Phase Two Environmental Site Assessment
1158 Second Line Road, Ottawa, Ontario

Client:
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Project Number:
OTT-00245054-A0

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Type of Document:
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Date Submitted:
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Legal Notification

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Executive Summary

EXP Services Inc. (EXP) was retained by Theberge Homes Ltd. to complete a Phase Two Environmental Site Assessment (ESA) of the property referred to as 1158 Second Line Road, located in Ottawa, Ontario hereinafter referred to as the 'Phase One Property'. 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 Phase One Property by EXP. It is understood that this report is required as part of the permitting process with the City of Ottawa. 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, 1158 Second Line Road, Ottawa*, Ontario* dated March 2, 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 Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
1. Potential On-Site contamination from a historic AST located at 1158 Second Line Road	North side of residence	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	Petroleum Hydrocarbons (PHCs), Benzene, Toluene, Ethylbenzene and Xylene (BTEX), metals	Soil

Based on the Phase One ESA findings, EXP recommended conducting a Phase Two ESA at the Phase One Property. The Phase Two ESA consisted of advancing boreholes and completing them as 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 7 of *Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act*, Ministry of the Environment, Conservation and Parks (MECP), 2011 for residential/institutional land use at a site with coarse textured soil in accordance with Ontario Regulation 153/04 (as amended).

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

- On October 22, 2018, 3 boreholes (BH1, BH2, MW18-3) were advanced at the Phase One Property and were instrumented with a monitoring well (MW18-3) and piezometers (BH1 and BH2).
- A 250 mm layer of topsoil was observed in all of the boreholes. No fill material was observed in the boreholes. Below the topsoil was a layer of silty sand and sandy silt that extended to a maximum depth of 1.7 m (BH2). Below the sandy silt in MW18-3 was a silty sand and gravel till followed by sandstone bedrock. The bedrock was present from a depth of 1.7 m to 2.4 m below ground surface. No petroleum odours were identified in the native soil.
- The depth to sandstone bedrock ranged from 1.7 m to 2.4 m below ground surface. Groundwater was encountered within the sandstone bedrock at a depth of 5.02 m bgs in MW18-3. The two piezometers were dry. No petroleum sheens were observed in the monitoring wells during either sampling event. Since groundwater was found in only one of the monitoring wells, the groundwater flow direction could not be calculated. Based on previous investigations in the area, the groundwater flow in the area is to the east.
- All of the soil and groundwater samples had concentrations of metals, PHC, and/or BTEX that were less than the 2011 MECP Table 7 site condition standards.

Based on the Phase Two ESA findings, no further work is recommended at this time. 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 Theberge Homes Ltd. to complete a Phase Two Environmental Site Assessment (ESA) of the property referred to as 1158 Second Line Road in Ottawa, Ontario, hereinafter referred to as the 'Phase One Property'. 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 Phase One Property by EXP. EXP understands that Theberge Homes Ltd. plans to re-develop the land as medium density residential and that this report is required as part of the permitting process with the City of Ottawa. 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 is currently occupied by a residential structure and has an area of 1.2 hectares. The Phase One Property is located on the north side of Second Line Road approximately 240 m southwest from the Old Carp Road and Second Line Road intersection as shown on Figure 1 in Appendix B. At the time of the investigation, the Phase One Property was owned by Mr. Adel Houssari and Mrs. Nada Harb.

Owner Contact: Mr. Adel Houssari and Mrs. Nada Harb
1158 Second Line Road
Ottawa, Ontario K2K 1X7

The Phase One Property is legally described as CON 3 PT LOT 11 RP 5R-1715; PARTS 1 & 2. The property identification number is 045260207. At the time of the investigation, the property was 80% woodlot and 20% building/driveway. The site was previously undeveloped until the mid-1990's when a single family residential structure was constructed at the Site (Figure 2 in Appendix B). The property is currently not serviced for water and sewer by the City of Ottawa, however the neighbouring residential properties to the north are municipally serviced.

Topographically, the Site is relatively flat. The surrounding area has a slight downwards slope towards the northeast. The closest body of water is the South March Wetlands, located approximately 120 m west of the Site. Regional groundwater flow direction is inferred to be to the northeast towards the Ottawa River.

The approximate Universal Transverse Mercator (UTM) coordinates for the Site centroid is NAD83, Zone 18, 425677.33 m E, 5022173.13 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, the Phase One Property was residential and previously the Phase One Property was vacant until the mid-1990s. The future land use will be residential. 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, Conservation and Parks (MECP) "*Soil, Ground*

Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", ("SGWS" Standards), (MECP, 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 MECP (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).

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 medium-fine textured soil conditions.

For assessment purposes, EXP selected the MECP (2011) Table 7: Full Depth Generic Site Condition Standards (SCS) in a non-potable groundwater condition for a residential/parkland/institutional property use and fine textured soil. The selection of this category was based on the following factors:

- The predominant soil type on the Phase One Property was considered to be coarse textured (refer to the results of the Grain Size Analysis as provided in the Certificates of Analysis presented in Appendix E); and,
- There was no intention to carry out a stratified restoration at the Phase One Property.
- Less than two-thirds of the Phase One Property has an overburden thickness greater than 2 m.
- The Phase One Property is not located within 30 m of a surface water body or an area of natural significance.
- The soil at the Phase One Property 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.
- The Phase One Property will be serviced by the City of Ottawa's water distribution system and the surrounding properties either are already municipally serviced or will be in the near future.
- The Phase One Property is planned for residential use.

2 Background Information

2.1 Physical Setting

At the time of the investigation, the Phase One Property was observed to be a large residential lot with a house in the west half of the Phase One Property. The surrounding area to the north, east and south was developed with residential houses (Figure 1 in Appendix A). To the west, across Second Line Road the land is undeveloped (Figure 3 in Appendix B). The Phase One Property is in a residential zoned area. The property is currently not serviced for water and sewer by the City of Ottawa, however the neighbouring residential properties to the north, east and south are municipally serviced.

Local Ontario Ministry of Environment, Conservation and Parks (MECP) water wells records show that bedrock was found at 0.3 - 2 m from surface. The overburden consists of sand and sandy clay from the ground surface to 0.6 – 2.0 m. Bedrock in the area was found to be sandstone and granite.

Topographically, the Phase One Property is relatively flat. The surrounding area has a slight downwards slope towards the northeast. The closest body of water is the South March Wetlands, located approximately 120 m west of the Phase One Property. Regional groundwater flow direction is inferred to be in the eastern direction towards the Ottawa River.

2.2 Past Investigations

The findings of a Phase One ESA were presented in a report entitled *Phase One Environmental Site Assessment, 1158 Second Line Road, Ottawa, Ontario,* dated March 2, 2018. The Phase One ESA identified the following APECs:

Table 2.1: 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 Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
1. Potential On-Site contamination from a historic AST located at 1158 Second Line Road	North side of residence	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	Petroleum Hydrocarbons (PHCs), Benzene, Toluene, Ethylbenzene and Xylene (BTEX), metals	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 Phase One Property.

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 Phase One Property and to obtain soil and groundwater data to further characterize conditions in the surficial fill/shallow overburden soils.

It is understood that the Phase One Property is to be re-developed with several residences to be built over most of the Phase One Property. 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 Phase One Property;
- 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 three (3) boreholes and complete one of them as a groundwater monitoring well and two of them as piezometers (previously done during Geotechnical Investigation);
- Attempt to collect representative soil samples for chemical analysis of metals, PHC and BTEX;
- Attempt to collect representative groundwater samples for chemical analysis of metals, PHC and BTEX;
- Measure groundwater levels in the monitoring well and piezometers;
- Completion of a survey of the borehole 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.

Mark Devlin B. Sc. conducted assessment work for this project and was supervised by 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 Phase One Property, 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 2.1.

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

3.4 Phase One ESA Conceptual Site Model

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

3.4.1 Current and Past Uses

Based on a review chain of title information, air photos, and other records, the Phase One Property had been developed as residential since the late 1990's.

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 – Current On-Site heating oil AST located along north side of the basement. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks).

No potentially contaminating activities that took place within the vicinity of the Phase One Property (approximately 250 m radius) were identified.

3.4.3 Areas of Potential Environmental Concern

As a result of the PCAs, the report identified the following APECs at the Phase One Property:

- APEC 1 – (central eastern part of Site) Contaminated soil. This APEC is associated with PCA1. The PCOCs include PHC and BTEX.

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

Topographically, the Phase One Property is relatively flat. The surrounding area has a slight downwards slope towards the northeast. The closest body of water is the South March Wetlands, located approximately 120 m west of the Phase One Property. Regional groundwater flow direction is inferred to be in the eastern direction towards the Ottawa River.

The bedrock in the general area is sandstone at a depth of approximately 0.3 - 2 m. Granite was also observed at a depth of 30-35 m during nearby investigations. With respect to surficial geology, beneath any fill, the site is underlain by Paleozoic sandstone bedrock.

3.4.5 Estimated Groundwater Flow Direction

Topographically, the Phase One Property relatively flat with a slight downwards slope towards the northeast. Regional groundwater flow direction is to be in the eastern direction towards the Ottawa River.

3.4.6 Underground Utilities

Currently, the underground utilities at the Phase One Property include water and sewage (septic tank and bed) and electricity/telephone.

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 Phase One Property.

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 Phase One Property investigative activities consisted of drilling 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 Phase One Property by locating companies. A private utility locating contractor was also retained to clear the individual borehole locations.

On October 22, 2018, a total of 3 boreholes (BH1, BH2, and MW18-3) were advanced at the Phase One Property by Strata Soil Drilling, a licensed well contractor, under the full-time supervision of EXP staff. A Geoprobe drill rig with lined tube samplers was used to collect the soil samples. A monitoring well was installed in MW18-3 to facility groundwater sampling. Piezometers had previously been installed at BH1 and BH2 during a geotechnical investigation. The locations of the boreholes and monitoring well are presented on Figure 4 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 line tube samplers 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, 61 cm long, lined tube samplers advanced into the subsurface using the drilling rig. 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 lined tube 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, Maxxam Analytics Inc. (Maxxam) of Ottawa, Ontario. The samples were transported/submitted within 24 hours of collection to the laboratory 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. One worst case soil sample from each borehole was submitted for laboratory analysis of metals, PHC, and BTEX.

4.6 Groundwater: Monitoring Well Installation

A groundwater monitoring well was installed in MW18-3 by Strata. Piezometers had previously been installed in MW18-1 and MW18-2 in February 2018. 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 3.0 m length of 37 mm diameter Schedule 40 PVC screen and an appropriate length of PVC riser pipe. The piezometers consisted of 19 mm diameter PVC pipes, with 1.5 m of hand made slots. 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 wells were completed with flush mount protector at the asphalt surface. Details of the monitoring well installations are shown on the Borehole Logs provided in Appendix C.

The installation details of the installed monitoring wells are summarized in Table 4.1.

Table 4.1: Monitoring Well Installation Details

Monitoring Well/Piezometer	Ground Elevation (MASL)	Top of Sand Elevation (m)	Top of Screen Elevation (m)	Bottom of Screen Elevation (m)	Bottom of Borehole Elevation (m)	Depth of Borehole (mbgs)
BH1	103.12	101.9	101.6	98.6	98.6	4.5
BH2	102.23	100.9	100.6	97.6	97.6	4.6
MW18-3	103.62	100.8	100.5	97.5	97.5	6.1

Note: Elevations were collected using a high precision GPS unit and a geodetic datum was established at the Phase One Property.
mbgs – metres below ground surface
TOC - top of plastic well casing

When the monitoring wells are 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.

Measures taken to minimize the potential for cross contamination or the introduction of contaminants during well construction included:

- The use of well pipe components (e.g. riser pipe and well screens) with factory machined threaded flush coupling joints;
- Construction of wells without the use of glues or adhesives;
- Removing the protective plastic wraps from well components at the time of borehole insertion to prevent contact with the ground and other surfaces;
- Cleaning of augers between sampling locations; and,
- The use of hollow stem augers to prevent loose and potentially contaminated material in overlying layers from sloughing into the boreholes and coming into contact with groundwater.

4.7 Groundwater: Field Measurement of Water Quality Parameters

The static water level was measured, the depth of each well was recorded and the well 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 collected from the monitoring well and piezometers on November 1, 2018. The monitoring activities consisted of measuring the depth to groundwater in each monitoring well and piezometer so that groundwater flow and direction below the Phase One Property could be assessed. The water level measurements were recorded on water level log sheets. The water level meter probe was decontaminated between monitoring well locations with a spray bottle of water and alconox solution, paper towel, then potable water.

The well was then sampled using a “low flow” technique whereby the well was continuously purged using an electric pump (equipped with dedicated tubing) and parameters within the purged water were monitored using a groundwater chemistry multi-meter probe (YSI 550) at 3 minute intervals. These parameters include: pH, conductivity, temperature, and salinity. Once these parameters were found to deviate less than 10% over three testing events, equilibrium was deemed to have occurred and a sample of the groundwater was collected.

The purge water was also continuously monitored for visual and olfactory evidence of petroleum and solvent impact (sheen and odour).

The groundwater samples were collected in laboratory provided sample bottles and submitted to Maxxam for analysis of metals, PHC and BTEX. The groundwater samples were placed in clean coolers containing ice prior to and during transportation to the subcontract laboratory.

4.9 Sediment: Sampling

As no water body was present at the Phase One Property, 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 was Maxxam Analytics Inc. Maxxam is an accredited laboratory 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 newly installed monitoring well locations. The top of casing and ground surface elevation of each monitoring well location was surveyed using a high precision GPS unit.

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 Phase One Property.

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 and groundwater samples to ensure analytical precision;
- Using dedicated and/or disposal sampling equipment;
- Using a trip blank for BTEX during sampling;
- 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.

Maxxam'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 boreholes 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 Phase One Property, in order of depth, is summarized in the following sections. The interpreted Phase One Property geology is shown on the enclosed cross section (Figure 5, Appendix B).

5.1.1 Fill Material

A 250 mm layer of topsoil was observed in all of the boreholes. No fill material was observed in the boreholes.

5.1.2 Native Material

Below the topsoil was a layer of silty sand and sandy silt that extended to a maximum depth of 1.7 m (BH2). Below the sandy silt in MW18-3 was a silty sand and gravel till followed by sandstone bedrock. The bedrock was present from a depth of 1.7 m to 2.4 m below ground surface. No petroleum odours were identified in the native soil.

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 A.

5.1.3 Bedrock

Sandstone bedrock was encountered from 1.7 m to 6.1 m.

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 Phase One Property, 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 both the contact zone and bedrock have been interpreted to be to the northeast towards the Ottawa River, generally following bedrock 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 monitoring well (MW18-3) and two piezometers (BH1 and BH2) screened within the sandstone bedrock at the Phase One Property.

Groundwater elevations and water levels were measured at the Phase One Property on October 31, 2018. Groundwater was encountered within the sandstone at a depth of 5.02 m bgs in MW18-3. The two piezometers were dry to a depth of 4.6 m. 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	Ground Elevation (MASL)	March 2, 2018		November 1, 2018	
		Water Level (mbg)	Water Level (MASL)	Water Level (mbg)	Water Level (MASL)
BH1	103.12	0.90	102.22	Dry (>4.63)	<98.49
BH2	102.23	Dry (>4.63)	<97.60	Dry (>4.63)	<97.60
MW18-5	103.62	NA	NA	5.02	98.60

Note: Elevations were referenced using a high precision GPS unit and a geodetic datum was established at the Phase One Property.

mbtoc – metres below top of plastic well casing

mASL – metres above sea level

NA – not applicable

Since only one monitoring well/piezometer had water in it, the groundwater flow direction at the site could not be calculated. However, based on previous investigations at the site, the groundwater flow in the area is to the east as shown on Figure 2 in Appendix B. EXP notes that groundwater flow direction and level 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 could not be estimated for the groundwater flow components identified in the shallow bedrock aquifer based on the November 2018 groundwater elevations since two of the wells were dry.

5.5 Single Well Response Tests (SWRTs) Analysis

A single well response test was conducted on MW18-3 as a part of this Phase Two ESA. The calculated hydraulic conductivity of MW18-3 was 7 x 10^{-8} m/s.

5.6 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 sandy silt overlying silty sand and gravel till or sandstone bedrock. The water table was found within the sandstone bedrock at a depth of 5 m from ground surface. Based on estimates provided by *Freeze and Cherry (1979)* the approximate horizontal hydraulic conductivity for sandstone bedrock ranges from 10^{-10} m/s to 10^{-6} m/s.

5.7 Soil Texture

Based on the grain size analysis of 3 soil samples, the soil texture at the water table at the Phase One Property was assessed to be coarse textured (refer to the three grain-size/hydrometer analyses in Appendix E) consisting of silty sand to sandy silt. Therefore, the soil texture is coarse grained.

5.8 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).

5.9 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 are found in Appendix D. Copies of the laboratory Certificates of Analysis for the tested soil samples are provided in Appendix E.

The MECP Table 7 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. Two soil samples were submitted for pH analysis with results of 7.58 and 7.95. The pH values were within the acceptable range for the application of MECP Table 7 SCS.

5.9.1 Petroleum Hydrocarbons

The concentrations of PHC and BTEX measured in the analysed soil samples were less than the laboratory detection limits and the MECP 2011 Table 7 SCS, as shown in Table 1 in Appendix D.

5.9.2 Metals

The concentrations of metals measured in the analysed current and previous soil samples were less than the MECP 2011 Table 7 SCS, as shown in Table 2 in Appendix D.

5.9.3 Chemical Transformation and Soil Contaminant Sources

There were no soil exceedances of the MECP Table 7 SCS.

5.9.4 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.

5.10 Groundwater Quality

Representative groundwater samples were collected from the newly installed monitoring wells to assess groundwater quality at the Phase One Property. 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.

5.10.1 Petroleum Hydrocarbons

One (1) groundwater sample, a blind duplicate, at trip spike, and a trip blank were submitted for the chemical analysis of PHC and BTEX. As shown in Table 3 in Appendix D, the concentrations of PHC and BTEX parameters in the groundwater samples were non-detect and below the MECP Table 7 SCS.

5.10.2 Metals

One (1) groundwater sample and a blind duplicate were submitted for the chemical analysis of metals. As shown in Table 4 in Appendix D, the concentrations of PHC and BTEX parameters in the groundwater samples were non-detect and below the MECP Table 7 SCS.

5.10.3 Chemical Transformation and Contaminant Sources

There were no groundwater exceedances of the MECP Table 7 SCS.

5.10.4 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.

5.11 Sediment Quality

As there were no water bodies on the Phase One Property, surface water and sediment sampling were not required.

5.12 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 Phase One Property. QA/QC measures, as described in Section 4.13, 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.

Duplicate soil sample pair MW18-1 SS1 and its duplicate MW18-4 SS2 were submitted for chemical analysis of BTEX, PHC, and metals. For QA/QC purposes, the analytical sample results are quantitatively evaluated by calculating the relative percent difference (RPD) between the samples and their duplicates. The concentrations of BTEX and PHC F1 were less than the laboratory reported detection limits for both the primary and duplicate samples. The RPD for metals was 13.6% which is well within the 30% RPD threshold and therefore the soil data is acceptable from a RPD perspective.

Duplicate groundwater sample pair MW18-1 and its duplicate MW18-17 were submitted for chemical analysis of BTEX and PHC. The concentrations of BTEX and PHC F1 were less than the laboratory reported detection limits for both the primary and duplicate samples. The RPD for metals was 5.5% which is well within the 30% RPD threshold and therefore the soil data is acceptable from a RPD perspective

Certificates of Analysis were received from Maxxam 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 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 (VOCs only) 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.

5.13 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 Phase One Property'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 Phase One Property. However, the data relied upon was limited to the most recent information to convey the current Phase One Property conditions.

5.13.1 Site Identification Information

The Site is currently occupied by a residential structure and has an area of approximately 1.2 hectares as shown on Figure 2 in Appendix B. The Phase I Property was 80% woodlot and 20% building/driveway. At the time of the investigation, the Phase One Property was owned by Mr. Adel Houssari and Mrs. Nada Harb.

The property is in a minor institutional zoned area. The Phase One Property is legally described as CON 3 PT LOT 11 RP 5R-1715; PARTS 1 & 2. The property identification number is 045260207 (Figure 2 in Appendix B). The property is currently not serviced for water and sewer by the City of Ottawa, however the neighbouring residential properties to the north are municipally serviced.

Local Ontario Ministry of Environment, Conservation and Parks (MECP) water wells records show that bedrock was found at 0.3 - 2 m from surface. The overburden consists of sand and sandy clay from the ground surface to 0.6 – 2.0 m. Bedrock in the area was found to be sandstone and granite.

Topographically, the Site is relatively flat. The surrounding area has a slight downwards slope towards the northeast. The closest body of water is the South March Wetlands, located approximately 120 m west of the Site. Regional groundwater flow direction is inferred to be in the eastern direction towards the Ottawa River.

Refer to the following table for the Phase One Property identification information.

Civic Address	1158 Second Line Road, Ottawa, ON
Current Land Use	Residential
Proposed Land Use	Residential
Legal Description	CON 3 PT LOT 11 RP 5R-1715; PARTS 1 & 2. City of Ottawa
Property Identification Number	045260207
UTM Coordinates	425677.33 m E, 5022173.13 m N
Phase One Property Area	1.2 ha
Property Owner	Mr. Adel Houssari and Mrs. Nada Harb
Owner Contact	Mr. Adel Houssari
Owner Address	1158 Second Line Road, Ottawa, ON

5.13.2 Physical Site Description

The Phase Two CSM provides a narrative and graphical interpretation of the Phase One Property 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 Phase One Property is located in a residential area of Ottawa where potable water is supplied by the City of Ottawa, however the depth to bedrock is less than 2 m over most of the Phase One Property and therefore the MECP Table 7 Site Condition Standards (SCS) are applied to the Phase One Property. The City of Ottawa obtains its water from the Ottawa River, located approximately 18 km northeast of the Phase One Property.

In accordance with Section 41 of the Ontario Regulation 153/04 (as amended), the Phase One Property is not an environmentally sensitive area. The Phase One Property 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 Phase One Property is a shallow soil property as defined in Section 43.1 of the regulation. It 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.

5.13.3 Geological and Hydrogeological Setting

Based on the Phase Two ESA and the previous geotechnical investigation, a layer of silty sand and sandy silt was observed in the boreholes. No petroleum odours were identified in the native soil.

Grey, sandstone bedrock was encountered at a depth of 1.2 m to 1.8 m. Groundwater was encountered at a depth of 0.90 m bgs in MW18-1 to more than 4.6 m in BH2. No petroleum sheens were observed in the monitoring wells during the sampling event.

The geologic cross-section prepared from the Phase One Property boreholes is presented on Figure 5 in Appendix B.

Based on previous investigations in the area, the groundwater flow is to the east within the bedrock.

5.13.4 Underground Utilities

The Phase One Property is not municipally serviced by underground utilities such as bell, gas, water and sewer. The groundwater flow pattern in the sandstone bedrock could be influenced by buried services.

5.13.5 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 – Current On-Site heating oil AST located along north side of the basement. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks).

No potentially contaminating activities that took place within the vicinity of the Phase One Property (approximately 250 m radius) were identified.

5.13.6 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 Phase One Property 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 2 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 Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
1. Potential On-Site contamination from a historic AST located at 1158 Second Line Road	North side of residence	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-Site	Petroleum Hydrocarbons (PHCs), Benzene, Toluene, Ethylbenzene and Xylene (BTEX), metals	Soil

5.13.7 Investigation and Remediation

The Phase Two ESA was conducted to assess the soil and groundwater quality at the Phase One Property. As indicated in the APEC and PCOC Table (above), the analytical program of the Phase Two ESA included testing of soil for metals, PHC and BTEX, and groundwater for PHC and BTEX from the boreholes and monitoring well installed on the Phase One Property. The borehole and monitoring well locations are shown on Figure 4 in Appendix B.

Based on the results of the investigation, all of the soil and groundwater samples had concentrations of metals, PHC, and BTEX that were less than the 2011 MECP Table 7 SCS.

5.13.8 Contaminants of Concern (COC)

Based on the results of the investigation, there are no contaminants of concern in soil or groundwater at the Phase One Property.

5.13.9 Contaminant Fate and Transport

Soil COCs

There are no contaminants of concern in soil at the Phase One Property.

Groundwater COCs

There are no contaminants of concern in groundwater at the Phase One Property.

6 Conclusions and Recommendations

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

- On October 22, 2018, 3 boreholes (BH1, BH2, and MW18-13) were advanced at the Phase One Property and were instrumented with a monitoring well (MW18-3) and piezometers (BH1 and BH2).
- A 250 mm layer of topsoil was observed in all of the boreholes. No fill material was observed in the boreholes. Below the topsoil was a layer of silty sand and sandy silt that extended to a maximum depth of 1.7 m (BH2). Below the sandy silt in MW18-3 was a silty sand and gravel till followed by sandstone bedrock. The bedrock was present from a depth of 1.7 m to 2.4 m below ground surface. No petroleum odours were identified in the native soil.
- The depth to sandstone bedrock ranged from 1.7 m to 2.4 m below ground surface. Groundwater was encountered within the sandstone bedrock at a depth of 5.02 m bgs in MW18-3. The two piezometers were dry. No petroleum sheens were observed in the monitoring wells during either sampling event. Since groundwater was found in only one of the monitoring wells, the groundwater flow direction could not be calculated. Based on previous investigations in the area, the groundwater flow in the area is to the east.
- All of the soil and groundwater samples had concentrations of metals, PHC, and/or BTEX that were less than the 2011 MECP Table 7 site condition standards.

Based on the Phase Two ESA findings, no further work is recommended at this time. 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 Phase One Property. The conclusions and recommendations presented in this report reflect Phase One Property 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:

- AMEC Environment and Infrastructure*;* April 2013; *Clearance Letter for March Landfill, Development of 1158 Second Line Road.*
- City of Ottawa. 2011. Characterization of Ottawa's Watersheds: An Environmental Foundation Document with Supporting Information Base. March.
- 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.
- Singer, S.N., C.K. Cheng, M.G. Scafe. 2003. Hydrogeology of Southern Ontario. Hydrogeology of Ontario Series – Report 1. Prepared for Ministry of Environment.
- WESA. 2006. Watershed Characterization: Geologic Model and Conceptual Hydrogeological Model, Raisin Region CA and South Nation Conservation, Source Protection Plan Partnership.

Tables

Table 1

Characteristic	Description
Minimum Depth to Bedrock	1.7 m
Minimum Depth to Overburden Groundwater	Dry (November 1, 2018)
Shallow Soil Property	Yes, bedrock less than 2.0 m
Proximity to water body or ANSI	120 m west
Soil pH	7.58 and 7.95
Soil Texture	Coarse
Current Property Use	Residential
Future Property Use	Residential
Proposed Future Building	Several over entire Site
Areas where soil has been brought to the Phase One Property	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 1158 Second Line 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/or metals. The soil sampling media is to consist of the overburden materials (depths up to 3 m of overburden beneath site). The soil sampling will be location-specific to assess for the potential presence of PHC, BTEX, and/or metals based on the identification of potential areas of potential environmental concern identified in a Phase One ESA completed by EXP in 2018. 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 metals, PHC and BTEX. The monitoring well network is to comprise of one monitoring well and two existing peizometers.

Vertical control of the boreholes and monitoring wells will be obtained through the completion of an elevation survey with reference to a geodetic benchmark. Groundwater flow and direction in the overburden aquifer 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 three (3) boreholes are proposed to be advanced at the site, up to a maximum overburden depth of approximately 3 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 one borehole will be instrumented as a groundwater monitoring well 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 3 to 5 m below grade. There are two existing piezometers that consist of 19 mm diameter PVC pipes, with 1.5 m of hand made slots. The monitoring wells will be constructed using 51 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 well 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 the monitoring well and piezometers 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 and piezometer 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 high precision GPS unit 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 the monitoring well for chemical analysis. The well 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.

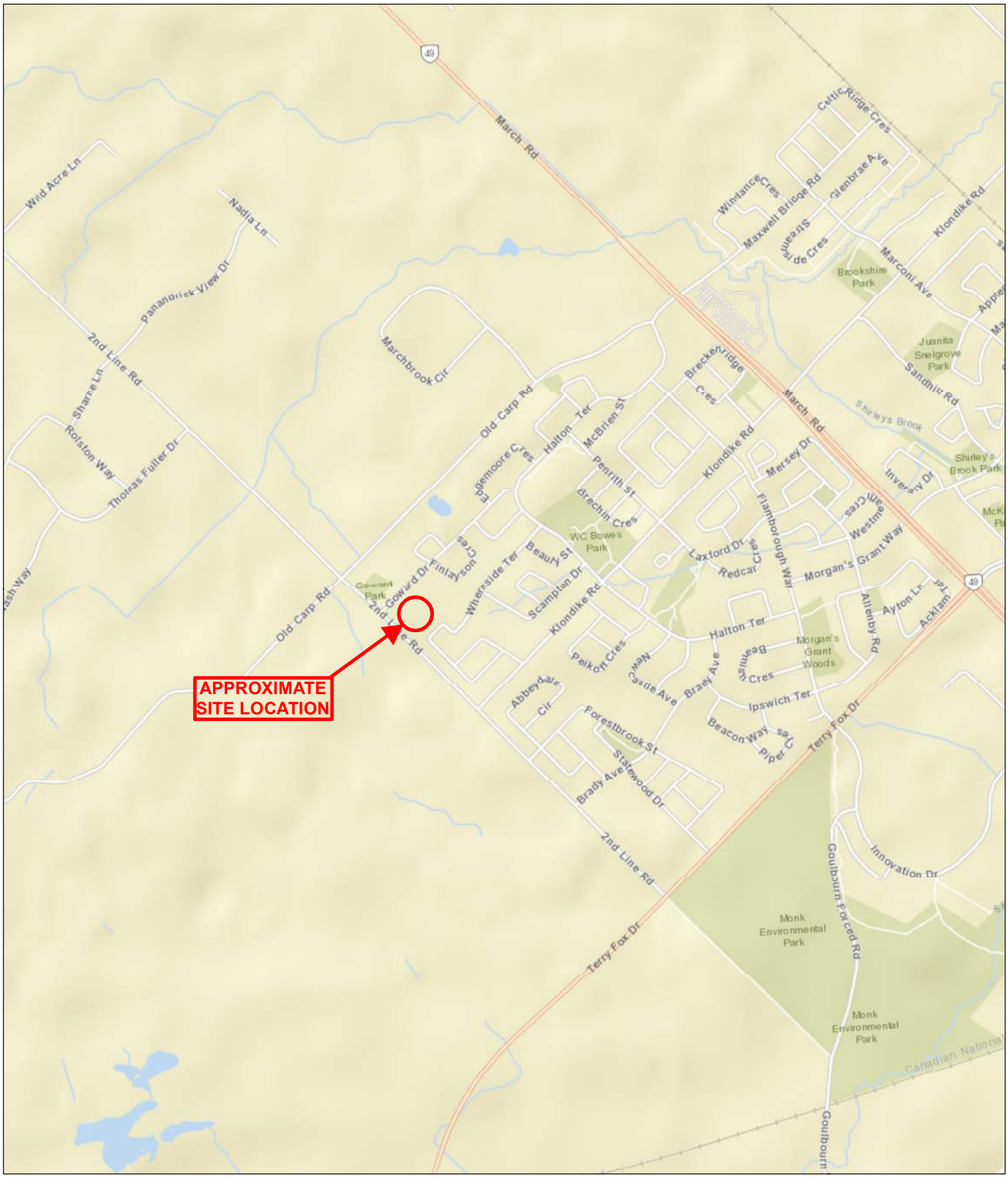
4.4 Sample Documentation

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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Ottawa, Ontario
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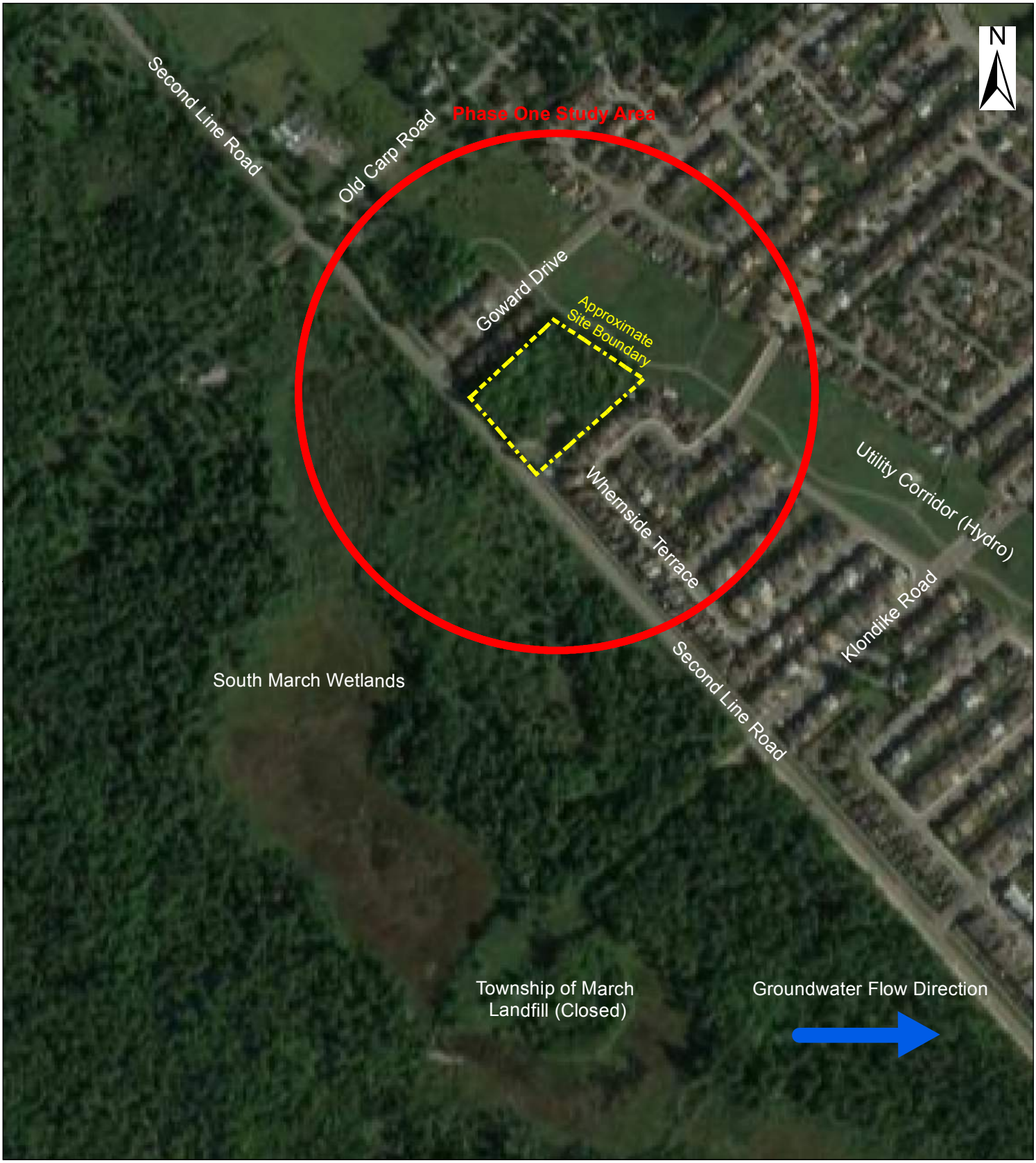
F - (613) - 225-7337

PROJECT TITLE:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
1158 Second Line Road
Ottawa, Ontario

DRAWING TITLE:
SITE LOCATION PLAN

PROJECT No.: OTT-00245054-A0	DWN: ML
SCALE: AS SHOWN	CHKD: MM
DATE: NOVEMBER 2018	FIG. No.: 1



0 250
Metres

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PROJECT TITLE:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
1158 Second Line Road
Ottawa, Ontario

DRAWING TITLE:
SITE PLAN

PROJECT No.: OTT-00245054-A0	DWN: ML
SCALE: AS SHOWN	CHKD: MM
DATE: NOVEMBER 2018	FIG. No.: 2

Legend

⊕ - Selection of monitoring wells associated with former landfill study

0 12.5 25 50 75 100 Meters

- Current on-Site Building - Approximate location of interior AST

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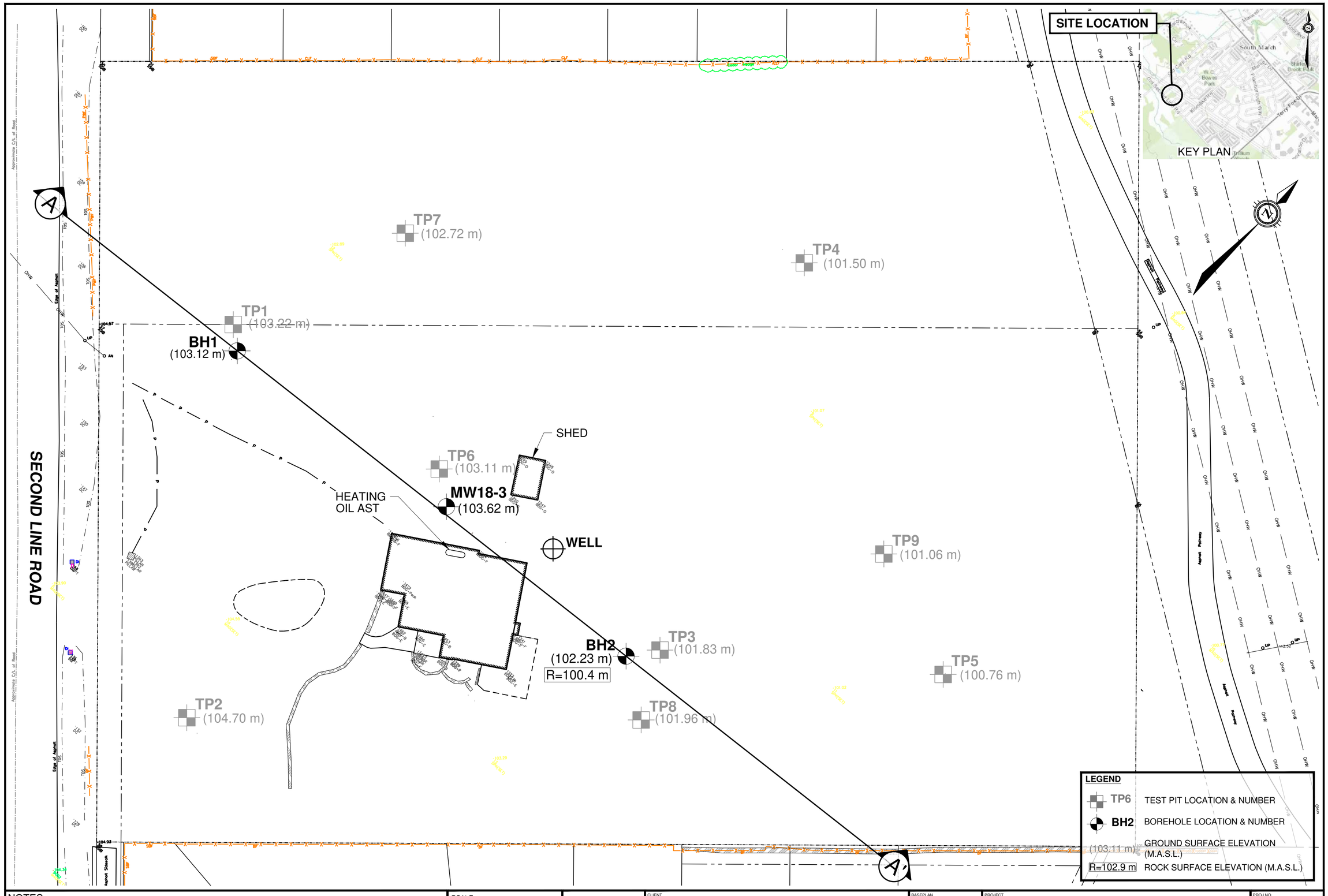
PROJECT TITLE:
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
1158 Second Line Road
Ottawa, Ontario

DRAWING TITLE:
CONCEPTUAL SITE MODEL

PROJECT No.: OTT-00245054-A0	DWN: ML
SCALE: AS SHOWN	CHKD: MM
DATE: NOVEMBER 2018	FIG. No.: 3



NOTES :

1. THE BOUNDARIES AND SOIL TYPES HAVE BEEN ESTABLISHED ONLY AT TEST PIT AND BOREHOLE LOCATIONS. BETWEEN TEST PITS AND BOREHOLES THEY ARE ASSUMED AND MAY BE SUBJECT TO CONSIDERABLE ERROR.
2. SOIL SAMPLES AND ROCK WILL BE RETAINED IN STORAGE FOR THREE MONTHS AND THEN DESTROYED UNLESS THE CLIENT ADVISES THAT AN EXTENDED TIME PERIOD IS REQUIRED.
3. TOPSOIL QUANTITIES SHOULD NOT BE ESTABLISHED FROM THE INFORMATION PROVIDED AT THE TEST PIT AND BOREHOLE LOCATIONS.
4. TEST PIT AND BOREHOLE ELEVATIONS SHOULD NOT BE USED TO DESIGN BUILDING(S) OR FLOOR SLABS OR PARKING LOT(S) GRADES.
5. THIS DRAWING FORMS PART OF THE REPORT PROJECT NUMBER AS REFERENCED AND SHOULD BE USED ONLY IN CONJUNCTION WITH THIS REPORT.
6. BASE PLAN OBTAINED FROM *FARLEY, SMITH & DENIS SURVEYING LTD. 2018* DATED FEBRUARY 28TH, 2018

SCALE
0 3m 6m 12m
HORIZONTAL 1:300

REVIEWED BY

CLIENT
THEBERGE HOMES
904 LADY ELLEN DRIVE
OTTAWA, ONTARIO

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• INDUSTRIAL • INFRASTRUCTURE • SUSTAINABILITY •

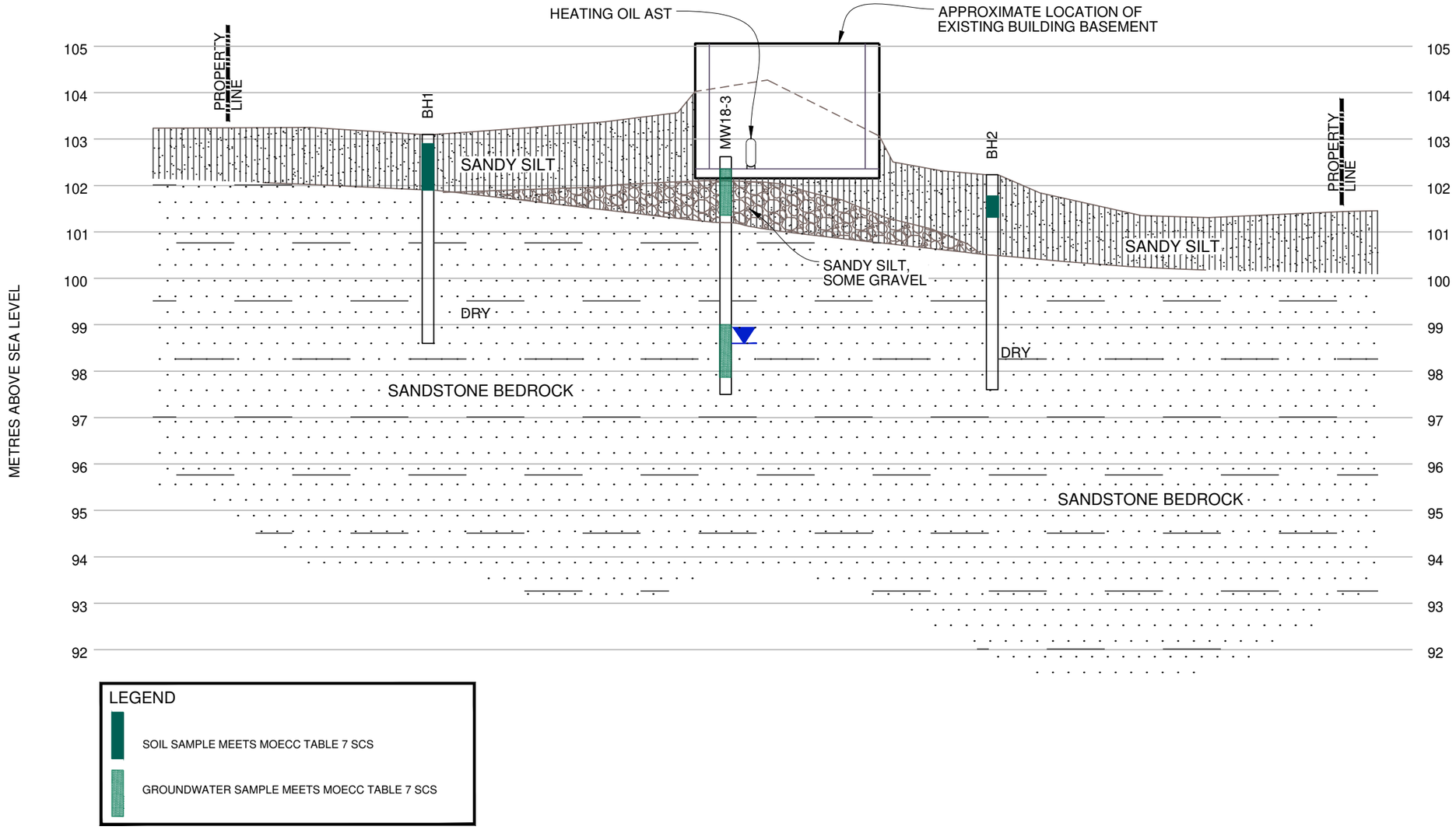
BASEPLAN
DESIGN
CHECKED I.T.
CAD J.R.
PROJ. MAN I.T.
APPROVED

PROJECT
PHASE TWO ENVIRONMENTAL SITE ASSESSMENT
PROPOSED RESIDENTIAL DEVELOPMENT
1158 SECOND LINE ROAD, OTTAWA, ONTARIO

TITLE
BOREHOLE & MONITORING WELL LOCATION PLAN

PROJ NO. OTT-00245054-A0
SURVEY
DATE NOVEMBER 2018
DRAWING NO. FIG 4

A — LOOKING NORTH — A'



LEGEND

- SOIL SAMPLE MEETS MOECC TABLE 7 SCS
- GROUNDWATER SAMPLE MEETS MOECC TABLE 7 SCS

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scale: 1:500	CLIENT: THEBERGE HOMES	project no.: OTT-00254054-A0
date: NOVEMBER 2018	TITLE: GEOLOGICAL CROSS-SECTION A-A'	FIG 5
drawn by: J.R.	1158 SECOND LINE ROAD, OTTAWA, ONTARIO	

Filename: r:\240000\245000\245054-a0 1158 2nd line road\245054-en\245054-en.dwg
Last Saved: 11/19/2018 2:38:24 PM
Last Plotted:11/22/2018 11:19:04 AMPlotted by: ReveIU Pen Table:: trow standard, july 01, 2004.ctb

EXP Services Inc.
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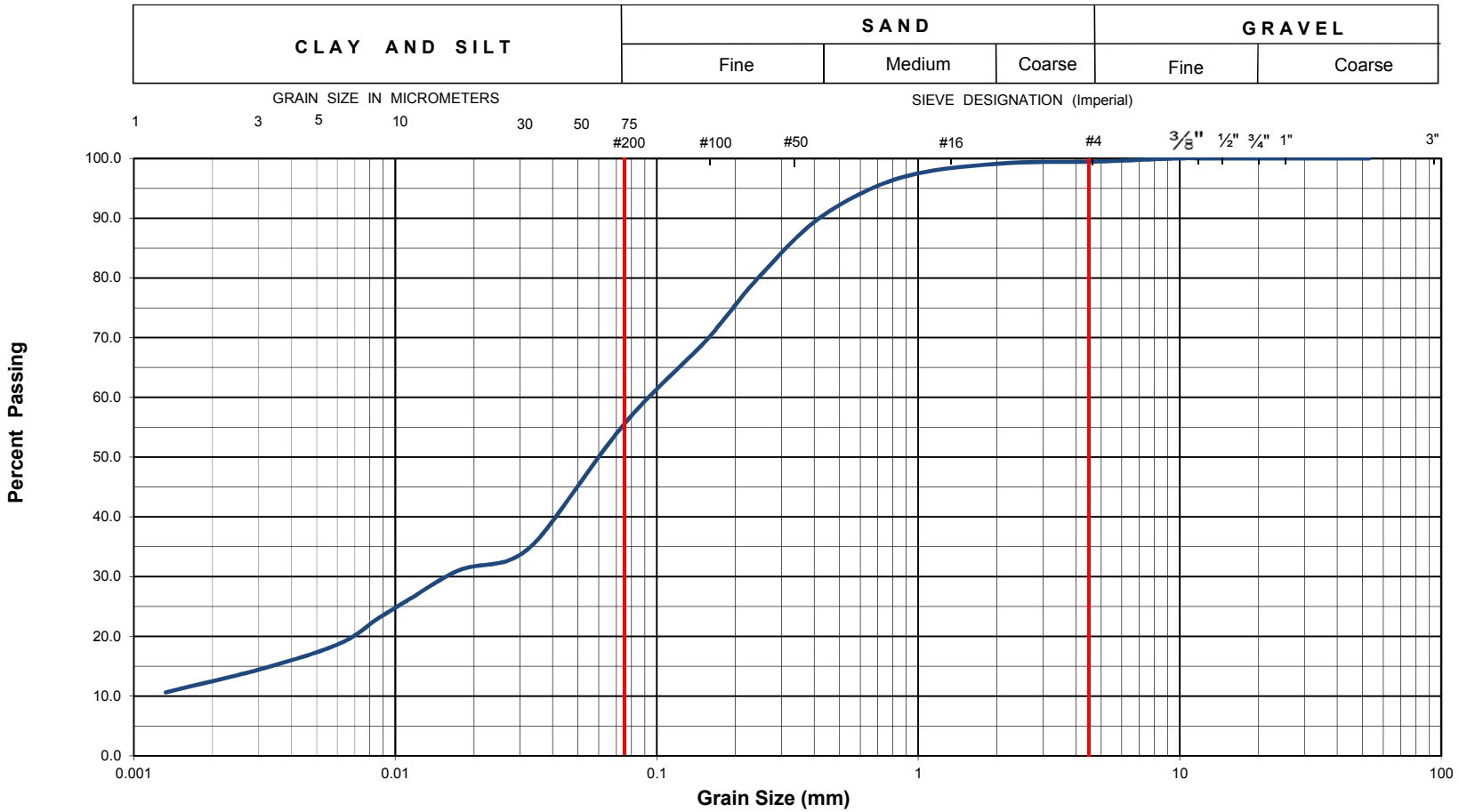
Grain-Size Distribution Curve

Method of Test for Particle Size Analysis of Soil

ASTM C-136/ASTM D-422

Unified Soil Classification System



EXP Project No.:	**OTT-00245054**	**Project Name :**	**Geotechnical Investigation Proposed Residential Development**				
Client :	**Theberge Homes**	**Project Location :**	**1158 Second Line Road, Ottawa**				
Date Sampled :	**February 16, 2018**	**Test Pit (Unit No.)**	**BH1**	**Sample No.:**	**SS2**	**Depth (m) :**	**0.8-1.4**
Sample Description :		**Sandy Silt (ML)**				**Figure :**	**14**

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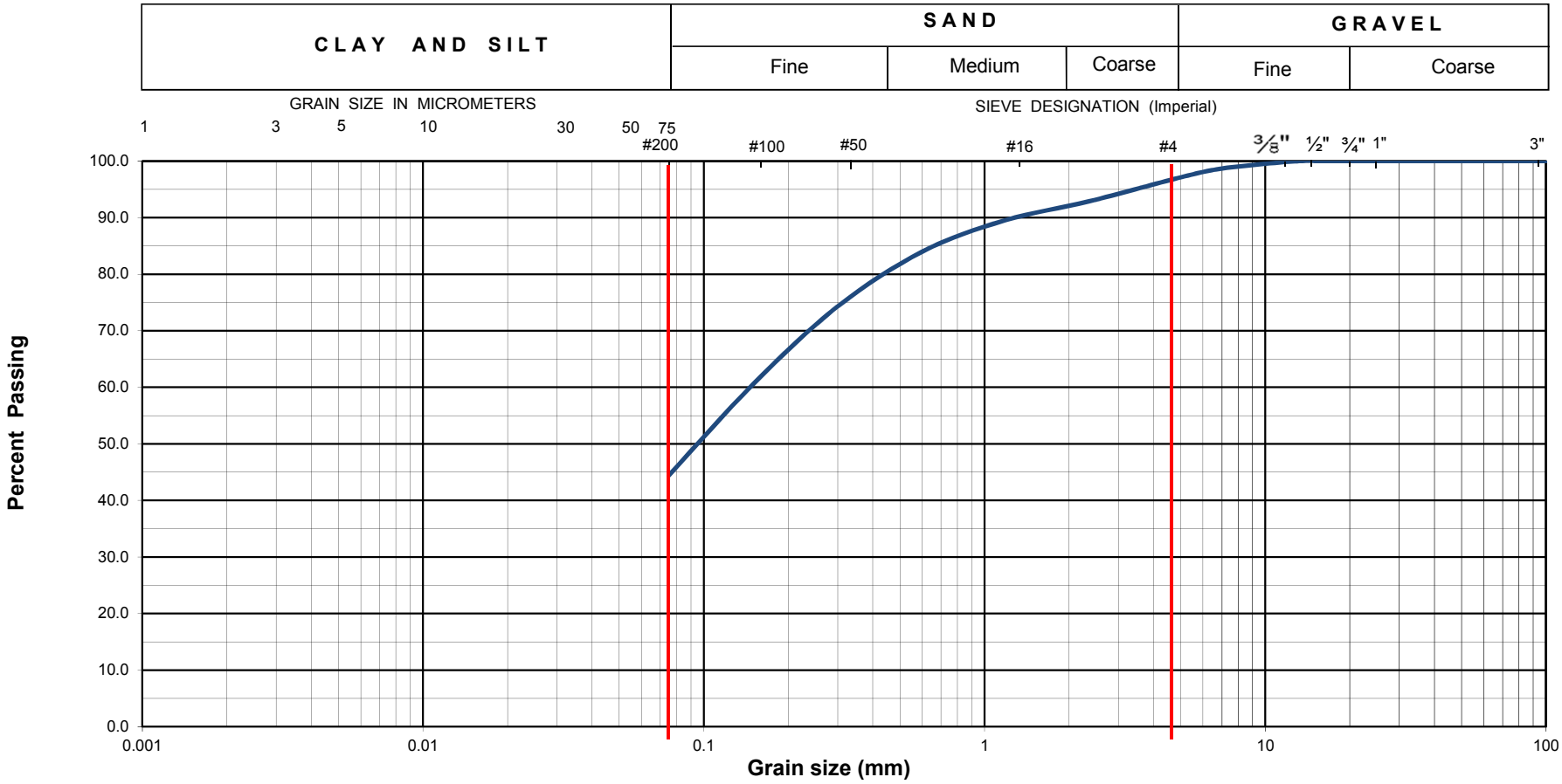
Grain-Size Distribution Curve

Method of Test for Sieve Analysis of Aggregate

ASTM C-136

Unified Soil Classification System



EXP Project No.:	**OTT-00245054**	**Project Name :**	**Geotechnical Investigation Proposed Residential Development**				
Client :	**Theberge Homes**	**Project Location :**	**1158 Second Line Road, Ottawa**				
Date Sampled :	**February 16, 2018**	**Test Pit No:**	**TP1**	**Sample:**	**SS1**	**Depth (m) :**	**0.3-1.2**
Sample Description :	**Silty Sand (SM)**					**Figure :**	**15**

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Grain-Size Distribution Curve

Method of Test for Particle Size Analysis of Soil

ASTM C-136/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-00245054**	**Project Name :**	**Geotechnical Investigation Proposed Residential Development**		
Client :	**Theberge Homes**	**Project Location :**	**1158 Second Line Road, Ottawa**		
Date Sampled :	**February 16, 2018**	**Test Pit (Unit No.)**	**TP7**	**Sample No.: S1**	**Depth (m) : 0.3-1.0**
Sample Description :	**Silty Sand, some Clay**				**Figure : xxxx**

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

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:

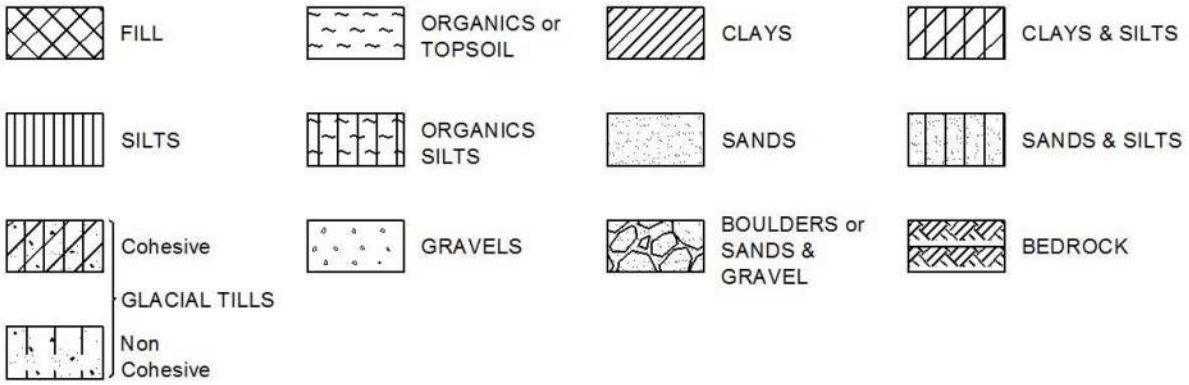
Table c: Consistency of Cohesive Soil

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

Log of Borehole BH1

Project No: OTT-00245054-A0

Project: Phase Two ESA

Location: 1158 Second Line Road, Ottawa, ON

Figure No. 3

Page. 1 of 1

Date Drilled: 'February 22, 2018

Drill Type: CME-55 Track Mounted Drill Rig

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
		TOPSOIL ~ 250 mm	103.12	0
		SANDY SILT (ML) Brown, wet, (very loose)	102.9	
M			102.22	1
		SANDSTONE BEDROCK Horizontally fractured, interbedded with limestone and granite (fair to excellent quality)	101.9	
			98.6	4
		Borehole Terminated at 4.5 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: Run 1, Run 2, Run 3

Natural Unit Wt. kN/m³

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm slotted standpipe was installed upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245054-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	0.9	4.5
8days	dry	
252 days	dry	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	1.2 - 1.5	100	60
2	1.5 - 3	100	66
3	3 - 4.5	100	91

LOG OF BOREHOLE LOGS OF BOREHOLE - 1158 SECOND LINE RD NOV 2018.GPJ TROW OTTAWA.GDT 11/22/18

Log of Borehole BH2

Project No: OTT-00245054-A0

Project: Phase Two ESA

Location: 1158 Second Line Road, Ottawa, ON

Figure No. 4

Page. 1 of 1

Date Drilled: 'February 22, 2018

Drill Type: CME-55 Track Mounted Drill Rig

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
			102.23	
		TOPSOIL ~ 150 mm	102.1	0
		SILTY SAND (SM) Occasional boulders, brown , moist to wet (loose to very dense)		1
			100.5	2
		SANDSTONE BEDROCK Fractured in the upper levels, Horizontally fractured, interbedded with limestone and granite (very poor to good quality)		3
			97.6	4
		Borehole Terminated at 4.6 m Depth		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

50/100 mm

9

50/125 mm

Combustible Vapour Reading (ppm): 250 500 750

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

SAMPLES: Run 1, Run 2

Natural Unit Wt. kN/m³

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm slotted standpipe was installed upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245054-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	4.6
8 days	dry	
252 days	dry	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	1.8 - 3.1	73	14
2	3.1 - 4.6	100	80

LOG OF BOREHOLE LOGS OF BOREHOLE - 1158 SECOND LINE RD NOV 2018.GPJ TROW OTTAWA.GDT 11/22/18

Log of Borehole MW18-3

Project No: OTT-00245054-A0

Project: Phase Two ESA

Location: 1158 Second Line Road, Ottawa, ON

Figure No. 5

Page. 1 of 1

Date Drilled: 'October 22, 2018

Drill Type: Geoprobe Drill Rig

Datum: Geodetic

Logged by: M. L. Checked by: M.M.

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
		TOPSOIL ~ 250 mm	103.62	0
		SANDY SILT (ML) Brown, wet, (very loose)	103.4	
		TILL Brown, silty sand, some gravel, wet, (very loose)	102.1	
		SANDSTONE BEDROCK Interbedded with limestone	101.2	
			98.6	5
			97.5	6
		Borehole Terminated at 6.1 m Depth		

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

Natural Unit Wt. kN/m³

5

5

Run 1

LOG OF BOREHOLE LOGS OF BOREHOLE - 1158 SECOND LINE RD NOV 2018.GPJ TROW OTTAWA.GDT 11/22/18

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 37 mm slotted monitoring well was installed upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245054-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
11 days	5.0	

CORE DRILLING RECORD

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

Appendix D - Analytical Summary Tables

TABLE 1 **SOIL ANALYTICAL RESULTS *(µg/g)***
Petroleum Hydrocarbons (PHCs) and BTEX
1158 Second Line Road, Ottawa

Parameter	MECP Table 7[1]	SA-1	BH1 SS1	MW18-4 SS2	BH2 SS1	MW18-3 SS2	Trip Blank
Sample Date (d/m/y)	Residential	22-Feb-18	22-Oct-18	Duplicate of	22-Oct-18	22-Oct-18	22-Oct-18
Sample Depth (mbsg)		0.05 - 0.15	0.25 - 1.1	BH1 SS1	0.25 - 0.6	0.25 - 1.2	
Benzene	0.21	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	2.1	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02
Toluene	2.3	<0.05	<0.02	<0.02	<0.02	<0.02	<0.02
Total Xylenes	3.1	<0.05	<0.04	<0.04	<0.04	<0.04	<0.04
F1 (C6-C10)	55	<7	<10	<10	<10	<10	<10
F2 (C10-C16 Hydrocarbons)	98	<4	<10	14	<10	11	NA
F3 (C16-C34 Hydrocarbons)	300	<8	<50	<50	<50	<50	NA
F4 (C34-C50 Hydrocarbons)	2800	<6	<50	<50	<50	<50	NA

NOTES:

1	MECP *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 7 Non-Potable Residential SCS, coarse grained soil.*
Shaded	Concentration exceeds MECP Table 7 Residential SCS.
NA	Not analyzed

TABLE 2 SOIL ANALYTICAL RESULTS *(µg/g)*
METALS

Parameter	MECP Table 7[2]	BH1 SS1	MW18-4 SS2	BH2 SS1	MW18-3 SS2
Sample Date (d/m/y)	Residential	22-Oct-18	Duplicate of	22-Oct-18	22-Oct-18
Sample Depth (mbsg)		0.25 - 1.1	BH1 SS1	0.25 - 0.6	0.25 - 1.2
Aluminum	NV	14000	15000	6400	2400
Antimony	7.5	<0.20	<0.20	0.27	<0.20
Arsenic	18	<1.0	<1.0	1.5	<1.0
Barium	390	130	140	100	61
Beryllium	4	0.47	0.50	0.46	0.24
Bismuth	NV	<1.0	<1.0	<1.0	<1.0
Boron	120	<5.0	<5.0	<5.0	<5.0
Cadmium	1.2	0.12	0.15	0.50	<0.10
Calcium	NV	11000	6000	4500	2500
Chromium	160	23	24	10	9.9
Cobalt	22	7.8	7.6	2.1	1.7
Copper	140	14	12	4.2	4.1
Iron	NV	20000	20000	8100	4400
Lead	120	5.3	5.6	14	1.5
Magnesium	NV	7700	5300	800	260
Manganese	NV	570	540	3200	2200
Mercury	NV	<0.050	<0.050	0.11	<0.050
Molybdenum	6.9	<0.50	<0.50	0.73	1.5
Nickel	100	14	14	4.5	4.3
Phosphoru	NV	990	850	820	750
Potassium	NV	1600	1400	690	450
Selenium	2.4	<0.50	<0.50	0.56	<0.50
Silver	20	<0.20	<0.20	<0.20	<0.20
Sodium	NV	300	220	<50	<50
Strontium	NV	23	18	16	41
Thallium	1	0.16	0.14	0.31	0.19
Tin	NV	<1.0	<1.0	<1.0	<1.0
Uranium	23	0.61	0.57	0.59	0.75
Vanadium	86	39	39	19	11
Zinc	340	36	40	33	6.9

NOTES:

1 MECP *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 7 Non-Potable Residential SCS, coarse grained soil.*

Shaded Concentration exceeds MECP Table 7 Residential SCS.

TABLE 3 GROUNDWATER ANALYTICAL RESULTS *(µg/L)*
PETROLEUM HYDROCARBONS and BTEX
1158 Second Line Road, Ottawa

Parameter	MECP Table 7[1]	MW18-3	MW 17	Trip Blank	Trip Spike
Sample Date (d/m/y)	**Residential**	1-Nov-18	Duplicate of MW18-3	1-Nov-18	1-Nov-18
Benzene	0.5	<0.20	<0.20	<0.20	85.20%
Toluene	320	<0.20	<0.20	<0.20	94.50%
Ethylbenzene	57	<0.20	<0.20	<0.20	96.51%
Total Xylenes	72	<0.40	<0.40	<0.40	72.20%
PHC F1	420	<25	<25	NA	NA
PHC F2	150	<100	<100	NA	NA
PHC F3	500	<200	<200	NA	NA
PHC F4	500	<200	<200	NA	NA

NOTES:

1 MECP *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 7, for a non-potable groundwater, residential standards, coarse grained soil.*

Shaded Concentration exceeds MECP Table 7 residential groundwater quality standard.

NA Not Analyzed

NV No Value

TABLE 4 GROUNDWATER ANALYTICAL RESULTS *(µg/L)*
PETROLEUM HYDROCARBONS and BTEX
1158 Second Line Road, Ottawa

Parameter	**MECP Table 7[1]**	**MW18-3**	**MW 17**
Sample Date (d/m/y)	**Residential**	1-Nov-18	Duplicate of MW18-3
Antimony	16000	5.1	5.0
Arsenic	1500	<1.0	<1.0
Barium	23000	120	120
Beryllium	53	<0.50	<0.50
Boron	36000	100	100
Cadmium	2.1	<0.10	<0.10
Chromium	640	<5.0	<5.0
Cobalt	52	3.1	3.2
Copper	69	2.3	2.8
Lead	20	<0.50	<0.50
Molybdenum	7300	15	15
Nickel	390	15	14
Selenium	50	2.5	2.2
Silver	1.2	<0.10	<0.10
Thallium	400	0.15	0.14
Uranium	330	91	91
Vanadium	200	<0.50	<0.50
Zinc	890	6.0	7.1

NOTES:

1	MECP *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 7, for a non-potable groundwater, residential standards, coarse grained soil.*
Shaded	Concentration exceeds MECP Table 7 residential groundwater quality standard.
NA	Not Analyzed
NV	No Value

Appendix E – Laboratory Certificates of Analysis

AGAT Laboratories

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

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

ATTENTION TO: **Raad Akrawi**

PROJECT: **OTT-245054**

AGAT WORK ORDER: **18Z315065**

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

DATE REPORTED: **Mar 05, 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.

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: 18Z315065

PROJECT: OTT-245054

CLIENT NAME: EXP SERVICES INC

SAMPLING SITE:1158 Second Line Rd.

ATTENTION TO: Raad Akrawi

SAMPLED BY:exp

Inorganic Chemistry (Soil)

DATE RECEIVED: 2018-02-27 **DATE REPORTED: 2018-03-05**

				BH1 Run 1	BH3 Run 1
		SAMPLE DESCRIPTION:		4'9"-5'	6'11"-7'3"
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2018-02-22	2018-02-22
Parameter	Unit	G / S	RDL	9089226	9089228
pH, 2:1 CaCl2 Extraction	pH Units		NA	7.58	7.95
Sulphate (2:1)	µg/g		2	30	24

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

9089226 Sulphate was determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). pH was determined on the 0.01M CaCl2 extract prepared at 2:1 ratio.

Certified By: Amanjot Bhela

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

AGAT WORK ORDER: 18Z315065

PROJECT: OTT-245054

ATTENTION TO: Raad Akrawi

SAMPLING SITE:1158 Second Line Rd.

SAMPLED BY:exp

Soil Analysis

RPT Date: Mar 05, 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 CaCl2 Extraction	9089226	9089226	7.58	7.63	0.7%	NA	101%	80%	120%						
Sulphate (2:1)	9089226	9089226	30	30	0.0%	< 2	100%	70%	130%	109%	70%	130%	112%	70%	130%

Comments: NA signifies Not Applicable.

Certified By: Amanjot Bhela

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: 18Z315065

PROJECT: OTT-245054

ATTENTION TO: Raad Akrawi

SAMPLING SITE:1158 Second Line Rd.

SAMPLED BY:exp

PARAMETER	AGAT S.O.P	LITERATURE REFERENCE	ANALYTICAL TECHNIQUE
Soil Analysis			
pH, 2:1 CaCl2 Extraction	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

AGAT Laboratories

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

Chain of Custody Record

If this is a Drinking Water sample, please use Drinking Water Chain of Custody Form (potable water consumed by humans)

Report Information:

Company: Exp Services
Contact: Raad Akrawi
Address: 100-2650 Queensview drive
Ottawa Ont K2B 8H6
Phone: 613-688-1899 Fax:
Reports to be sent to:
1. Email: Raad.Akrawi@exp.com
2. Email:

Project Information:

Project: OTT-245054
Site Location: 1158 Second line 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:

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

Sample Matrix Legend

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

Laboratory Use Only

Work Order #: 18731506 5
Cooler Quantity: One on ice
Arrival Temperatures: 14.8 | 14.7 | 14.7 | 14.0 (NO ice)
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
Notes:

Turnaround Time (TAT) Required:

Regular TAT ☒ 5 to 7 Business Days
Rush TAT (Rush Surcharges Apply)
☐ 3 Business Days ☐ 2 Business Days ☐ 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

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_3+NO_2	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	Sulphides
BH 1 Run 1 4'9"-5'	Feb 22/18																		✓	✓
BH 3 Run 1 6'11"-7'3"	Feb 22/18																		✓	✓

Samples Relinquished By (Print Name and Sign): Ryan DiGiuseppe	Date: Feb 26/18	Time: 5:05	Samples Received By (Print Name and Sign):	Date: 27-Feb-18	Time: 8h00
Samples Relinquished By (Print Name and Sign): GSO FedEx 27-Feb-18	Date:	Time: 16h00	Samples Received By (Print Name and Sign):	Date:	Time:
Samples Relinquished By (Print Name and Sign):	Date:	Time:	Samples Received By (Print Name and Sign): Shaumin Feb 28/18	Date: 9:07 am	Time:

Page 1 of
N°: T 063372

Document ID: Div 78-1511-014

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

Date Revised: February 22, 2017

Maxxam
A Bureau Veritas Group Company

Your Project #: OTT-00245054-A0
Site Location: 1158 OLD SECOND LINE RD
Your C.O.C. #: 688940-01-01

Attention: Jeffery O'Banion

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

Report Date: 2018/10/31
Report #: R5464120
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8S5082
Received: 2018/10/25, 15:00

Sample Matrix: Soil
Samples Received: 5

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Petroleum Hydro. CCME F1 & BTEX in Soil (2)	5	N/A	2018/10/27	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil (3)	4	2018/10/29	2018/10/30	OTT SOP-00001	CCME CWS
Strong Acid Leachable Metals by ICPMS (1)	4	2018/10/30	2018/10/30	CAM SOP-00447	EPA 6020B m
Moisture	4	N/A	2018/10/30	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. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

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. When sampling is not conducted by Maxxam, results relate to the supplied 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) This test was performed by Maxxam Analytics Mississauga
(2) 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.
(3) 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.

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Your Project #: OTT-00245054-A0
Site Location: 1158 OLD SECOND LINE RD
Your C.O.C. #: 688940-01-01

Attention: Jeffery O'Banion

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

Report Date: 2018/10/31
Report #: R5464120
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8S5082
Received: 2018/10/25, 15:00

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alisha Williamson, Project Manager
Email: AWilliamson@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.

Maxxam Job #: B8S5082
Report Date: 2018/10/31

exp Services Inc
Client Project #: OTT-00245054-A0
Site Location: 1158 OLD SECOND LINE RD
Sampler Initials: ML

RESULTS OF ANALYSES OF SOIL

Maxxam ID		IDC967	IDC968	IDC969	IDC970		
Sampling Date		2018/10/22 09:00	2018/10/22 09:00	2018/10/22 10:00	2018/10/22 11:00		
COC Number		688940-01-01	688940-01-01	688940-01-01	688940-01-01		
	UNITS	**BH18-1 SS1**	**MW18-4 SS2**	**BH18-2 SS1**	**MW18-3 SS2**	**RDL**	**QC Batch**
Inorganics							
Moisture	%	7.6	7.8	12	3.1	0.2	5808561

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B8S5082
Report Date: 2018/10/31

exp Services Inc
Client Project #: OTT-00245054-A0
Site Location: 1158 OLD SECOND LINE RD
Sampler Initials: ML

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		IDC967	IDC968	IDC969	IDC970		
Sampling Date		2018/10/22 09:00	2018/10/22 09:00	2018/10/22 10:00	2018/10/22 11:00		
COC Number		688940-01-01	688940-01-01	688940-01-01	688940-01-01		
	UNITS	**BH18-1 SS1**	**MW18-4 SS2**	**BH18-2 SS1**	**MW18-3 SS2**	**RDL**	**QC Batch**
Metals							
Acid Extractable Aluminum (Al)	ug/g	14000	15000	6400	2400	50	5810030
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	0.27	<0.20	0.20	5810030
Acid Extractable Arsenic (As)	ug/g	<1.0	<1.0	1.5	<1.0	1.0	5810030
Acid Extractable Barium (Ba)	ug/g	130	140	100	61	0.50	5810030
Acid Extractable Beryllium (Be)	ug/g	0.47	0.50	0.46	0.24	0.20	5810030
Acid Extractable Bismuth (Bi)	ug/g	<1.0	<1.0	<1.0	<1.0	1.0	5810030
Acid Extractable Boron (B)	ug/g	<5.0	<5.0	<5.0	<5.0	5.0	5810030
Acid Extractable Cadmium (Cd)	ug/g	0.12	0.15	0.50	<0.10	0.10	5810030
Acid Extractable Calcium (Ca)	ug/g	11000	6000	4500	2500	50	5810030
Acid Extractable Chromium (Cr)	ug/g	23	24	10	9.9	1.0	5810030
Acid Extractable Cobalt (Co)	ug/g	7.8	7.6	2.1	1.7	0.10	5810030
Acid Extractable Copper (Cu)	ug/g	14	12	4.2	4.1	0.50	5810030
Acid Extractable Iron (Fe)	ug/g	20000	20000	8100	4400	50	5810030
Acid Extractable Lead (Pb)	ug/g	5.3	5.6	14	1.5	1.0	5810030
Acid Extractable Magnesium (Mg)	ug/g	7700	5300	800	260	50	5810030
Acid Extractable Manganese (Mn)	ug/g	570	540	3200	2200	1.0	5810030
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	<0.50	0.73	1.5	0.50	5810030
Acid Extractable Nickel (Ni)	ug/g	14	14	4.5	4.3	0.50	5810030
Acid Extractable Phosphorus (P)	ug/g	990	850	820	750	50	5810030
Acid Extractable Potassium (K)	ug/g	1600	1400	690	450	200	5810030
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	0.56	<0.50	0.50	5810030
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	<0.20	<0.20	0.20	5810030
Acid Extractable Sodium (Na)	ug/g	300	220	<50	<50	50	5810030
Acid Extractable Strontium (Sr)	ug/g	23	18	16	41	1.0	5810030
Acid Extractable Thallium (Tl)	ug/g	0.16	0.14	0.31	0.19	0.050	5810030
Acid Extractable Tin (Sn)	ug/g	<1.0	<1.0	<1.0	<1.0	1.0	5810030
Acid Extractable Uranium (U)	ug/g	0.61	0.57	0.59	0.75	0.050	5810030
Acid Extractable Vanadium (V)	ug/g	39	39	19	11	5.0	5810030
Acid Extractable Zinc (Zn)	ug/g	36	40	33	6.9	5.0	5810030
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	0.11	<0.050	0.050	5810030

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B8S5082
Report Date: 2018/10/31

exp Services Inc
Client Project #: OTT-00245054-A0
Site Location: 1158 OLD SECOND LINE RD
Sampler Initials: ML

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		IDC967	IDC968	IDC968	IDC969	IDC970		
Sampling Date		2018/10/22 09:00	2018/10/22 09:00	2018/10/22 09:00	2018/10/22 10:00	2018/10/22 11:00		
COC Number		688940-01-01	688940-01-01	688940-01-01	688940-01-01	688940-01-01		
	UNITS	**BH18-1 SS1**	**MW18-4 SS2**	**MW18-4 SS2 Lab-Dup**	**BH18-2 SS1**	**MW18-3 SS2**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons								
Benzene	ug/g	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	5805563
Toluene	ug/g	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	5805563
Ethylbenzene	ug/g	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	5805563
o-Xylene	ug/g	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	5805563
p+m-Xylene	ug/g	<0.04	<0.04	<0.04	<0.04	<0.04	0.04	5805563
Total Xylenes	ug/g	<0.04	<0.04	<0.04	<0.04	<0.04	0.04	5805563
F1 (C6-C10)	ug/g	<10	<10	<10	<10	<10	10	5805563
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	<10	<10	10	5805563
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	<10	14	<10	<10	11	10	5808322
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	<50	<50	<50	50	5808322
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	<50	<50	<50	50	5808322
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes	Yes		5808322
Surrogate Recovery (%)								
1,4-Difluorobenzene	%	99	97	97	97	96		5805563
4-Bromofluorobenzene	%	99	102	99	98	98		5805563
D10-Ethylbenzene	%	107	102	110	116	123		5805563
D4-1,2-Dichloroethane	%	95	95	94	97	94		5805563
o-Terphenyl	%	97	95	93	88	89		5808322

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
Lab-Dup = Laboratory Initiated Duplicate

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B8S5082
Report Date: 2018/10/31

exp Services Inc
Client Project #: OTT-00245054-A0
Site Location: 1158 OLD SECOND LINE RD
Sampler Initials: ML

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		IDC971		
Sampling Date		2018/10/22		
COC Number		688940-01-01		
	UNITS	**TRIP BLANK**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons				
Benzene	ug/g	<0.02	0.02	5805563
Toluene	ug/g	<0.02	0.02	5805563
Ethylbenzene	ug/g	<0.02	0.02	5805563
o-Xylene	ug/g	<0.02	0.02	5805563
p+m-Xylene	ug/g	<0.04	0.04	5805563
Total Xylenes	ug/g	<0.04	0.04	5805563
F1 (C6-C10) - BTEX	ug/g	<10	10	5805563
Surrogate Recovery (%)				
1,4-Difluorobenzene	%	104		5805563
4-Bromofluorobenzene	%	105		5805563
D10-Ethylbenzene	%	114		5805563
D4-1,2-Dichloroethane	%	98		5805563

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B8S5082
Report Date: 2018/10/31

exp Services Inc
Client Project #: OTT-00245054-A0
Site Location: 1158 OLD SECOND LINE RD
Sampler Initials: ML

TEST SUMMARY

Maxxam ID: IDC967
Sample ID: BH18-1 SS1
Matrix: Soil

Collected: 2018/10/22
Shipped:
Received: 2018/10/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5805563	N/A	2018/10/27	Fatemeh Habibagahi
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5808322	2018/10/29	2018/10/30	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5810030	2018/10/30	2018/10/30	Daniel Teclu
Moisture	BAL	5808561	N/A	2018/10/30	Samantha Arachchige

Maxxam ID: IDC968
Sample ID: MW18-4 SS2
Matrix: Soil

Collected: 2018/10/22
Shipped:
Received: 2018/10/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5805563	N/A	2018/10/27	Fatemeh Habibagahi
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5808322	2018/10/29	2018/10/30	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5810030	2018/10/30	2018/10/30	Daniel Teclu
Moisture	BAL	5808561	N/A	2018/10/30	Samantha Arachchige

Maxxam ID: IDC968 Dup
Sample ID: MW18-4 SS2
Matrix: Soil

Collected: 2018/10/22
Shipped:
Received: 2018/10/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5805563	N/A	2018/10/27	Fatemeh Habibagahi
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5808322	2018/10/29	2018/10/30	Mariana Vascan

Maxxam ID: IDC969
Sample ID: BH18-2 SS1
Matrix: Soil

Collected: 2018/10/22
Shipped:
Received: 2018/10/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5805563	N/A	2018/10/27	Fatemeh Habibagahi
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5808322	2018/10/29	2018/10/30	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5810030	2018/10/30	2018/10/30	Daniel Teclu
Moisture	BAL	5808561	N/A	2018/10/30	Samantha Arachchige

Maxxam ID: IDC970
Sample ID: MW18-3 SS2
Matrix: Soil

Collected: 2018/10/22
Shipped:
Received: 2018/10/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5805563	N/A	2018/10/27	Fatemeh Habibagahi
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5808322	2018/10/29	2018/10/30	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5810030	2018/10/30	2018/10/30	Daniel Teclu
Moisture	BAL	5808561	N/A	2018/10/30	Samantha Arachchige

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Maxxam Job #: B8S5082
Report Date: 2018/10/31

exp Services Inc
Client Project #: OTT-00245054-A0
Site Location: 1158 OLD SECOND LINE RD
Sampler Initials: ML

TEST SUMMARY

Maxxam ID: IDC971
Sample ID: TRIP BLANK
Matrix: Soil

Collected: 2018/10/22
Shipped:
Received: 2018/10/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5805563	N/A	2018/10/27	Fatemeh Habibagahi

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B8S5082
Report Date: 2018/10/31

exp Services Inc
Client Project #: OTT-00245054-A0
Site Location: 1158 OLD SECOND LINE RD
Sampler Initials: ML

GENERAL COMMENTS

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

Package 1	2.7°C

Results relate only to the items tested.

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Job #: B8S5082
Report Date: 2018/10/31

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-00245054-A0
Site Location: 1158 OLD SECOND LINE RD
Sampler Initials: ML

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5805563	1,4-Difluorobenzene	2018/10/27	98	60 - 140	100	60 - 140	99	%		
5805563	4-Bromofluorobenzene	2018/10/27	102	60 - 140	101	60 - 140	98	%		
5805563	D10-Ethylbenzene	2018/10/27	107	30 - 130	101	30 - 130	99	%		
5805563	D4-1,2-Dichloroethane	2018/10/27	91	60 - 140	94	60 - 140	94	%		
5808322	o-Terphenyl	2018/10/29	84	30 - 130	98	30 - 130	99	%		
5805563	Benzene	2018/10/27	72	60 - 140	73	60 - 140	<0.02	ug/g	NC	50
5805563	Ethylbenzene	2018/10/27	83	60 - 140	83	60 - 140	<0.02	ug/g	NC	50
5805563	F1 (C6-C10) - BTEX	2018/10/27					<10	ug/g	NC	50
5805563	F1 (C6-C10)	2018/10/27	89	60 - 140	95	80 - 120	<10	ug/g	NC	50
5805563	o-Xylene	2018/10/27	69	60 - 140	73	60 - 140	<0.02	ug/g	NC	50
5805563	p+m-Xylene	2018/10/27	74	60 - 140	76	60 - 140	<0.04	ug/g	NC	50
5805563	Toluene	2018/10/27	96	60 - 140	96	60 - 140	<0.02	ug/g	NC	50
5805563	Total Xylenes	2018/10/27					<0.04	ug/g	NC	50
5808322	F2 (C10-C16 Hydrocarbons)	2018/10/30	67	50 - 130	80	80 - 120	<10	ug/g	35	50
5808322	F3 (C16-C34 Hydrocarbons)	2018/10/30	67	50 - 130	80	80 - 120	<50	ug/g	NC	50
5808322	F4 (C34-C50 Hydrocarbons)	2018/10/30	67	50 - 130	80	80 - 120	<50	ug/g	NC	50
5808561	Moisture	2018/10/30							2.5	50
5810030	Acid Extractable Aluminum (Al)	2018/10/30	NC	75 - 125	99	80 - 120	<50	ug/g		
5810030	Acid Extractable Antimony (Sb)	2018/10/30	92	75 - 125	100	80 - 120	<0.20	ug/g	NC	30
5810030	Acid Extractable Arsenic (As)	2018/10/30	101	75 - 125	101	80 - 120	<1.0	ug/g	2.5	30
5810030	Acid Extractable Barium (Ba)	2018/10/30	NC	75 - 125	99	80 - 120	<0.50	ug/g	5.8	30
5810030	Acid Extractable Beryllium (Be)	2018/10/30	97	75 - 125	94	80 - 120	<0.20	ug/g	0.19	30
5810030	Acid Extractable Bismuth (Bi)	2018/10/30	95	75 - 125	97	80 - 120	<1.0	ug/g		
5810030	Acid Extractable Boron (B)	2018/10/30	96	75 - 125	90	80 - 120	<5.0	ug/g	3.6	30
5810030	Acid Extractable Cadmium (Cd)	2018/10/30	100	75 - 125	98	80 - 120	<0.10	ug/g	2.1	30
5810030	Acid Extractable Calcium (Ca)	2018/10/30	NC	75 - 125	101	80 - 120	<50	ug/g		
5810030	Acid Extractable Chromium (Cr)	2018/10/30	NC	75 - 125	102	80 - 120	<1.0	ug/g	1.6	30
5810030	Acid Extractable Cobalt (Co)	2018/10/30	96	75 - 125	98	80 - 120	<0.10	ug/g	4.5	30
5810030	Acid Extractable Copper (Cu)	2018/10/30	NC	75 - 125	97	80 - 120	<0.50	ug/g	1.8	30
5810030	Acid Extractable Iron (Fe)	2018/10/30	NC	75 - 125	98	80 - 120	<50	ug/g		
5810030	Acid Extractable Lead (Pb)	2018/10/30	99	75 - 125	101	80 - 120	<1.0	ug/g	3.3	30

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Maxxam Job #: B8S5082
Report Date: 2018/10/31

QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-00245054-A0
Site Location: 1158 OLD SECOND LINE RD
Sampler Initials: ML

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5810030	Acid Extractable Magnesium (Mg)	2018/10/30	NC	75 - 125	96	80 - 120	<50	ug/g		
5810030	Acid Extractable Manganese (Mn)	2018/10/30	NC	75 - 125	99	80 - 120	<1.0	ug/g		
5810030	Acid Extractable Mercury (Hg)	2018/10/30	94	75 - 125	96	80 - 120	<0.050	ug/g	NC	30
5810030	Acid Extractable Molybdenum (Mo)	2018/10/30	98	75 - 125	99	80 - 120	<0.50	ug/g	10	30
5810030	Acid Extractable Nickel (Ni)	2018/10/30	NC	75 - 125	99	80 - 120	<0.50	ug/g	3.6	30
5810030	Acid Extractable Phosphorus (P)	2018/10/30	NC	75 - 125	106	80 - 120	<50	ug/g		
5810030	Acid Extractable Potassium (K)	2018/10/30	NC	75 - 125	85	80 - 120	<200	ug/g		
5810030	Acid Extractable Selenium (Se)	2018/10/30	99	75 - 125	102	80 - 120	<0.50	ug/g	NC	30
5810030	Acid Extractable Silver (Ag)	2018/10/30	99	75 - 125	99	80 - 120	<0.20	ug/g	NC	30
5810030	Acid Extractable Sodium (Na)	2018/10/30	NC	75 - 125	87	80 - 120	<50	ug/g		
5810030	Acid Extractable Strontium (Sr)	2018/10/30	NC	75 - 125	102	80 - 120	<1.0	ug/g		
5810030	Acid Extractable Thallium (Tl)	2018/10/30	98	75 - 125	100	80 - 120	<0.050	ug/g	6.9	30
5810030	Acid Extractable Tin (Sn)	2018/10/30	100	75 - 125	96	80 - 120	<1.0	ug/g		
5810030	Acid Extractable Uranium (U)	2018/10/30	102	75 - 125	100	80 - 120	<0.050	ug/g	3.2	30
5810030	Acid Extractable Vanadium (V)	2018/10/30	NC	75 - 125	98	80 - 120	<5.0	ug/g	2.8	30
5810030	Acid Extractable Zinc (Zn)	2018/10/30	NC	75 - 125	92	80 - 120	<5.0	ug/g	11	30

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

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

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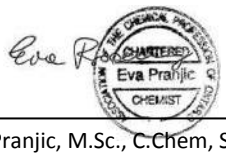
Maxxam Job #: B8S5082
Report Date: 2018/10/31

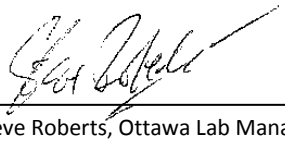
exp Services Inc
Client Project #: OTT-00245054-A0
Site Location: 1158 OLD SECOND LINE RD
Sampler Initials: ML

VALIDATION SIGNATURE PAGE

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



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist



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.

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#17498 exp Services Inc	Company Name:		Quotation #:	B45998 Stream 3	Maxxam Job #:	Bottle Order #:
Attention:	Accounts Payable	Attention:	Jeffery O'Banion / Mail R. Merrill@exp.com	P.O. #:			688940
Address:	100-2650 Queensview Drive Ottawa ON K2B 8H6	Address:		Project:	OTT-00245054-A0	COC #:	Project Manager:
Tel:	(613) 688-1899 Fax: (613) 225-7337	Tel:	Fax:	Project Name:	1158 OLD Second Line Rd	C#688940-01-01	Alisha Williamson
Email:	accounting.ottawa@exp.com; Karen.Burke@exp.com;	Email:	Jeffery.O'Banion@exp.com / Mail R. Merrill@exp.com	Site #:			
				Sampled By:	Max L		

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

Regulation 153 (2011)	Other Regulations	Special Instructions
[X] Table 1 [ ] Res/Park [ ] Medium/Fine	[ ] CCME [ ] Sanitary Sewer Bylaw	
[ ] Table 2 [ ] Ind/Comm [ ] Coarse	[ ] Reg 558. [ ] Storm Sewer Bylaw	
[ ] Table 3 [ ] Agri/Other [ ] For RSC	[ ] MISA Municipality	
[ ] Table ___	[ ] PWQO	
	[ ] Other	

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

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

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

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 Petroleum Hydrocarbons (Soil)	Strong Acid Leachable Metals by ICPMS	BTEX	# of Bottles	Comments
1		BH 18-1 551	OCT 22/18		So.l		X	X		4	
2		MW 18-4 552					X	X			
3		BH 18-2 551					X	X			
4		MW 18-3 552					X	X			
5		Trip Blank							X	2	
6											
7											
8											
9											
10											ON Tap

25-Oct-18 15:00
Alisha Williamson
B8S5082
KIV OTT-001

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Daniel Clarke	18/10/25	9:30		2018/10/25	15:00	

Laboratory Use Only					
Time Sensitive	Temperature (°C) on Recei	2.1, 5	Custody Seal Present	Yes	No
			Intact	✓	

* 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.

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

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

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

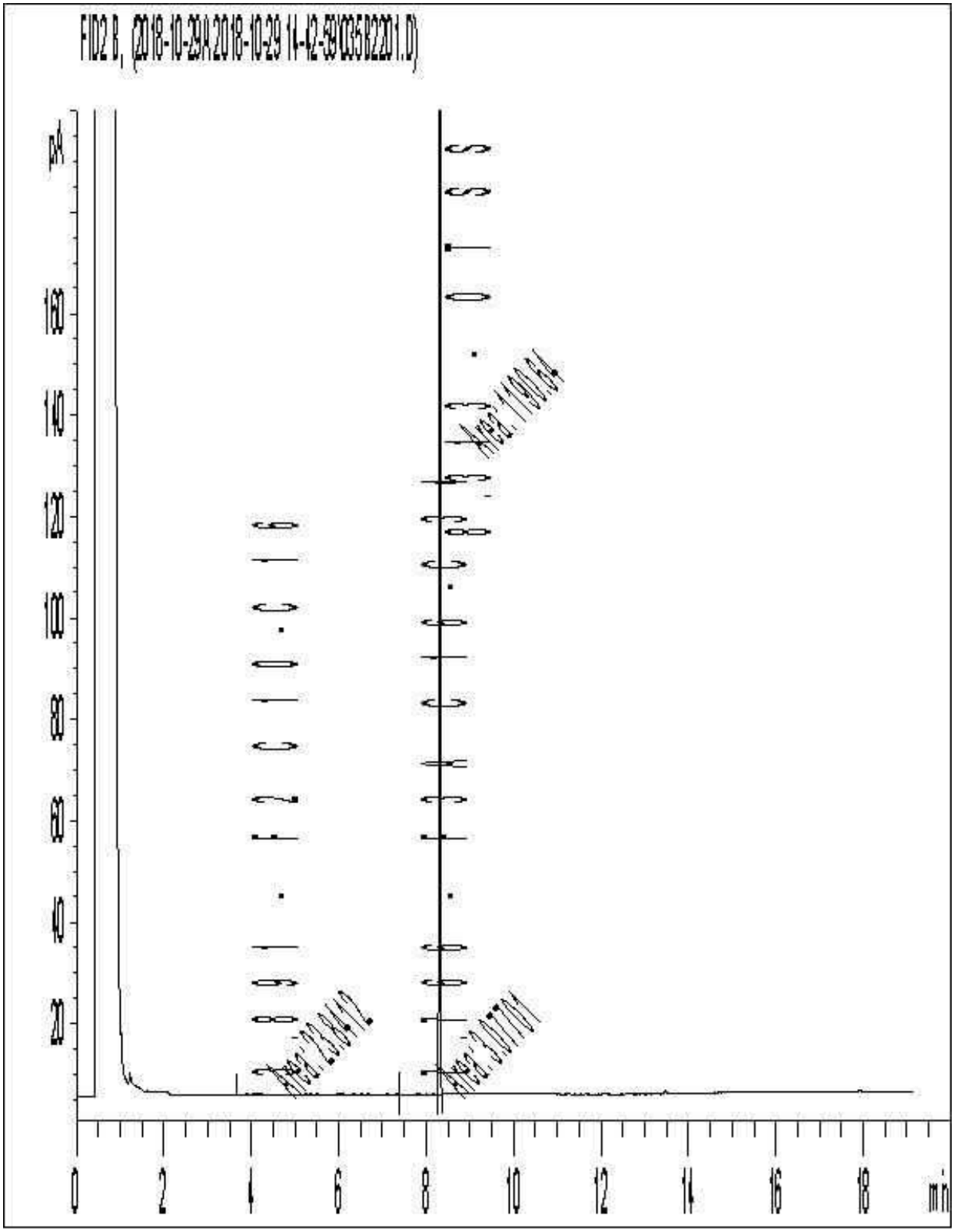
White: Maxxa Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam Job #: B8S5082
Report Date: 2018/10/31
Maxxam Sample: IDC967

exp Services Inc
Client Project #: OTT-00245054-A0
Project name: 1158 OLD SECOND LINE RD
Client ID: BH18-1 SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

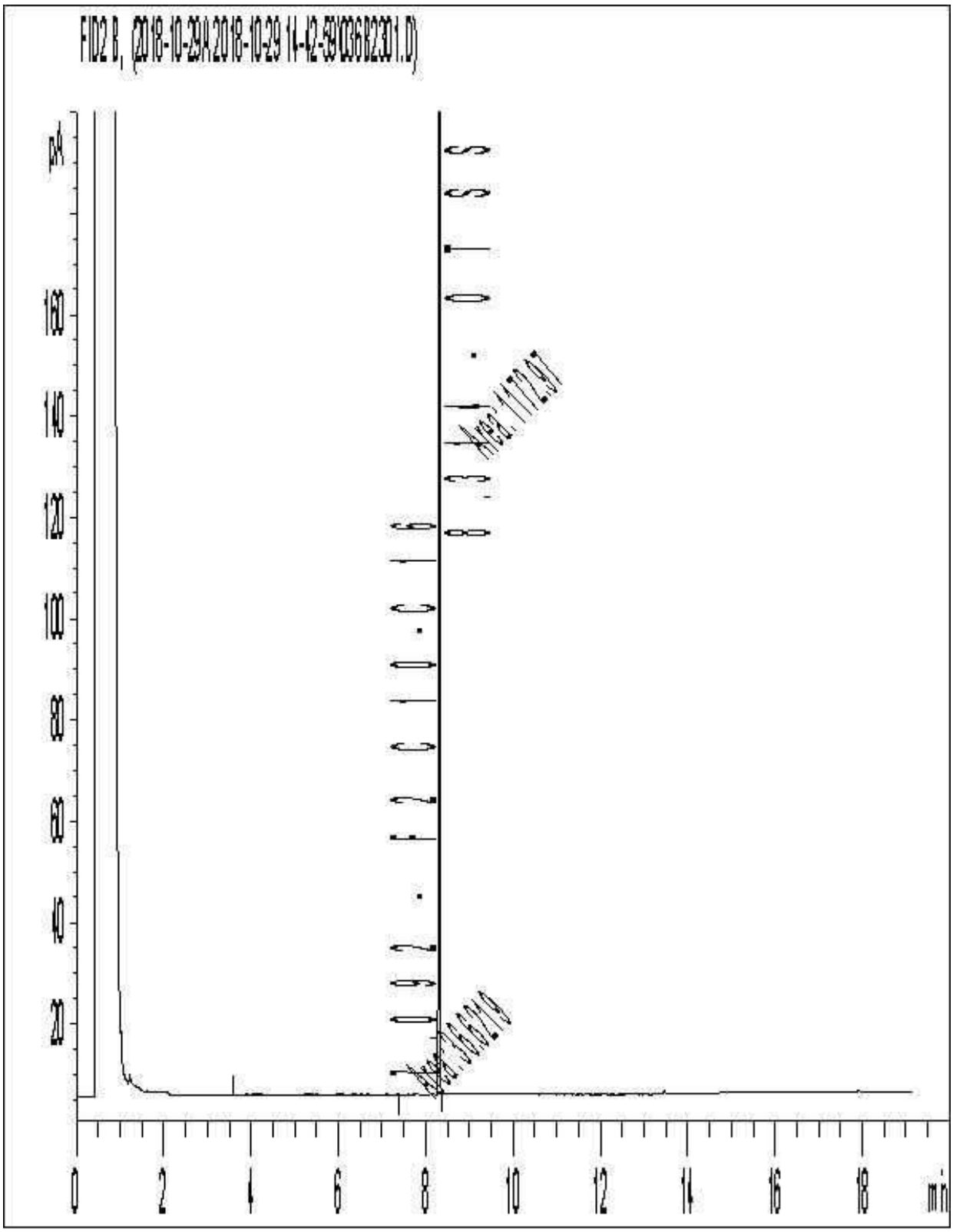


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8S5082
Report Date: 2018/10/31
Maxxam Sample: IDC968

exp Services Inc
Client Project #: OTT-00245054-A0
Project name: 1158 OLD SECOND LINE RD
Client ID: MW18-4 SS2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

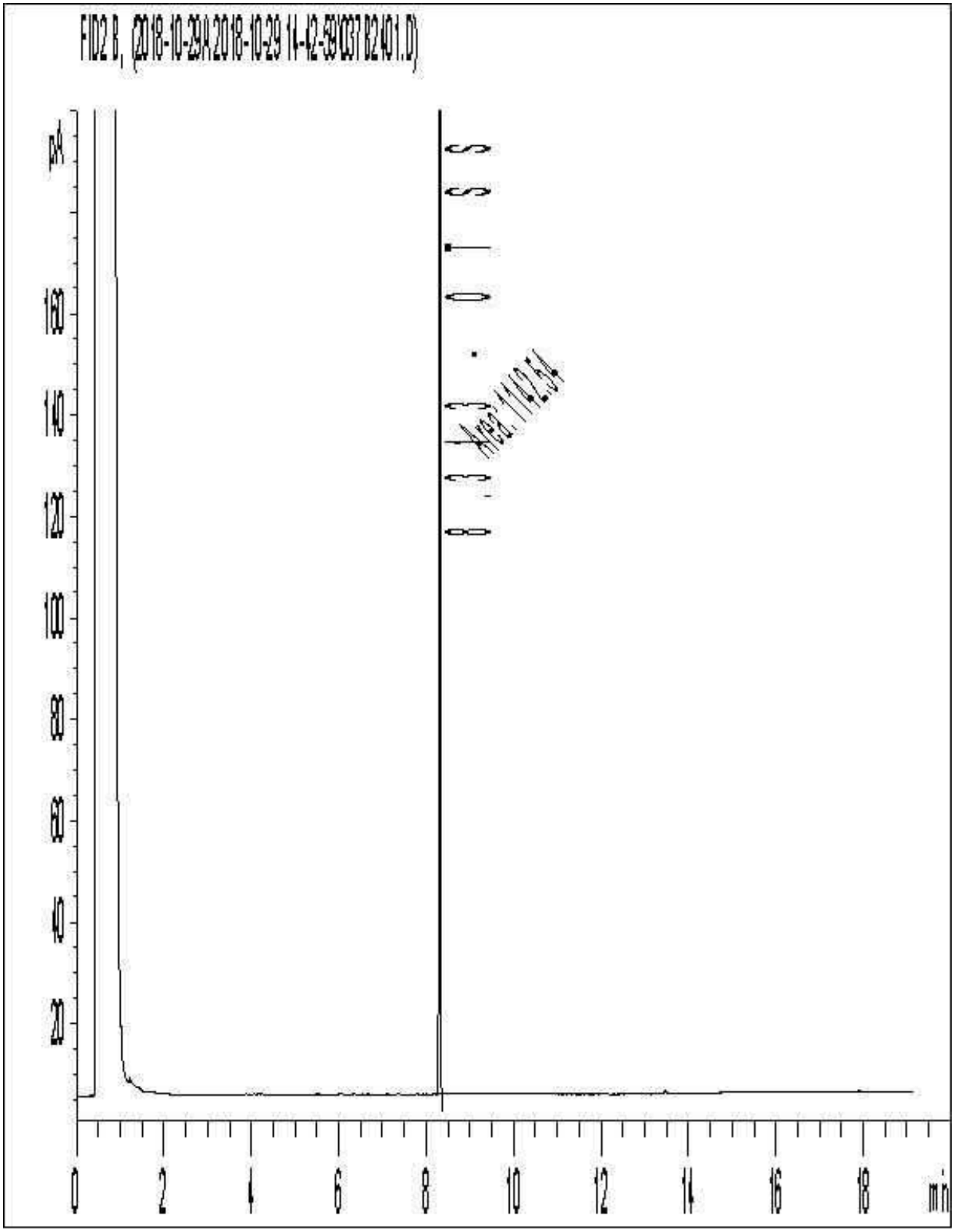


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8S5082
Report Date: 2018/10/31
Maxxam Sample: IDC968 Lab-Dup

exp Services Inc
Client Project #: OTT-00245054-A0
Project name: 1158 OLD SECOND LINE RD
Client ID: MW18-4 SS2

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

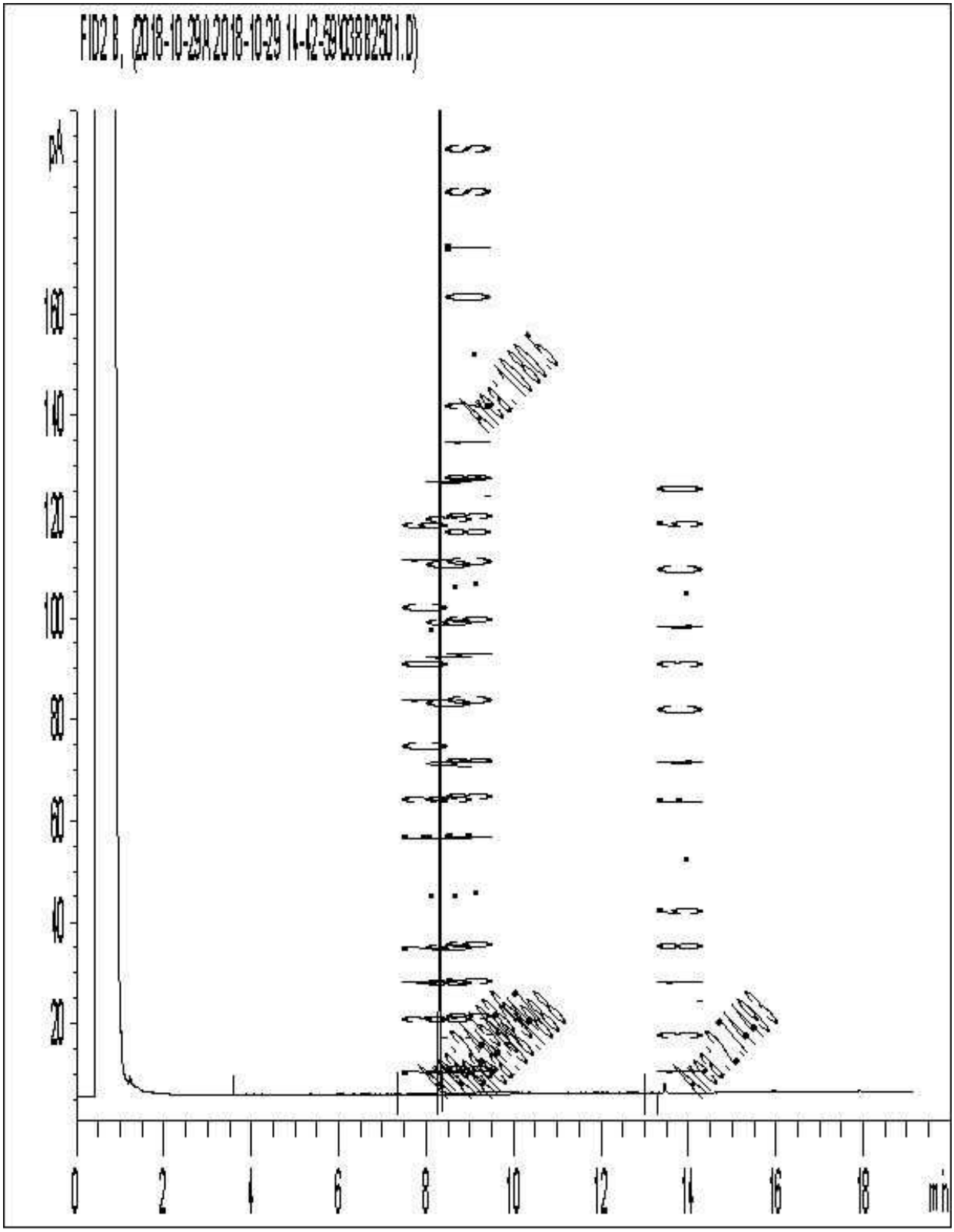


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8S5082
Report Date: 2018/10/31
Maxxam Sample: IDC969

exp Services Inc
Client Project #: OTT-00245054-A0
Project name: 1158 OLD SECOND LINE RD
Client ID: BH18-2 SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

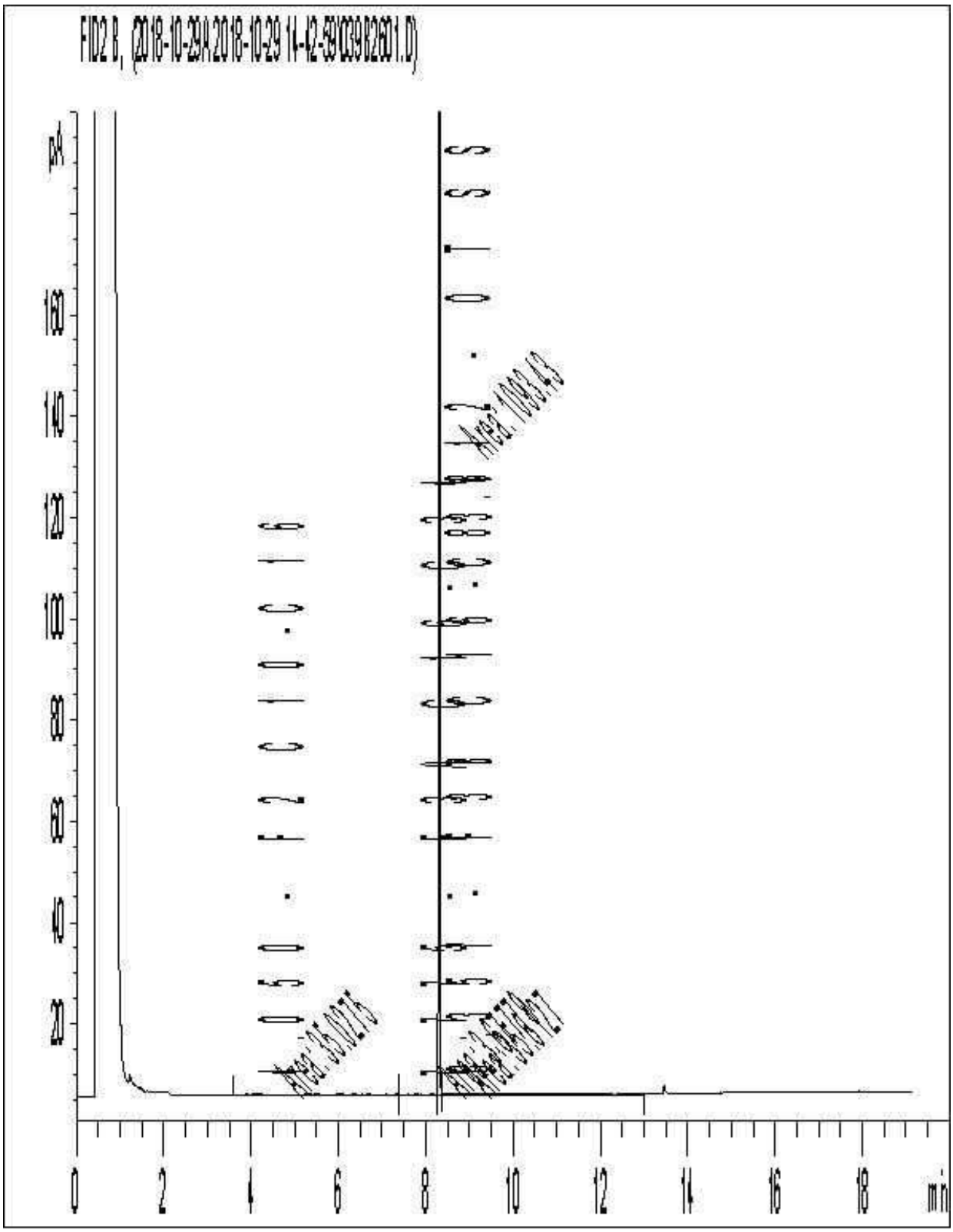


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8S5082
Report Date: 2018/10/31
Maxxam Sample: IDC970

exp Services Inc
Client Project #: OTT-00245054-A0
Project name: 1158 OLD SECOND LINE RD
Client ID: MW18-3 SS2

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.

Your Project #: OTT-00245054-A0
Your C.O.C. #: 690287-01-01

Attention: Jeffery O'Banion

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

Report Date: 2018/11/08
Report #: R5475552
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8T2141
Received: 2018/11/01, 17:15

Sample Matrix: Water
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Petroleum Hydro. CCME F1 & BTEX in Water	1	N/A	2018/11/02	OTT SOP-00002	CCME CWS
Petroleum Hydro. CCME F1 & BTEX in Water	3	N/A	2018/11/05	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Water (2)	2	2018/11/02	2018/11/03	OTT SOP-00001	CCME Hydrocarbons
Dissolved Metals by ICPMS (1)	2	N/A	2018/11/07	CAM SOP-00447	EPA 6020B m

Remarks:

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

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in Maxxam's profession using 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. Where applicable, unless otherwise noted, Measurement Uncertainty has not been accounted for when stating conformity to the referenced standard.

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. Maxxam is not responsible for the accuracy or any data impacts, that result from the information provided by the customer or their agent.

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. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.

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) This test was performed by Maxxam Analytics Mississauga

(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.

Your Project #: OTT-00245054-A0
Your C.O.C. #: 690287-01-01

Attention: Jeffery O'Banion

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

Report Date: 2018/11/08
Report #: R5475552
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8T2141
Received: 2018/11/01, 17:15

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alisha Williamson, Project Manager
Email: AWilliamson@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.

Maxxam Job #: B8T2141
Report Date: 2018/11/08

exp Services Inc
Client Project #: OTT-00245054-A0
Sampler Initials: JO

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		IEP962	IEP963		
Sampling Date		2018/11/01 10:30	2018/11/01 10:30		
COC Number		690287-01-01	690287-01-01		
	UNITS	**MW 17**	**MW 18-3**	**RDL**	**QC Batch**
Metals					
Dissolved Antimony (Sb)	ug/L	5.0	5.1	0.50	5820347
Dissolved Arsenic (As)	ug/L	<1.0	<1.0	1.0	5820347
Dissolved Barium (Ba)	ug/L	120	120	2.0	5820347
Dissolved Beryllium (Be)	ug/L	<0.50	<0.50	0.50	5820347
Dissolved Boron (B)	ug/L	100	100	10	5820347
Dissolved Cadmium (Cd)	ug/L	<0.10	<0.10	0.10	5820347
Dissolved Chromium (Cr)	ug/L	<5.0	<5.0	5.0	5820347
Dissolved Cobalt (Co)	ug/L	3.2	3.1	0.50	5820347
Dissolved Copper (Cu)	ug/L	2.8	2.3	1.0	5820347
Dissolved Lead (Pb)	ug/L	<0.50	<0.50	0.50	5820347
Dissolved Molybdenum (Mo)	ug/L	15	15	0.50	5820347
Dissolved Nickel (Ni)	ug/L	14	15	1.0	5820347
Dissolved Selenium (Se)	ug/L	2.2	2.5	2.0	5820347
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	0.10	5820347
Dissolved Thallium (Tl)	ug/L	0.14	0.15	0.050	5820347
Dissolved Uranium (U)	ug/L	91	91	0.10	5820347
Dissolved Vanadium (V)	ug/L	<0.50	<0.50	0.50	5820347
Dissolved Zinc (Zn)	ug/L	7.1	6.0	5.0	5820347

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8T2141
Report Date: 2018/11/08

exp Services Inc
Client Project #: OTT-00245054-A0
Sampler Initials: JO

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		IEP962	IEP963			IEP964			IEP965		
Sampling Date		2018/11/01 10:30	2018/11/01 10:30			2018/11/01			2018/11/01		
COC Number		690287-01-01	690287-01-01			690287-01-01			690287-01-01		
	UNITS	**MW 17**	**MW 18-3**	**RDL**	**QC Batch**	**TRIP BLANK**	**RDL**	**QC Batch**	**TRIP SPIKE**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons											
Benzene	ug/L	<0.20	<0.20	0.20	5817900	<0.20	0.20	5817900	85.20%	0.20	5817900
Toluene	ug/L	<0.20	<0.20	0.20	5817900	<0.20	0.20	5817900	94.50%	0.20	5817900
Ethylbenzene	ug/L	<0.20	<0.20	0.20	5817900	<0.20	0.20	5817900	96.51%	0.20	5817900
o-Xylene	ug/L	<0.20	<0.20	0.20	5817900	<0.20	0.20	5817900	95.55%	0.20	5817900
p+m-Xylene	ug/L	<0.40	<0.40	0.40	5817900	<0.40	0.40	5817900	97.22%	0.40	5817900
Total Xylenes	ug/L	<0.40	<0.40	0.40	5817900	<0.40	0.40	5817900			
F1 (C6-C10)	ug/L	<25	<25	25	5817900	<25	25	5817900			
F1 (C6-C10) - BTEX	ug/L	<25	<25	25	5817900	<25	25	5817900			
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	100	5817382						
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	200	5817382						
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	200	5817382						
Reached Baseline at C50	ug/L	Yes	Yes		5817382						
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	104	102		5817900	102		5817900	102		5817900
4-Bromofluorobenzene	%	100	98		5817900	97		5817900	99		5817900
D10-Ethylbenzene	%	118	109		5817900	101		5817900	110		5817900
D4-1,2-Dichloroethane	%	101	98		5817900	94		5817900	95		5817900
o-Terphenyl	%	89	90		5817382						

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8T2141
Report Date: 2018/11/08

exp Services Inc
Client Project #: OTT-00245054-A0
Sampler Initials: JO

TEST SUMMARY

Maxxam ID: IEP962
Sample ID: MW 17
Matrix: Water

Collected: 2018/11/01
Shipped:
Received: 2018/11/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	5817900	N/A	2018/11/05	Fatemeh Habibagahi
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5817382	2018/11/02	2018/11/03	Mariana Vascan
Dissolved Metals by ICPMS	ICP/MS	5820347	N/A	2018/11/07	Thao Nguyen

Maxxam ID: IEP963
Sample ID: MW 18-3
Matrix: Water

Collected: 2018/11/01
Shipped:
Received: 2018/11/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	5817900	N/A	2018/11/05	Fatemeh Habibagahi
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5817382	2018/11/02	2018/11/03	Mariana Vascan
Dissolved Metals by ICPMS	ICP/MS	5820347	N/A	2018/11/07	Thao Nguyen

Maxxam ID: IEP964
Sample ID: TRIP BLANK
Matrix: Water

Collected: 2018/11/01
Shipped:
Received: 2018/11/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	5817900	N/A	2018/11/02	Fatemeh Habibagahi

Maxxam ID: IEP965
Sample ID: TRIP SPIKE
Matrix: Water

Collected: 2018/11/01
Shipped:
Received: 2018/11/01

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	5817900	N/A	2018/11/05	Fatemeh Habibagahi

Maxxam Analytics International Corporation o/a Maxxam Analytics 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.maxxam.ca

GENERAL COMMENTS

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

Package 1	8.0°C

PETROLEUM HYDROCARBONS (CCME)

Petroleum Hydro. CCME F1 & BTEX in Water: F1/BTEX Analysis: Matrix spiked recoveries were not calculated (NC) due to high concentration of target compounds in the parent sample.

Results relate only to the items tested.

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Maxxam Job #: B8T2141
Report Date: 2018/11/08

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-00245054-A0
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
5817382	o-Terphenyl	2018/11/02	96	30 - 130	96	30 - 130	95	%		
5817900	1,4-Difluorobenzene	2018/11/05	97	70 - 130	97	70 - 130	104	%		
5817900	4-Bromofluorobenzene	2018/11/05	97	70 - 130	100	70 - 130	96	%		
5817900	D10-Ethylbenzene	2018/11/05	111	70 - 130	101	70 - 130	104	%		
5817900	D4-1,2-Dichloroethane	2018/11/05	91	70 - 130	93	70 - 130	95	%		
5817382	F2 (C10-C16 Hydrocarbons)	2018/11/03	90	50 - 130	84	80 - 120	<100	ug/L	NC	50
5817382	F3 (C16-C34 Hydrocarbons)	2018/11/03	90	50 - 130	84	80 - 120	<200	ug/L	36	50
5817382	F4 (C34-C50 Hydrocarbons)	2018/11/03	90	50 - 130	84	80 - 120	<200	ug/L	33	50
5817900	Benzene	2018/11/05	72	70 - 130	75	70 - 130	<0.20	ug/L	10	40
5817900	Ethylbenzene	2018/11/05	NC	70 - 130	90	70 - 130	<0.20	ug/L	6.9	40
5817900	F1 (C6-C10) - BTEX	2018/11/05					<25	ug/L	1.4	40
5817900	F1 (C6-C10)	2018/11/05	83	70 - 130	92	70 - 130	<25	ug/L	0.16	40
5817900	o-Xylene	2018/11/05	73	70 - 130	74	70 - 130	<0.20	ug/L	4.1	40
5817900	p+m-Xylene	2018/11/05	71	70 - 130	84	70 - 130	<0.40	ug/L	3.1	40
5817900	Toluene	2018/11/05	101	70 - 130	101	70 - 130	<0.20	ug/L	1.5	40
5817900	Total Xylenes	2018/11/05					<0.40	ug/L	3.0	40
5820347	Dissolved Antimony (Sb)	2018/11/07	110	80 - 120	105	80 - 120	<0.50	ug/L	NC	20
5820347	Dissolved Arsenic (As)	2018/11/07	101	80 - 120	101	80 - 120	<1.0	ug/L	NC	20
5820347	Dissolved Barium (Ba)	2018/11/07	100	80 - 120	101	80 - 120	<2.0	ug/L	2.2	20
5820347	Dissolved Beryllium (Be)	2018/11/07	100	80 - 120	101	80 - 120	<0.50	ug/L	NC	20
5820347	Dissolved Boron (B)	2018/11/07	NC	80 - 120	99	80 - 120	<10	ug/L	0.82	20
5820347	Dissolved Cadmium (Cd)	2018/11/07	101	80 - 120	101	80 - 120	<0.10	ug/L	NC	20
5820347	Dissolved Chromium (Cr)	2018/11/07	99	80 - 120	98	80 - 120	<5.0	ug/L	NC	20
5820347	Dissolved Cobalt (Co)	2018/11/07	99	80 - 120	100	80 - 120	<0.50	ug/L	NC	20
5820347	Dissolved Copper (Cu)	2018/11/07	99	80 - 120	101	80 - 120	<1.0	ug/L	NC	20
5820347	Dissolved Lead (Pb)	2018/11/07	97	80 - 120	99	80 - 120	<0.50	ug/L	NC	20
5820347	Dissolved Molybdenum (Mo)	2018/11/07	110	80 - 120	103	80 - 120	<0.50	ug/L	9.8	20
5820347	Dissolved Nickel (Ni)	2018/11/07	97	80 - 120	99	80 - 120	<1.0	ug/L	NC	20
5820347	Dissolved Selenium (Se)	2018/11/07	99	80 - 120	101	80 - 120	<2.0	ug/L	NC	20
5820347	Dissolved Silver (Ag)	2018/11/07	75 (1)	80 - 120	101	80 - 120	<0.10	ug/L	NC	20
5820347	Dissolved Thallium (Tl)	2018/11/07	96	80 - 120	98	80 - 120	<0.050	ug/L	NC	20

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5820347	Dissolved Uranium (U)	2018/11/07	103	80 - 120	102	80 - 120	<0.10	ug/L	4.6	20
5820347	Dissolved Vanadium (V)	2018/11/07	102	80 - 120	98	80 - 120	<0.50	ug/L	NC	20
5820347	Dissolved Zinc (Zn)	2018/11/07	96	80 - 120	99	80 - 120	<5.0	ug/L	NC	20

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

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

(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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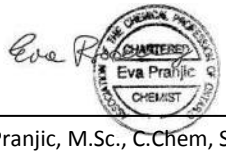
Maxxam Job #: B8T2141
Report Date: 2018/11/08

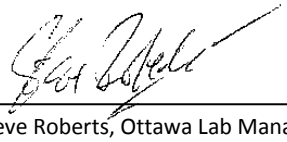
exp Services Inc
Client Project #: OTT-00245054-A0
Sampler Initials: JO

VALIDATION SIGNATURE PAGE

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



Ewa Pranjic, M.Sc., C.Chem, Scientific Specialist



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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Maxxam
A Bureau Veritas Group Company

Maxxam Analytics International Corporation o/a Maxxam Analytics
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page of

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#17498 exp Services Inc	Company Name:		Quotation #:	B45998	Maxxam Job #:	Bottle Order #: 690287
Attention:	Accounts Payable	Attention:	Jeffery O'Banion	P.O. #:			
Address:	100-2650 Queensview Drive Ottawa ON K2B 8H6	Address:		Project:	OTT-00245054-A0	COC #: C#690287-01-01	Project Manager: Alisha Williamson
Tel:	(613) 688-1899 Fax: (613) 225-7337	Tel:	Fax:	Project Name:			
Email:	accounting.ottawa@exp.com; Karen.Burke@exp.com;	Email:	Jeffery.O'Banion@exp.com Mark. McCully	Site #:			
				Sampled By:	Jeff O.		

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

Regulation 153 (2011)	Other Regulations	Special Instructions
☐ Table 1 ☒ Res/Park ☐ Medium/Fine	☐ CCME ☐ Sanitary Sewer Bylaw	
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ Reg 558. ☐ Storm Sewer Bylaw	
☐ Table 3 ☐ Agri/Other ☐ For RSC	☐ MISA Municipality	
☐ Table ___	☐ PWQO	
	☐ Other	

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

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

Turnaround Time (TAT) Required:
Please provide advance notice for rush projects

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

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 Petroleum Hydrocarbons (Water)	O.Reg 153 Dissolved ICPMS Metals (Water)	BTEX	F1-BTEX	# of Bottles	Comments
1		MW 17	18.11.01	10:30am	GW		✓	✓				Project # on bottles should read ~~24~~ 24 but do not
2		~~MW~~ MW18-1	1	1	1		✓	✓				
3		Trip BLANK							KAM ✓			
4		Trip Spike										
5												
6												
7												
8												on ice
9												
10												

01-Nov-18 17:15
Alisha Williamson
B8T2141
KIV OTT-001

RECEIVED IN OTTAWA

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Jeff O.	18-11-01	5:15pm	Serge Leger	18/11/01	17:15	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	6.8 8.8	Present		
		Intact	X	

* 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.

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

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT HTTP://MAXXAM.CA/WP-CONTENT/UPLOADS/ONTARIO-COC.PDF.

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

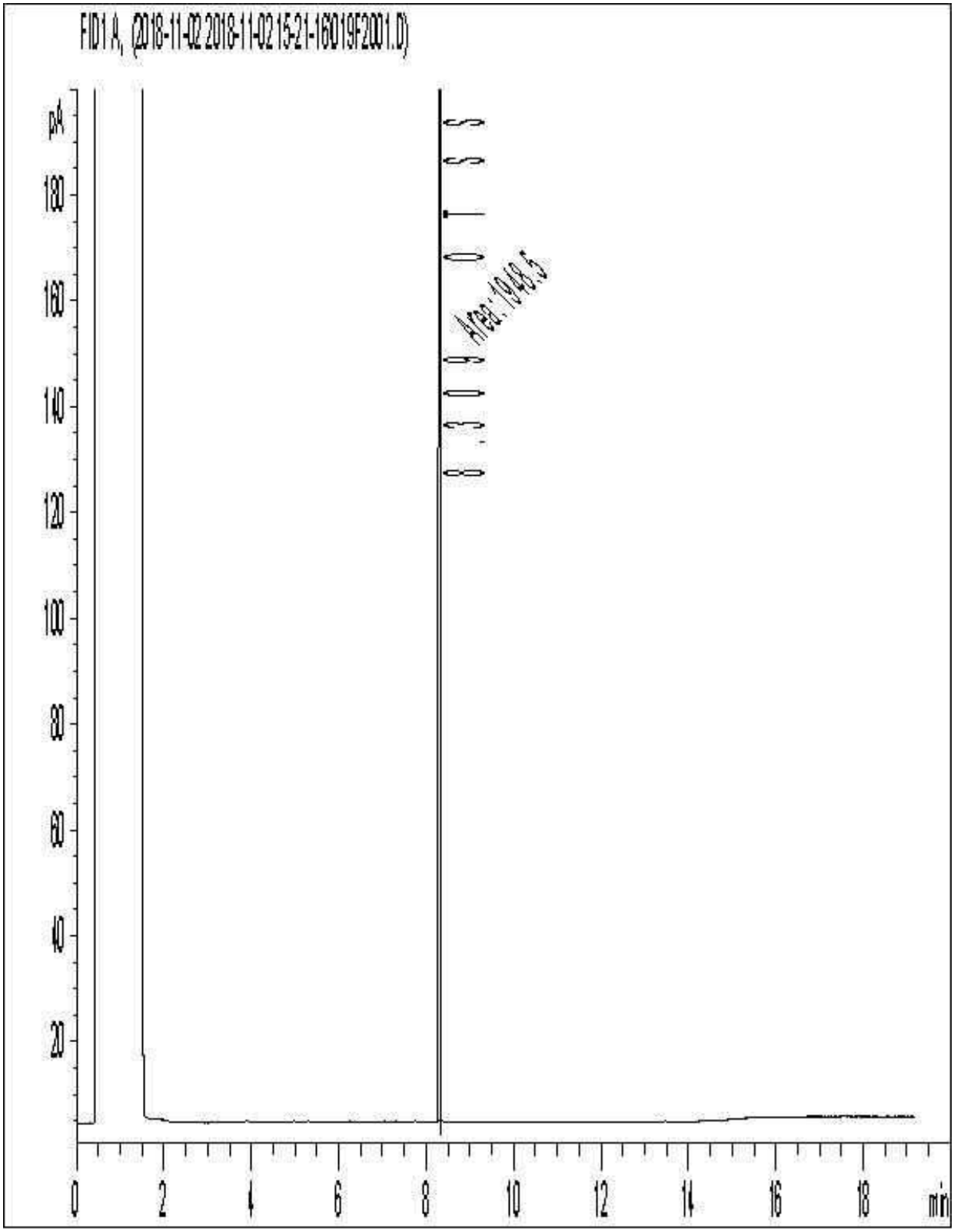
White: Maxxa Yellow: Client

Maxxam Analytics International Corporation o/a Maxxam Analytics

Maxxam Job #: B8T2141
Report Date: 2018/11/08
Maxxam Sample: IEP962

exp Services Inc
Client Project #: OTT-00245054-A0
Client ID: MW 17

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

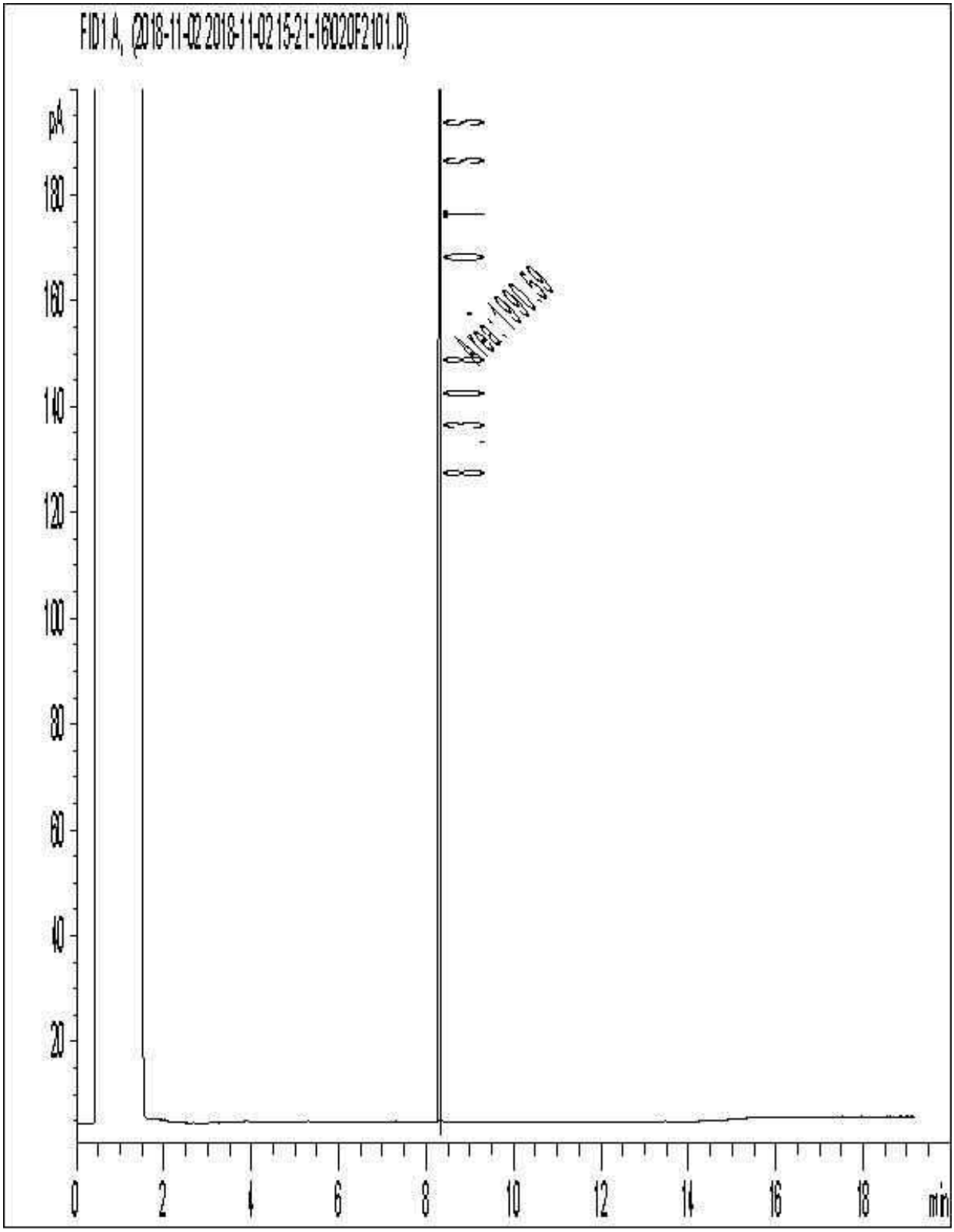


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8T2141
Report Date: 2018/11/08
Maxxam Sample: IEP963

exp Services Inc
Client Project #: OTT-00245054-A0
Client ID: MW 18-3

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



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