:	1813243-01	-	-	-
	MDL/Units	Water	-	-	-
Volatiles					
Benzene	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
Toluene-d8	Surrogate	107%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO: Fallowfield

Report Date: 02-Apr-2018
Order Date: 28-Mar-2018
Project Description: OTT00243143A0

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: Toluene-d8	*83.2*		*ug/L*		*104*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Volatiles									
Benzene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND			0.0	30	
Toluene	ND	0.5	ug/L	ND			0.0	30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: Toluene-d8	*84.3*		*ug/L*		*105*	*50-140*			

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO: Fallowfield

Report Date: 02-Apr-2018
Order Date: 28-Mar-2018
Project Description: OTT00243143A0

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1660	25	ug/L		83.1	68-117			
F2 PHCs (C10-C16)	1760	100	ug/L		97.9	60-140			
F3 PHCs (C16-C34)	3620	100	ug/L		97.4	60-140			
F4 PHCs (C34-C50)	2450	100	ug/L		98.9	60-140			
Volatiles									
Benzene	40.6	0.5	ug/L		102	60-130			
Ethylbenzene	41.6	0.5	ug/L		104	60-130			
Toluene	40.0	0.5	ug/L		100	60-130			
m,p-Xylenes	83.4	0.5	ug/L		104	60-130			
o-Xylene	41.7	0.5	ug/L		104	60-130			
Surrogate: Toluene-d8	*78.9*		*ug/L*		*98.7*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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Paracel ID: 1813243

Chain of Custody
(Lab Use Only)
№ 116334

Page 1 of 1

Client Name: exp Services	Project Reference: Fallowfield	**Turnaround Time:**
Contact Name: Jeff O'Banion	Quote #	☐ 1 Day ☐ 3 Day
Address: 2650 Queensview Dr.	PO #	☐ 2 Day ☒ Regular
Telephone: 613-688-1899	Email Address: jeffery.o'banion@exp.com Mark.McCallum@exp.com	Date Required:

Criteria: ☑ O. Reg. 153/04 (As Amended) Table 3 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number: 1813243

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)							
1	3144	GW		3	27.03.2018	12:00pm	✓													
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: Walk-in

Relinquished By (Sign):	Received by Driver/Depot: Karen Cull	Received at Lab:	Verified By:
Relinquished By (Print): Jeff O.	Date/Time: Mar 28/18 9:25	Date/Time: Mar 28/18 11:20	Date/Time: Mar 28/18 11:33
Date/Time: 28.03.2018 9:25 am	Temperature: 2.3 °C	Temperature: 4.8 °C	pH Verified [ ] By: N/A