Phase Two Environmental Site Assessment
5924 Hazeldean Road, Ottawa, Ontario

Client:
GNCR Developments Inc.
521 Kilspindie Ridge
Ottawa, Ontario
K2J 5M8

Project Number:
OTT-00250806-A0

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Legal Notification

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Executive Summary

EXP Services Inc. (EXP) was retained by GNCR Developments Inc. to complete a Phase Two Environmental Site Assessment (ESA) of the property referred to as 5924 Hazeldean 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 Two 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. This work was supervised and completed by Mark McCalla, P. Geo., a qualified person in the province of Ontario.

The findings of a Phase One ESA were presented in a report entitled *Phase One Environmental Site* Assessment, 5924 Hazeldean Road, Ottawa*, Ontario* dated February 21, 2019. 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 Two 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 contamination from a former retail gasoline sales outlet and service garage located at 5938 Hazeldean Road	West part of Phase One property	#28: Gasoline and Associated Products Storage in Fixed Tanks #27: Garages and Maintenance and Repair	Off-Site, adjacent to the west	Petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene and xylenes (BTEX), volatile organic compounds (VOCs), lead	Soil and groundwater

Based on the Phase One ESA findings, EXP recommended conducting a Phase Two ESA at the Phase Two 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, VOC, 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 January 11, 2019 and February 20, 2019, 3 boreholes (BH1, BH2, and BH3) were advanced at the Phase One Property and each was instrumented with a monitoring well that was installed within the limestone bedrock.
- Silty sand was observed in the boreholes. Grey, limestone bedrock was encountered at a depth of 0.1 m to 0.9 m. No petroleum odours were identified in the native soil.
- Groundwater was encountered within the limestone bedrock at a depth of 1.47 m bgs in BH1 to 3.29 m in BH2. No petroleum sheens were observed in the monitoring wells during the sampling event. The groundwater flow direction in the limestone bedrock was to the southeast.
- All of the soil and groundwater samples had concentrations of metals, PHC, and/or VOC 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 GNCR Developments Incorporated to complete a Phase Two Environmental Site Assessment (ESA) of the property referred to as 5924 Hazeldean Road in Ottawa, Ontario, hereinafter referred to as the 'Phase Two 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 Two property by EXP. EXP understands that GNCR Developments Inc. 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 Phase Two property is currently an unoccupied and undeveloped lot and has an area of 0.49 hectares. It is located at the southwest corner of the intersection of Hazeldean Road and Victor Street as shown on Figure 1 in Appendix B. It is legally described as *Concession 11 Part of Lot 26, Corner; Hazeldean Rd & John St.* The property identification number is 044620476. At the time of the investigation, the property was snow-covered, but is assumed to have been grass covered. The Phase Two property has remained undeveloped since at least 1945. At the time of the investigation, the Phase Two property was owned by Mr. Carmine Zayoun.

Owner Contact: Mr. Carmine Zayoun
GNCR Developments Inc.
521 Kilspindie Road
Ottawa, Ontario K2J 6A2

The property is currently not serviced. The adjacent neighbouring residential and commercial properties are expected to be serviced by City of Ottawa water and sewage.

Topographically, the Phase Two property is relatively flat. The surrounding area has a noticeable downwards slope towards the east. Regional groundwater flow direction is inferred to be in the easterly direction towards Poole Creek, found 500 m to the east.

The approximate Universal Transverse Mercator (UTM) coordinates for the Site centroid is NAD83, Zone 18T, 427724.89 m E, 5014067.53 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 Two property was vacant and has not been developed. 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 coarse textured soil. The selection of this category was based on the following factors:

- The predominant soil type on the Phase Two 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);
- There was no intention to carry out a stratified restoration at the Phase Two property.
- Less than two-thirds of the Phase Two property has an overburden thickness greater than 2 m.
- The soil at the Phase Two 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 Two property is planned for residential use.

2 Background Information

2.1 Physical Setting

At the time of the investigation, the Phase Two property was observed to be an undeveloped lot with an area of 0.49 hectares, located at the southwest corner of the intersection of Hazeldean Road and Victor Street. The surrounding area to the east and south was developed with residential houses (Figure 1 in Appendix A). To the north, across Hazeldean Road the land is commercial and to the west there is an abandoned gasoline retail outlet (Figure 3 in Appendix B). The Phase Two property is in a mixed commercial and residential zoned area. The Phase Two property is currently not serviced for water and sewer by the City of Ottawa, however the neighbouring properties are municipally serviced.

Local Ontario Ministry of Environment, Conservation and Parks (MECP) water wells records show that bedrock was found at 1.5 - 5 m from surface. The overburden consists of sand and sandy clay. Bedrock in the area was found to be limestone.

Topographically, the Phase Two property is relatively flat. The surrounding area has a noticeable downwards slope towards the east. Regional groundwater flow direction is inferred to be in the easterly direction towards Poole Creek, found 500 m to the east.

2.2 Past Investigations

The following previous reports were provided to EXP for review.

- *Geotechnical Investigation, Site of Proposed Amber Centre, Victor Street at Hazeldean Road, Township of Goulbourn, Ontario*, dated august 11, 1994, prepared by John D. Patterson and Associates Ltd.

  The report details the advanced and sampling of nine (9) test pits on the subject Site. The depth to bedrock varied from 0.25 to 1.5 m below surface grade. Weather limestone encountered was encountered in all test pits.

- *Phase I - Environmental Site Assessment, Vacant Property, 5924 Hazeldean Road, Ottawa, Ontario*, dated November 21, 2006, prepared by Paterson Group Inc.

  The report indicated that the adjacent former retail gasoline sales outlet to the west was considered a potential environmental concern. A single borehole was advanced on November 1, 2006 along the Site's western boundary; this was advanced to a depth of 9.3 m from surface grade using a truck-mounted drilling rig and finished as a groundwater monitoring well. No soil sample was submitted for analysis as there was no overburden at this sample site.

  The groundwater sample collected on November 15, 2006 was submitted for laboratory analysis and no petroleum hydrocarbons or benzene, toluene, ethylbenzene, xylenes (BTEX) were reported. No details on well construction, purging or the sampling method were found within the report.

The findings of a Phase One ESA were presented in a report entitled *Phase One Environmental Site Assessment, 5924 Hazeldean Road, Ottawa, Ontario,* dated February 21, 2019. 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 Two 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 contamination from a former retail gasoline sales outlet and service garage located at 5938 Hazeldean Road	West part of Phase One property	#28: Gasoline and Associated Products Storage in Fixed Tanks #27: Garages and Maintenance and Repair	Off-Site, adjacent to the west	Petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene and xylenes (BTEX), volatile organic compounds (VOCs), lead	Soil and groundwater

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 Two 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 Two 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 Two property is to be re-developed with medium density residential. 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 them as a groundwater monitoring wells;
- Attempt to collect representative soil samples for chemical analysis of metals, VOC, PHC and BTEX;
- Attempt to collect representative groundwater samples for chemical analysis of metals, VOC, PHC and BTEX;
- Measure groundwater levels in the monitoring wells and piezometer;
- 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 Two property, no surface water or sediment sampling was required.

The potential contaminants of concern (PCOCs) identified in EXP's (2019) 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 Two 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 Two property has never been developed.

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 Two study area. The following PCAs were identified:

- PCA 1 – 5938 Hazeldean Road – Former retail gasoline sales outlet and service garage, located adjacent to west of the Phase Two property. (PCA#27 – Garages and Maintenance and Repair, PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks).
- PCA 2 – 5943 Hazeldean Road – Retail gasoline sales outlet built in 2015, located adjacent to 110 m west of the Phase Two property. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on intervening distance and short time frame, this is not considered an APEC.
- PCA 3 – 5899 Hazeldean Road – Retail gasoline sales outlet, located adjacent to 80 m to the northeast of the Phase Two property. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on intervening distance and being downslope in terms of the assumed direction of groundwater flow, this is not considered an APEC

3.4.3 Areas of Potential Environmental Concern

As a result of the PCAs, the report identified the following APECs at the Phase Two property:

- APEC 1 – (western part of Site) Contaminated soil and groundwater. This APEC is associated with PCA1. The PCOCs include metals, VOC, 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 Two property is relatively flat. The surrounding area has a downwards slope towards the east. The closest body of water is Poole Creek, located approximately 500 m east of the Phase Two property. Regional groundwater flow direction is inferred to be in the eastern direction.

The bedrock in the general area is limestone at a depth of approximately less than 2 m. With respect to surficial geology, beneath any fill, the site is underlain by sand and sandy clay.

3.4.5 Estimated Groundwater Flow Direction

Topographically, the Phase Two property relatively flat with a slight downwards slope towards the east. Regional groundwater flow direction is inferred to be in the eastern direction towards Poole Creek.

3.4.6 Underground Utilities

Currently, there are no underground utilities at the Phase One Property.

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 Two 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 Two 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. This work was supervised and completed by Mark McCalla, P. Geo., a qualified person in the province of Ontario.

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 Two property by locating companies. A private utility locating contractor was also retained to clear the individual borehole locations.

On January 11, 2019, and February 20, 2019, a total of 3 boreholes (BH1 to BH3) were advanced at the Phase Two property by Downing Estate Drilling, a licensed well contractor, under the full-time supervision of EXP staff concurrently with a geotechnical investigation. A track mounted CME drill rig with split spoon samplers was used to collect the soil samples. The locations of the boreholes and monitoring wells 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 split spoon 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, split spoon 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 split spoon sampler and placed directly into pre-cleaned, laboratory-supplied glass sample jars/vials. Samples to be analysed for VOC, 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, VOC, PHC, and BTEX.

4.6 Groundwater: Monitoring Well Installation

A groundwater monitoring well was installed in BH2 by Downing and monitoring wells were installed in BH1 and BH3 by OGS Drilling. The monitoring wells were installed in general accordance with the Ontario Water Resources Act - R.R.O. 1990, Regulation 903 (as-amended).

The monitoring wells consisted of a 3.0 m length of 37 mm diameter Schedule 40 PVC screen and an appropriate length of PVC riser pipe. The piezometer 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	112.63	110.3	110.0	108.0	108.0	4.6
BH2	113.69	111.2	110.9	107.9	107.9	5.8
BH3	113.06	110.7	110.4	108.4	108.4	4.6

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 January 23, 2019. 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 Two 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, VOC, 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 snow at the Phase Two 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 VOC 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

No fill material was observed in the boreholes.

5.1.2 Native Material

Below the topsoil was a layer of silty sand and gravel till. 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

Limestone bedrock was encountered from at 0.1 m in BH1 to 0.9 m in BH2. The limestone was present to a depth of at least 5.8 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 Two 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 three monitoring wells (BH1 to BH3) screened within the limestone bedrock at the Phase Two property.

Groundwater elevations and water levels were measured at the Phase Two property on January 22, 2019. Groundwater was encountered within the limestone at a depth of 1.47 m bgs in BH1 to 3.29 m in BH2. 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)	February 22, 2019	
		Water Level (mbg)	Water Level (MASL)
BH1	112.63	1.47	111.10
BH2	113.69	3.29	110.40
BH3	113.06	3.08	109.98

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

Based on the groundwater levels measured on February 22, 2019, the groundwater flow direction within the limestone bedrock at the site was to the southeast as shown on Figure 3 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 estimated for the groundwater flow components identified in the shallow bedrock aquifer based on the February 2019 groundwater elevations was 0.036 m/m.

5.5 Single Well Response Tests (SWRTs) Analysis

The thin overburden at the site was dry. A single well response test was conducted on BH2 as a part of this Phase Two ESA. The calculated hydraulic conductivity in the limestone bedrock unit at BH-2 was 1.1 x 10^{-7} m/s.

5.6 Soil Texture

Based on the grain size analysis of 2 soil samples, the soil texture at the water table at the Phase Two property was assessed to be coarse textured (refer to the three grain-size/hydrometer analyses in Appendix E) consisting of sandy grave, some silt, trace clay. Therefore, the soil texture is coarse grained.

5.7 Soil: Field Screening

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

5.8 Soil Quality

In accordance with the scope of work, chemical analyses were performed on selected soil samples recovered from the boreholes. The selection of representative “worst case” soil samples from each borehole was based on field visual or olfactory evidence of impacts and/or presence of potential water bearing zones. Summaries of the soil analytical results 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 7.89 and 7.85. The pH values were within the acceptable range for the application of MECP Table 7 SCS.

5.8.1 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.

5.8.2 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.

5.8.3 Volatile Organic Compounds

The concentrations of VOC measured in the analysed soil samples were less than the laboratory detection limits and the MECP 2011 Table 7 SCS, as shown in Table 3 in Appendix D.

5.8.4 Chemical Transformation and Soil Contaminant Sources

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

5.8.5 Evidence of Non-Aqueous Phase Liquid

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

5.9 Groundwater Quality

Representative groundwater samples were collected from the newly installed monitoring wells to assess groundwater quality at the Phase Two 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 4 in Appendix D and the Certificates of Analysis are enclosed in Appendix E.

5.9.1 Petroleum Hydrocarbons

One (1) groundwater samples and a blind duplicate were submitted for the chemical analysis of PHC and BTEX. As shown in Table 4 in Appendix D, the concentrations of benzene and PHC F2 exceeded the MECP Table 7 SCS in the initial groundwater sample collected from BH2. The duplicate sample from this monitoring well also had an exccedance for benzene. The well was purged and re-sampled two weeks later and the concentrations of PHC and BTEX parameters in the groundwater sample were below the MECP Table 7 SCS.

5.9.2 Metals

One (1) groundwater sample and a blind duplicate were submitted for the chemical analysis of metals. As shown in Table 5 in Appendix D, the concentrations of PHC and BTEX parameters in the groundwater samples were non-detect and below the MECP Table 7 SCS.

5.9.3 Volatile Organic Compounds

One (1) groundwater sample and a blind duplicate were submitted for the chemical analysis of volatile organic compounds (VOC). As shown in Table 6 in Appendix D, the concentrations of VOC parameters in the groundwater sample were non-detect and below the MECP Table 7 SCS.

5.9.4 Chemical Transformation and Contaminant Sources

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

5.9.5 Evidence of Non-Aqueous Phase Liquid

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

5.10 Sediment Quality

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

5.11 Quality Assurance and Quality Control Results

Quality assurance and quality control measures were taken during the field activities to meet the objectives of the sampling and quality assurance plan to collect unbiased and representative samples to characterize existing conditions in the fill/upper overburden materials and groundwater at the Phase Two 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 BH2 AS1 and its duplicate DUPE were submitted for chemical analysis of VOC, 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 VOC and PHC were less than the laboratory reported detection limits for both the primary and duplicate samples. The RPD for metals was 11.1% which is well within the 30% RPD threshold and therefore the soil data is acceptable from a RPD perspective.

Duplicate groundwater sample pair BH2 and its duplicate BH3 were submitted for chemical analysis of VOC, metals, and PHC. The RPD for VOC was 13.3% which is well within the 30% RPD threshold and the RPD for metals was 4.3% which is well within the 30% RPD threshold and therefore the groundwater 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.

5.12 Phase Two Conceptual Site Model

This section presents a Conceptual Site Model (CSM) providing a narrative, graphical and tabulated description integrating information related to the Phase Two 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 Two property. However, the data relied upon was limited to the most recent information to convey the current Phase Two property conditions.

5.12.1 Site Identification Information

The Phase Two property is currently an unoccupied and undeveloped lot and has an area of 0.49 hectares. It is located at the southwest corner of the intersection of Hazeldean Road and Victor Street as shown on Figure 2 in Appendix B. At the time of the investigation, the property was snow-covered, but is assumed to have been grass covered. The Phase Two property has remained undeveloped since at least 1945. At the time of the investigation, the Phase Two property was owned by GNCR Developments Inc.

The property is in a mixed commercial and residentially zoned area. The Phase Two property is legally described as Concession 11 Part of Lot 26, Corner; Hazeldean Rd & John St. The property identification number is 044620476. The property is currently not serviced for water and sewer by the City of Ottawa, however the neighbouring properties are municipally serviced.

Local Ontario Ministry of Environment, Conservation and Parks (MECP) water wells records show that bedrock was found at 0.3 - 3 m from surface. The overburden consists of sand and gravel from the ground surface to 0.6 – 2.0 m. Bedrock in the area was found to be limestone.

Topographically, the Phase Two property is relatively flat. The surrounding area has a noticeable downwards slope towards the east. Regional groundwater flow direction is inferred to be in the easterly direction towards Poole Creek, found 500 m to the east. Refer to the following table for the Phase Two property identification information.

Civic Address	5924 Hazeldean Road, Ottawa, ON
Current Land Use	Undeveloped
Proposed Land Use	Residential
Legal Description	Concession 11 Part of Lot 26, Corner; Hazeldean Rd & John St. City of Ottawa
Property Identification Number	044620476
UTM Coordinates	427724.89 m E, 5014067.53 m N
Phase One Property Area	0.49 ha
Property Owner	GNCR Developments Inc
Owner Contact	Mr. Carmine Zayoun
Owner Address	521 Kilspindie Road, Ottawa, ON

5.12.2 Physical Site Description

The Phase Two CSM provides a narrative and graphical interpretation of the Phase Two 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 Two 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 Two property and therefore the MECP Table 7 Site Condition Standards (SCS) are applied to the Phase Two property. The City of Ottawa obtains its water from the Ottawa River, located approximately 15 km northeast of the Phase Two property.

In accordance with Section 41 of the Ontario Regulation 153/04 (as amended), the Phase Two property is not an environmentally sensitive area. The Phase Two 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 Two 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.

5.12.3 Geological and Hydrogeological Setting

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

Grey, limestone bedrock was encountered at a depth of 0.1 m to 0.9 m. Groundwater was encountered at a depth of 1.47 m bgs in BH1 to 3.29 m in BH2. No petroleum sheens were observed in the monitoring wells during the sampling event.

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

Based on the Phase Two ESA, the groundwater flow is to the southeast within the limestone bedrock.

5.12.4 Underground Utilities

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

5.12.5 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 Two study area. The following PCAs were identified:

- PCA 1 – 5938 Hazeldean Road – Former retail gasoline sales outlet, located adjacent to west of the Phase Two property. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks).
- PCA 2 – 5943 Hazeldean Road – Retail gasoline sales outlet built in 2015, located adjacent to 110 m west of the Phase Two property. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on intervening distance and short time frame, this is not considered an APEC.
- PCA 3 – 5899 Hazeldean Road – Retail gasoline sales outlet, located adjacent to 80 m to the northeast of the Two property property. (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on intervening distance and being downslope in terms of the assumed direction of groundwater flow, this is not considered an APEC.

No other PCAs that took place within the vicinity of the Phase Two property (approximately 250 m radius) were identified.

5.12.6 Areas of Potential Environmental Concern / Potential Contaminants of Concern

As per Ontario Regulation 153/04 (as amended), Potential Contaminating Activity (PCA) is defined as one of the 59 industrial operations set out in Table 2 of Schedule D that occurs or has occurred on the Phase Two property or within the Phase Two 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 Two 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 contamination from a former retail gasoline sales outlet and service garage located at 5938 Hazeldean Road	West part of Phase One property	#28: Gasoline and Associated Products Storage in Fixed Tanks #27: Garages and Maintenance and Repair	Off-Site, adjacent to the west	Petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene and xylenes (BTEX), volatile organic compounds (VOCs), lead	Soil and groundwater

5.12.7 Investigation and Remediation

The Phase Two ESA was conducted to assess the soil and groundwater quality at the Phase Two property. As indicated in the APEC and PCOC Table (above), the analytical program of the Phase Two ESA included testing of soil for metals, VOC, PHC, and BTEX, and groundwater for metals, VOC, PHC, and BTEX from the boreholes and monitoring well installed on the Phase Two 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, VOC, PHC, and BTEX that were less than the 2011 MECP Table 7 SCS.

5.12.8 Contaminants of Concern (COC)

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

5.12.9 Contaminant Fate and Transport

Soil COCs

There are no contaminants of concern in soil at the Phase Two property.

Groundwater COCs

There are no contaminants of concern in groundwater at the Phase Two property.

6 Conclusions and Recommendations

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

- On January 11m 2019 and February 20, 2019, 3 boreholes (BH1, BH2, and BH3) were advanced at the Phase Two property and were instrumented with a monitoring well that was installed within the limestone bedrock.
- Silty sand was observed in the boreholes. Grey, limestone bedrock was encountered at a depth of 0.1 m to 0.9 m. No petroleum odours were identified in the native soil.
- Groundwater was encountered within the limestone bedrock at a depth of 1.47 m bgs in BH1 to 3.29 m in BH2. No petroleum sheens were observed in the monitoring wells during the sampling event. The groundwater flow direction in the limestone bedrock was to the southeast.
- All of the soil and groundwater samples had concentrations of metals, PHC, and/or VOC 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 Two property. The conclusions and recommendations presented in this report reflect Phase Two 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:

- John D. Patterson and Associates Limited; August 11, 1994; *Geotechnical Investigation, Site of Proposed Amber Centre, Victor Street At Hazeldean Road, Township of Goulbourn, Ontario.*
- 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	0.3 m
Minimum Depth to Overburden Groundwater	3.3 m (January 22, 2019)
Shallow Soil Property	Yes, bedrock less than 2.0 m
Proximity to water body or ANSI	500 m west
Soil pH	7.89 and 7.85
Soil Texture	Coarse
Current Property Use	Vacant
Future Property Use	Residential
Proposed Future Building	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 5924 Hazeldean 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'), volatile organic compounds (VOC), and/or metals. The soil sampling media is to consist of the overburden materials (depths up to 1.5 m of overburden beneath site). The soil sampling will be location-specific to assess for the potential presence of PHC, BTEX, VOC, and/or metals based on the identification of potential areas of potential environmental concern identified in a Phase One ESA completed by EXP in 2019. Vapour readings will also be taken in the field to determine samples to be submitted for laboratory analysis.

Each of the groundwater samples will be submitted for analysis of metals, VOC, PHC and BTEX. The monitoring well network is to comprise of two monitoring wells and one peizometer.

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 6 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 standard penetrating 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 VOC, 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 two boreholes 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 6 m below grade. There will also be one piezometers that consist of 19 mm diameter PVC pipes, with 1.5 m of hand made slots. The monitoring wells will be constructed using 37 mm diameter, Schedule 40, PVC riser pipe and number 10 slot size (0.25 mm) well screens. The base of the well screens will be sealed with threaded flush PVC end caps. All well pipe connections will be factory machined threaded flush couplings. The annular space around the well screens will be backfilled with silica sand, to an average height of 0.3 m above the top of the screen. Granular bentonite will be placed in the borehole annulus from the top of the sand pack to approximately 0.3 m below grade. The monitoring wells will be completed with either a flush-mounted protective steel casing or above ground protective casings cemented into place.

3.4 Monitoring Well Development

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

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

3.5 Groundwater Level Measurements

Groundwater level measurements will be recorded for the monitoring wells and piezometer 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.

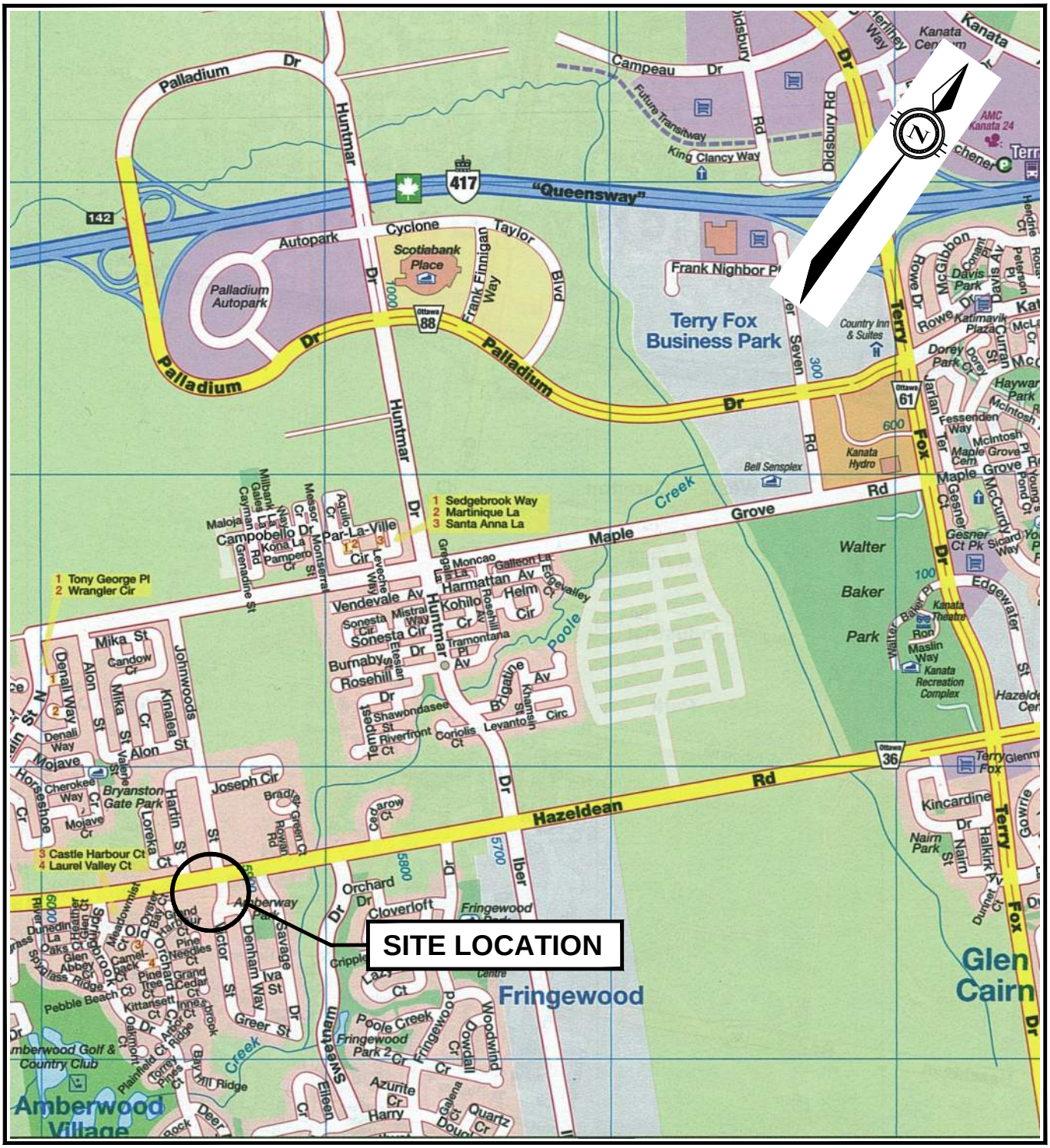
4.4 Sample Documentation

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, ON K2B 8H6, Canada

DATE: JAN. 2019	CLIENT: GNCR DEVELOPMENTS	project no. OTT-00250806-A0
DESIGN: C.H. / CHECKED: M.G.M.	TITLE: SITE LOCATION PLAN 5924 HAZELDEAN ROAD, OTTAWA, ON	scale 1:5,000
DRAWN BY: M.N.		FIG 1

Filename: p:\projects\environmental\250000s\250806 - phase one esa 5924 hazeldean roadworking drawings\phase 2\250806-a0 fig 1 - 2 phase 2.dwg
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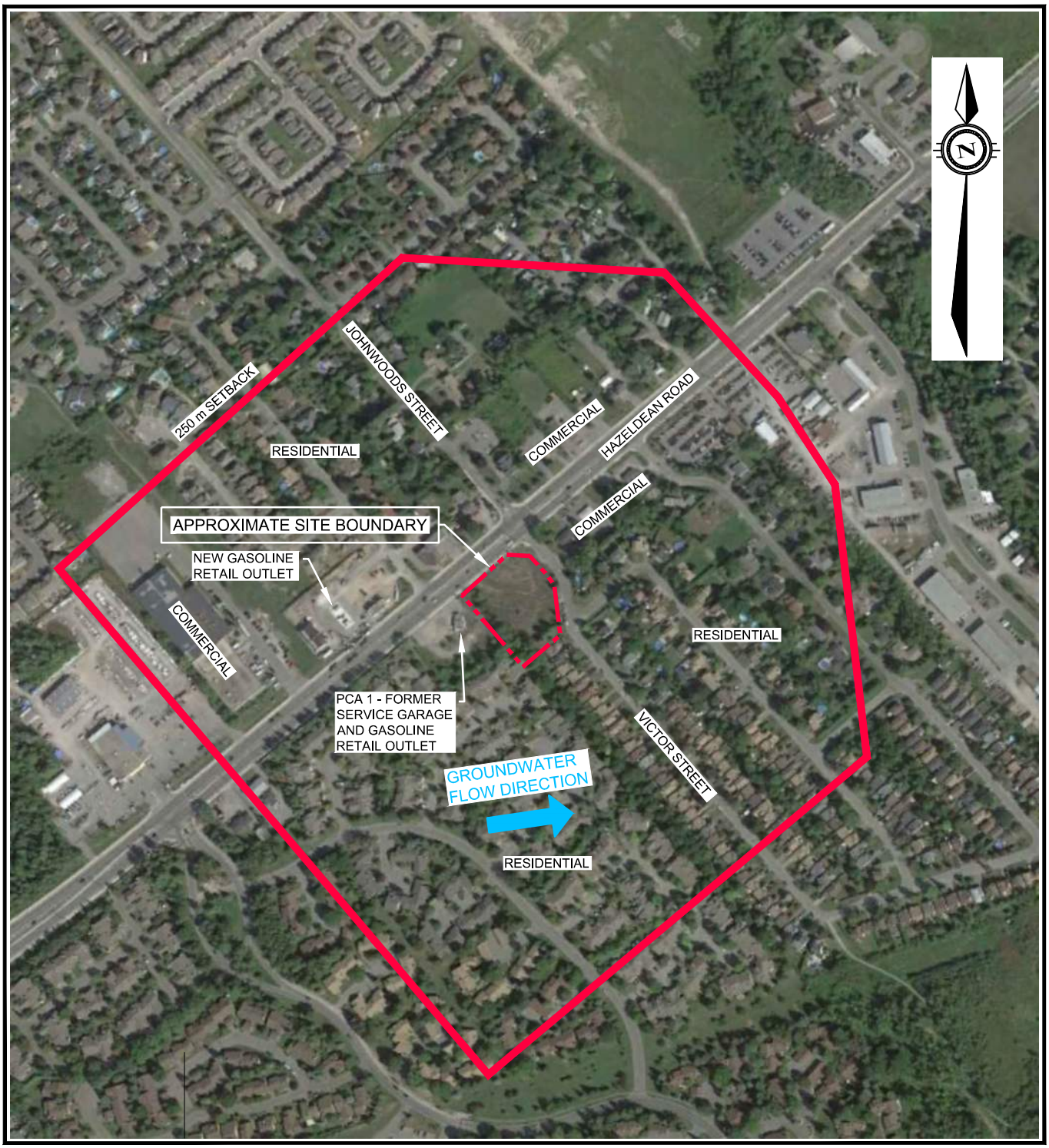

0 50m 100m 200m

HORIZONTAL 1:5000

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DATE: FEB. 2019	CLIENT: GNCR DEVELOPMENTS	project no. OTT-00250806-A0
DESIGN: C.H. / CHECKED: M.G.M.	TITLE: PHASE TWO ESA STUDY AREA 5924 HAZELDEAN ROAD, OTTAWA, ON	scale 1:5,000
DRAWN BY: M.N.		FIG 2

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0 5m 10m 30m

HORIZONTAL 1:750

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DATE: FEB. 2019	CLIENT: GNCR DEVELOPMENTS	project no.: OTT-00250806-A0
DESIGN: C.H. / CHECKED: M.G.M.		scale: 1:750
DRAWN BY: M.N.	TITLE: PCA AND APEC PLAN 5924 HAZELDEAN ROAD, OTTAWA, ON	FIG 3

Filename: p:\projects\environmental\250000s\250806 - phase one esa 5924 hazeldean roadworking drawings\phase 2\250806-a0 fig 3.dwg
Last Saved: 2/26/2019 11:31:54 AM
Last Plotted:2/26/2019 11:47:31 AM Plotted by: nugentm Pen Table:: trow standard, july 01, 2004.ctb

BH1 BOREHOLE NUMBER AND LOCATION

TP4 TEST PIT NUMBER AND LOCATION

109.98 GROUNDWATER ELEVATION FEB. 22, 2019

CALCULATED GROUNDWATER FLOW DIRECTION

0 5m 10m 30m

HORIZONTAL 1:750

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DATE: FEB. 2019	CLIENT: GNCR DEVELOPMENTS	project no.: OTT-00250806-A0
DESIGN: C.H. / CHECKED: M.G.M.		scale: 1:750
DRAWN BY: M.N.	TITLE: BOREHOLE LOCATION PLAN PHASE TWO ESA 5924 HAZELDEAN ROAD, OTTAWA, ON	FIG 4

Filename: p:\projects\environmental\250000s\250806 - phase one esa 5924 hazeldean roadworking drawings\phase 2\250806-a0 fig 4 phase 2.dwg
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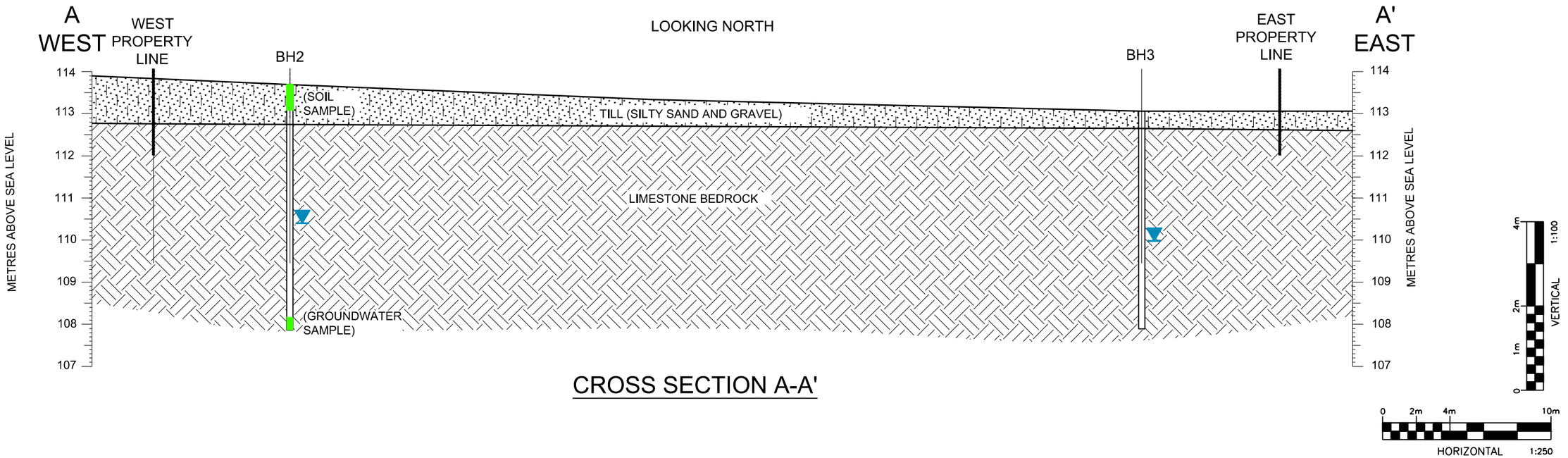
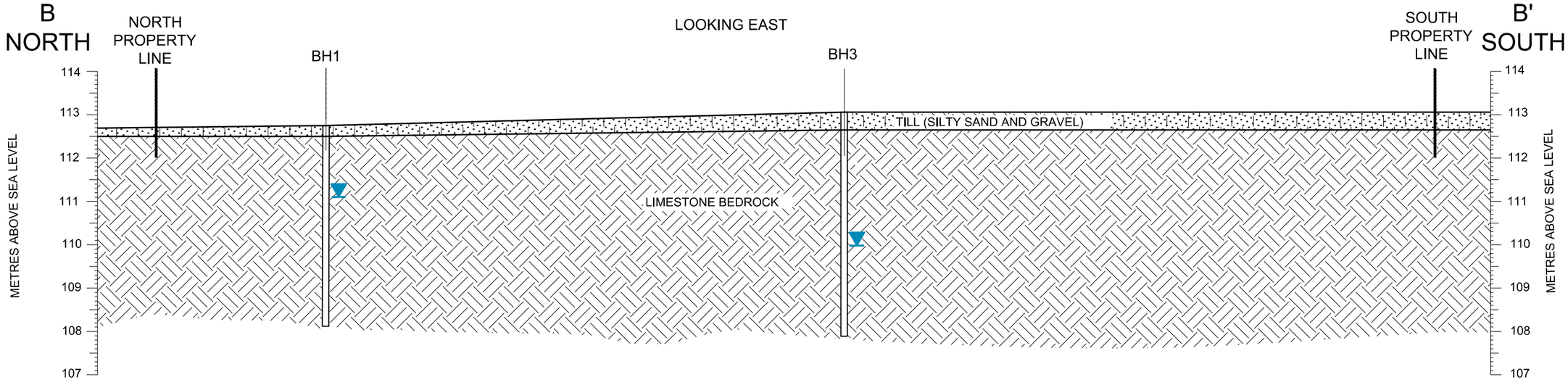


CROSS SECTION A-A'



CROSS SECTION B-B'

LEGEND

- GROUNDWATER LEVEL (FEB. 22, 2019)
- TILL (SILTY SAND AND GRAVEL)
- LIMESTONE BEDROCK
- SOIL AND GROUNDWATER QUALITY MEETS MECP TABLE 7 SCS

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DATE: FEB. 2019	CLIENT: GNCR DEVELOPMENTS	project no. OTT-00250806-A0
DESIGN: M.G.M. / CHECKED: M.G.M.	TITLE: CROSS-SECTIONS A-A' & B-B' PHASE TWO ESA 5924 HAZELDEAN ROAD, OTTAWA, ON	scale AS NOTED
DRAWN BY: M.N.		FIG 5

Filename: p:\projects\environmental\250000s\250806 - phase one esa 5924 hazeldean roadtworking drawings\phase 2\250806-a0 fig 5.dwg
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Plotted by: nugentm
Pen Table:: trow standard, july 01, 2004.ctb

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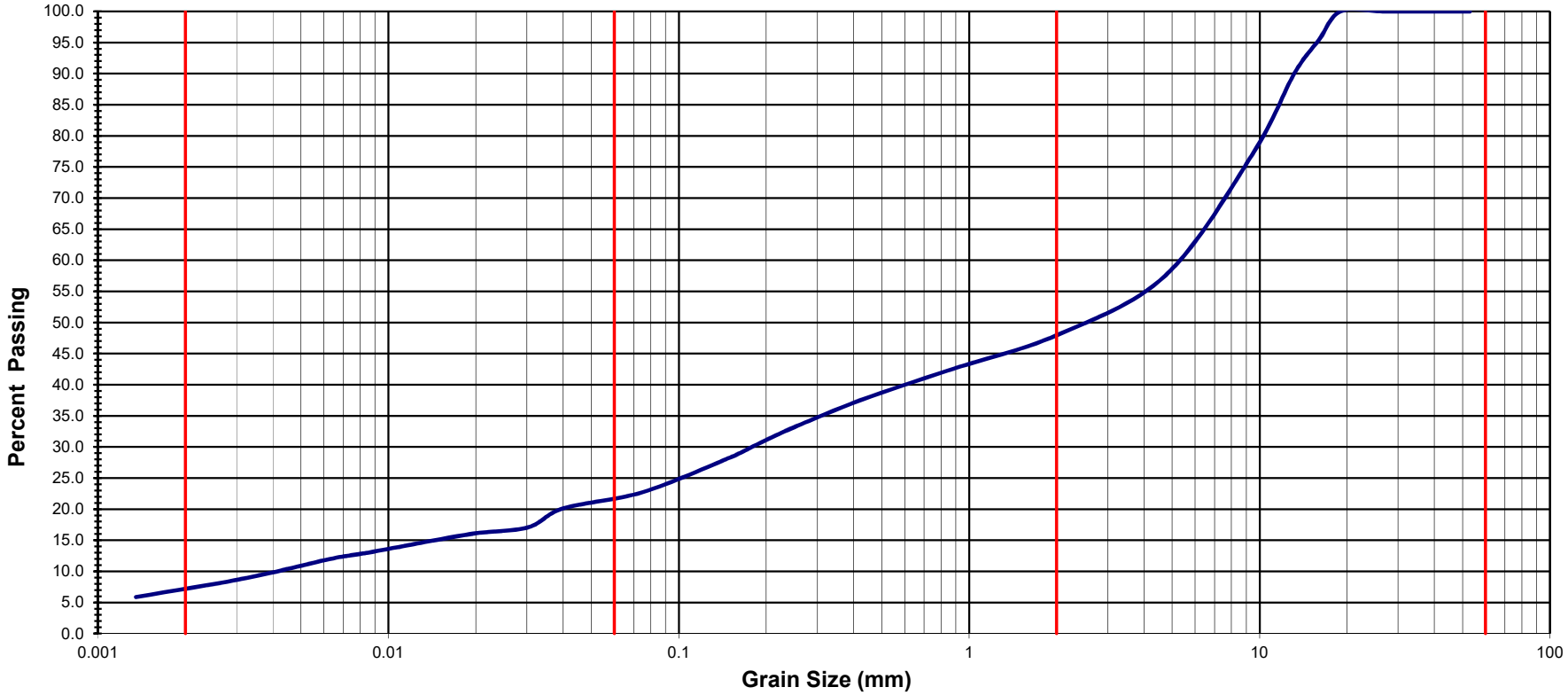
Grain-Size Distribution Curve
Method of Test for Particle Size Analysis of Soil
ASTM C-136/ASTM D-422

Modified M.I.T. Classification

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



EXP Project No.:	**OTT-00250806-A0**		**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**					
Client :	**GNCR Developments**		**Project Location :**	**5924 Hazeldean Rd, Ottawa**					
Date Sampled :	**January 11, 2019**		**Borehole No:**	**BH3**		**Sample No.:**	**AS1**	**Depth (m) :**	**0-0.6**
Sample Composition:	**% Clay:**	**7**	**% Silt:**	**15**	**% Sand:**	**26**	**% Gravel:**	**52**	**Figure :** **C1**
Sample Description :	**Sandy Gravel, some Silt, trace Clay**								

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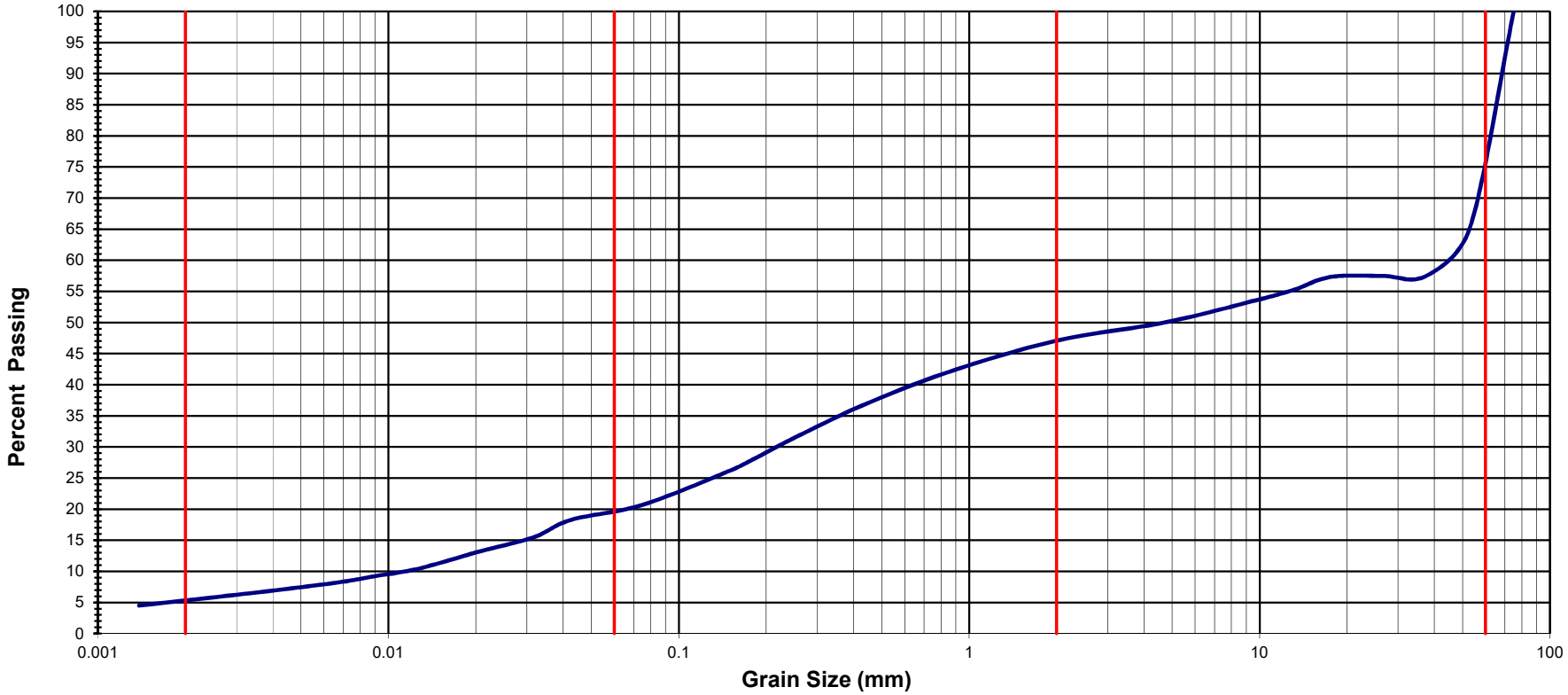
Grain-Size Distribution Curve
Method of Test for Particle Size Analysis of Soil
ASTM C-136/ASTM D-422

Modified M.I.T. Classification

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



EXP Project No.:	**OTT-00250806-A0**		**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**					
Client :	**GNCR Developments**		**Project Location :**	**5924 Hazeldean Rd, Ottawa**					
Date Sampled :	**February 12, 2019**		**Borehole No:**	**TP5**		**Sample No.:**	**S2**	**Depth (m) :**	**0.3-0.9**
Sample Composition:	**% Clay:**	**5**	**% Silt:**	**14**	**% Sand:**	**28**	**% Gravel:**	**53**	**Figure :** **C2**
Sample Description :	**Sandy Gravel, some Silt, trace Clay**								

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:

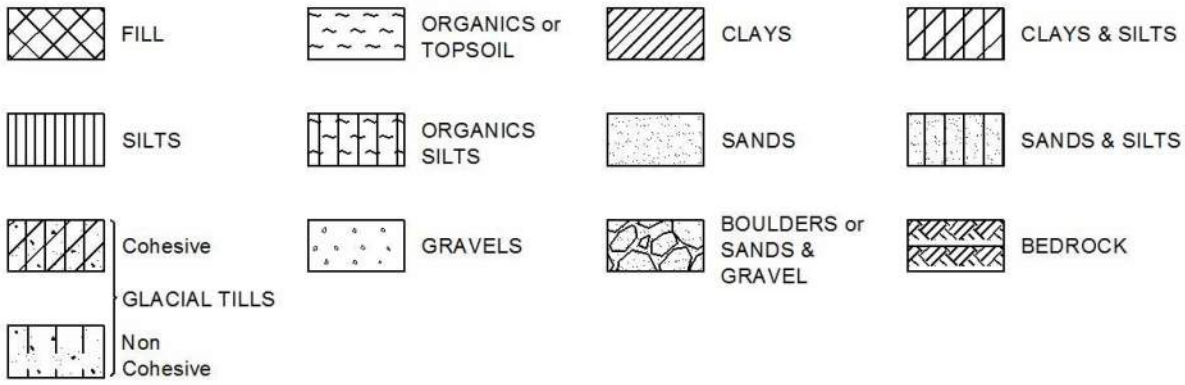
Table c: Consistency of Cohesive Soil

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-00250806-A0

Project: Phase Two ESA

Location: 5924 Hazeldean Road, City of Ottawa, Ontario

Figure No. 4

Page. 1 of 1

Date Drilled: 'February 20, 2019

Drill Type: CME-75 Trackmount

Datum: Geodetic

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

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits ⊢○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~20 mm	112.63	0	20 40 60 80 / 50 100 150 200 kPa	250 500 750 / 20 40 60	Run 1	
		LIMESTONE BEDROCK Grey, aphinitic.	112.5					
			111.1	1			Run 2	
				2				
				3			Run 3	
				4			Run 4	
			108.0					
		Borehole Terminated at 4.62 m Depth						

LOG OF BOREHOLE BH LOGS - 250806 - 5924 HAZELDEAN.GPJ TROW OTTAWA.GDT 2/25/19

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. 32 mm diameter standpipe piezometer installed upon completion
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00250806-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	N/A	N/A
4 days	1.5	

CORE DRILLING RECORD

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

Log of Borehole BH2

Project No: OTT-00250806-A0

Project: Phase Two ESA

Location: 5924 Hazeldean Road, City of Ottawa, Ontario

Figure No. 5

Page. 1 of 1

Date Drilled: 'January 11, 2019

Drill Type: CME-75 Trackmount

Datum: Geodetic

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

Split Spoon Sample ⊠
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test ——
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits |—○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth
			113.69	0
		TOPSOIL ~30 mm	113.6	
		TILL Mixture of sand, gravel and silty clay, brown, moist, upper 600 mm frozen, no petroleum odours	112.8	
		HIGHLY WEATHERED BEDROCK ~200 mm	112.6	1
		LIMESTONE BEDROCK Grey, aphinitic.		2
			110.4	3
				4
			107.9	5
		Borehole Terminated at 5.8 m Depth		

Standard Penetration Test N Value: 20 40 60 80
Shear Strength: 50 100 150 200 kPa
50 for 100 mm

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

0 0

SAMPLES

Natural Unit Wt. kN/m³

Run 1
Run 2
Run 3

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. 32 mm diameter monitoring well installed upon completion
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00250806-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	N/A	N/A
11 days	1.6	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	1.1 - 2.6	100	60
2	2.6 - 4.2	100	90
3	4.2 - 5.8	100	92

LOG OF BOREHOLE BH LOGS - 250806 - 5924 HAZELDEAN.GPJ TROW OTTAWA.GDT 2/25/19

Log of Borehole BH3

Project No: OTT-00250806-A0

Project: Phase Two ESA

Location: 5924 Hazeldean Road, City of Ottawa, Ontario

Figure No. 6

Page. 1 of 1

Date Drilled: 'February 20, 2019

Drill Type: CME-75 Trackmount

Datum: Geodetic

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

Split Spoon Sample ☒
Auger Sample ◧
SPT (N) Value ○
Dynamic Cone Test —
Shelby Tube ■
Shear Strength by Vane Test +S

Combustible Vapour Reading □
Natural Moisture Content ×
Atterberg Limits |—○
Undrained Triaxial at % Strain at Failure ⊕
Shear Strength by Penetrometer Test ▲

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth
			113.06	
		TOPSOIL ~20 mm	113.0	0
		TILL Gravel and sand, brown, moist, frozen, no petroleum odours	112.5	
		LIMESTONE BEDROCK Grey, aphinitic.		1
				2
			109.98	3
				4
			108.4	
		Borehole Terminated at 4.67 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: Run 1, Run 2, Run 3, Run 4

Natural Unit Wt. kN/m³

LOG OF BOREHOLE BH LOGS - 250806 - 5924 HAZELDEAN.GPJ TROW OTTAWA.GDT 2/25/19

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. 32 mm diameter standpipe piezometer installed upon completion
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00250806-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	N/A	N/A
4 days	3.3	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	0.6 - 1.1	100	40
2	1.1 - 2.6	100	72

Appendix D - Analytical Summary Tables

TABLE 1 **SOIL ANALYTICAL RESULTS *(µg/g)***
Petroleum Hydrocarbons (PHCs) and BTEX
5924 Hazeldean Road, Ottawa

Parameter	MECP Table 7[1]	BH2 AS1	DUPE
Sample Date (d/m/y)	Residential	11-Jan-19	Duplicate of
Sample Depth (mbsg)		0.0 - 0.6	BH2 AS1
Benzene	0.21	<0.020	<0.020
Ethylbenzene	2.1	<0.020	<0.020
Toluene	2.3	<0.020	<0.020
Total Xylenes	3.1	<0.020	<0.020
F1 (C6-C10)	55	<10	<10
F2 (C10-C16 Hydrocarbons)	98	<10	<10
F3 (C16-C34 Hydrocarbons)	300	<50	<50
F4 (C34-C50 Hydrocarbons)	2800	<50	<50

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
5924 Hazeldean Road, Ottawa

Parameter	**MECP Table 7[2]**	**BH2 AS1**	**DUPE**
Sample Date (d/m/y)	**Residential**	11-Jan-19	Duplicate of
Sample Depth (mbsg)		0.0 - 0.6	BH2 AS1
Antimony	7.5	<0.20	<0.20
Arsenic	18	1.9	2.5
Barium	390	66	70
Beryllium	4	0.31	0.34
Boron	120	<5.0	<5.0
Cadmium	1.2	<0.10	0.10
Chromium	160	16	18
Cobalt	22	5.0	5.2
Copper	140	7.4	8.9
Lead	120	3.3	3.8
Molybdenum	6.9	<0.50	<0.50
Nickel	100	12	13
Selenium	2.4	<0.50	<0.50
Silver	20	<0.20	<0.20
Thallium	1	0.099	0.11
Uranium	23	0.47	0.50
Vanadium	86	23	25
Zinc	340	20	22

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 **SOIL ANALYTICAL RESULTS *(µg/g)***
VOLATILE ORGANIC COMPOUNDS
5924 Hazeldean Road, Ottawa

Parameter	MECP Table 7[2]	BH2 AS1	DUPE
Sample Date (d/m/y)	Residential	11-Jan-19	Duplicate of
Sample Depth (mbsg)		0.0 - 0.6	BH2 AS1
Acetone	16	<0.50	<0.50
Benzene	0.21	<0.020	<0.020
Bromodichloromethane	13	<0.050	<0.050
Bromoform	5.4	<0.050	<0.050
Bromomethane	0.05	<0.050	<0.050
Carbon Tetrachloride	0.05	<0.050	<0.050
Chlorobenzene	2.4	<0.050	<0.050
Chloroform	3.1	<0.050	<0.050
Dibromochloromethane	9.4	<0.050	<0.050
1,2-Dichlorobenzene	3.4	<0.050	<0.050
1,3-Dichlorobenzene	4.5	<0.050	<0.050
1,4-Dichlorobenzene	0.083	<0.050	<0.050
Dichlorodifluoromethane	16	<0.050	<0.050
1,1-Dichloroethane	3.5	<0.050	<0.050
1,2-Dichloroethane	0.05	<0.050	<0.050
1,1-Dichloroethylene	0.05	<0.050	<0.050
Cis-1,2-Dichloroethylene	3.4	<0.050	<0.050
Trans-1,2-Dichloroethylene	0.084	<0.050	<0.050
1,2-Dichloropropane	0.05	<0.050	<0.050
Cis-1,3-Dichloropropylene	0.05	<0.030	<0.030
Trans-1,3-Dichloropropylene		<0.040	<0.040
Ethylbenzene	2.1	<0.020	<0.020
Ethylene Dibromide	0.05	<0.050	<0.050
Hexane	2.8	<0.050	<0.050
Methylene Chloride	0.1	<0.050	<0.050
Methyl Ethyl Ketone	16	<0.50	<0.50
Methyl Isobutyl Ketone	1.7	<0.50	<0.50
Methyl-t-Butyl Ether	0.75	<0.050	<0.050
Styrene	0.7	<0.050	<0.050
1,1,1,2-Tetrachloroethane	0.058	<0.050	<0.050
1,1,2,2-Tetrachloroethane	0.05	<0.050	<0.050
Toluene	2.3	<0.050	<0.050
Tetrachloroethylene	0.28	<0.020	<0.020
1,1,1-Trichloroethane	0.38	<0.050	<0.050
1,1,2-Trichloroethane	0.05	<0.050	<0.050
Trichloroethylene	0.05	<0.050	<0.050
Trichlorofluoromethane	4.0	<0.050	<0.050
Vinyl Chloride	0.02	<0.020	<0.020
Total Xylenes	3.1	<0.020	<0.020

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 4 GROUNDWATER ANALYTICAL RESULTS *(µg/L)*
PETROLEUM HYDROCARBONS and BTEX
5924 Hazeldean Road, Ottawa

Parameter	**MECP Table 7[1]**	**BH2**	**BH3**	**BH2**
Sample Date (d/m/y)	**Residential**	23-Jan-19	Duplicate of BH2	6-Feb-19
Benzene	0.5	1.9	1.8	0.29
Toluene	320	9.1	6.9	1.1
Ethylbenzene	57	0.74	0.71	<0.2
Total Xylenes	72	4.4	4.5	<0.2
PHC F1	420	<25	<25	<25
PHC F2	150	160	<100	<100
PHC F3	500	<200	<200	<200
PHC F4	500	<200	<200	<200

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 5 GROUNDWATER ANALYTICAL RESULTS *(µg/L)*
METALS
5924 Hazeldean Road, Ottawa

Parameter	**MECP Table 7[1]**	**BH2**	**BH3**
Sample Date (d/m/y)	**Residential**	23-Jan-19	Duplicate of BH2
Antimony	16000	<0.50	<0.50
Arsenic	1500	2.0	2.1
Barium	23000	79	81
Beryllium	53	<0.50	<0.50
Boron	36000	23	21
Cadmium	2.1	<0.10	<0.10
Chromium	640	<5.0	<5.0
Cobalt	52	3.2	3.2
Copper	69	2.9	3.2
Lead	20	1.9	2.0
Molybdenum	7300	6.8	6.9
Nickel	390	5.1	5.2
Selenium	50	<2.0	<2.0
Silver	1.2	<0.10	<0.10
Thallium	400	0.055	0.059
Uranium	330	1.1	1.1
Vanadium	200	<0.50	<0.50
Zinc	890	20	21

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 6 GROUNDWATER ANALYTICAL RESULTS *(µg/L)*
VOLATILE ORGANIC COMPOUNDS
5924 Hazeldean Road, Ottawa

Parameter	MECP Table 7[1]	BH2	BH3	BH2
Sample Date	**Residential**	23-Jan-19	Duplicate of BH2	6-Feb-19
Acetone	100000	600	640	NA
Benzene	0.5	1.9	1.8	0.29
Bromodichloromethane	67000	1.1	1.1	NA
Bromoform	29000	<1.0	<1.0	NA
Bromomethane	0.89	<0.50	<0.50	NA
Carbon Tetrachloride	0.2	<0.20	<0.20	NA
Chlorobenzene	140	<0.20	<0.20	NA
Chloroform	10	4.5	7.6	NA
Dibromochloromethane	65000	<0.50	<0.50	NA
1,2-Dichlorobenzene	150	<0.50	<0.50	NA
1,3-Dichlorobenzene	7600	<0.50	<0.50	NA
1,4-Dichlorobenzene	0.5	<0.50	<0.50	NA
Dichlorodifluoromethane	3500	<1.0	<1.0	NA
1,1-Dichloroethane	11	<0.20	<0.20	NA
1,2-Dichloroethane	0.5	<0.50	<0.50	NA
1,1-Dichloroethylene	0.5	<0.20	<0.20	NA
Cis-1,2-Dichloroethylene	1.6	<0.50	<0.50	NA
Trans-1,2-Dichloroethylene	1.6	<0.50	<0.50	NA
1,2-Dichloropropane	0.58	<0.20	<0.20	NA
Cis-1,3-Dichloropropylene	0.5	<0.50	<0.50	NA
Trans-1,3-Dichloropropylene				NA
Ethylbenzene	57	0.74	0.71	<0.2
Ethylene Dibromide	0.2	<0.20	<0.20	NA
Hexane	5	<1.0	<1.0	NA
Methylene Chloride	26	3.4	4.2	NA
Methyl Ethyl Ketone	21000	54	55	NA
Methyl Isobutyl Ketone	5200	<5.0	<5.0	NA
Methyl-t-Butyl Ether	15	<0.50	<0.50	NA
Styrene	43	<0.50	<0.50	NA
1,1,1,2-Tetrachloroethane	1.1	<0.50	<0.50	NA
1,1,2,2-Tetrachloroethane	0.5	<0.50	<0.50	NA
Tetrachloroethylene	0.5	<0.20	<0.20	NA
Toluene	320	9.1	6.9	1.1
1,1,1-Trichloroethane	23	<0.20	<0.20	NA
1,1,2-Trichloroethane	0.5	<0.50	<0.50	NA
Trichloroethylene	0.5	<0.20	<0.20	NA
Trichlorofluoromethane	2000	<0.50	<0.50	NA
Vinyl Chloride	0.5	<0.20	<0.20	NA
Total Xylenes	72	4.4	4.5	<0.2

NOTES:

1 *April 2011, Table 2 potable standards.*

Shaded Concentration exceeds MOE Table 2 groundwater quality criterion.

Appendix E – Laboratory Certificates of Analysis

Maxxam
A Bureau Veritas Group Company

Your Project #: OTT-00250806-A0
Site Location: 5924 HAZELDEAN RD
Your C.O.C. #: 483688

Attention: Mark McCalla

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

Report Date: 2019/01/18
Report #: R5562137
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B910652
Received: 2019/01/14, 15:39

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
1,3-Dichloropropene Sum	2	N/A	2019/01/18	OTT SOP-00002	EPA 8260C m
Petroleum Hydrocarbons F2-F4 in Soil (2)	2	2019/01/15	2019/01/16	OTT SOP-00001	CCME CWS
Strong Acid Leachable Metals by ICPMS (1)	2	2019/01/16	2019/01/16	CAM SOP-00447	EPA 6020B m
Moisture	2	N/A	2019/01/16	CAM SOP-00445	McKeague 2nd ed 1978
Volatile Organic Compounds and F1 PHCs	2	N/A	2019/01/16	OTT SOP-00002	EPA 8260C 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-00250806-A0
Site Location: 5924 HAZELDEAN RD
Your C.O.C. #: 483688

Attention: Mark McCalla

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

Report Date: 2019/01/18
Report #: R5562137
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B910652
Received: 2019/01/14, 15:39

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 #: B910652
Report Date: 2019/01/18

exp Services Inc
Client Project #: OTT-00250806-A0
Site Location: 5924 HAZELDEAN RD
Sampler Initials: ML

RESULTS OF ANALYSES OF SOIL

Maxxam ID		ITD435	ITD435	ITD436		
Sampling Date		2019/01/11 13:00	2019/01/11 13:00	2019/01/11 13:00		
COC Number		483688	483688	483688		
	UNITS	**BH2-AS1**	**BH2-AS1 Lab-Dup**	**DUPE**	**RDL**	**QC Batch**
Inorganics						
Moisture	%	7.9	9.1	9.3	0.2	5928684

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

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Maxxam Job #: B910652
Report Date: 2019/01/18

exp Services Inc
Client Project #: OTT-00250806-A0
Site Location: 5924 HAZELDEAN RD
Sampler Initials: ML

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		ITD435	ITD436		
Sampling Date		2019/01/11 13:00	2019/01/11 13:00		
COC Number		483688	483688		
	UNITS	**BH2-AS1**	**DUPE**	**RDL**	**QC Batch**
Metals					
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	0.20	5930434
Acid Extractable Arsenic (As)	ug/g	1.9	2.5	1.0	5930434
Acid Extractable Barium (Ba)	ug/g	66	70	0.50	5930434
Acid Extractable Beryllium (Be)	ug/g	0.31	0.34	0.20	5930434
Acid Extractable Boron (B)	ug/g	<5.0	<5.0	5.0	5930434
Acid Extractable Cadmium (Cd)	ug/g	<0.10	0.10	0.10	5930434
Acid Extractable Chromium (Cr)	ug/g	16	18	1.0	5930434
Acid Extractable Cobalt (Co)	ug/g	5.0	5.2	0.10	5930434
Acid Extractable Copper (Cu)	ug/g	7.4	8.9	0.50	5930434
Acid Extractable Lead (Pb)	ug/g	3.3	3.8	1.0	5930434
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	<0.50	0.50	5930434
Acid Extractable Nickel (Ni)	ug/g	12	13	0.50	5930434
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	0.50	5930434
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	0.20	5930434
Acid Extractable Thallium (Tl)	ug/g	0.099	0.11	0.050	5930434
Acid Extractable Uranium (U)	ug/g	0.47	0.50	0.050	5930434
Acid Extractable Vanadium (V)	ug/g	23	25	5.0	5930434
Acid Extractable Zinc (Zn)	ug/g	20	22	5.0	5930434

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B910652
Report Date: 2019/01/18

exp Services Inc
Client Project #: OTT-00250806-A0
Site Location: 5924 HAZELDEAN RD
Sampler Initials: ML

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		ITD435			ITD435			ITD436		
Sampling Date		2019/01/11 13:00			2019/01/11 13:00			2019/01/11 13:00		
COC Number		483688			483688			483688		
	UNITS	**BH2-AS1**	**RDL**	**QC Batch**	**BH2-AS1 Lab-Dup**	**RDL**	**QC Batch**	**DUPE**	**RDL**	**QC Batch**
Calculated Parameters										
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	0.050	5927479				<0.050	0.050	5927479
Volatile Organics										
Acetone (2-Propanone)	ug/g	<0.50	0.50	5930717	<0.50	0.50	5930717	<0.50	0.50	5930717
Benzene	ug/g	<0.020	0.020	5930717	<0.020	0.020	5930717	<0.020	0.020	5930717
Bromodichloromethane	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Bromoform	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Bromomethane	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Carbon Tetrachloride	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Chlorobenzene	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Chloroform	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Dibromochloromethane	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
1,2-Dichlorobenzene	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
1,3-Dichlorobenzene	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
1,4-Dichlorobenzene	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
1,1-Dichloroethane	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
1,2-Dichloroethane	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
1,1-Dichloroethylene	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
cis-1,2-Dichloroethylene	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
trans-1,2-Dichloroethylene	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
1,2-Dichloropropane	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
cis-1,3-Dichloropropene	ug/g	<0.030	0.030	5930717	<0.030	0.030	5930717	<0.030	0.030	5930717
trans-1,3-Dichloropropene	ug/g	<0.040	0.040	5930717	<0.040	0.040	5930717	<0.040	0.040	5930717
Ethylbenzene	ug/g	<0.020	0.020	5930717	<0.020	0.020	5930717	<0.020	0.020	5930717
Ethylene Dibromide	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Hexane	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Methylene Chloride(Dichloromethane)	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	0.50	5930717	<0.50	0.50	5930717	<0.50	0.50	5930717
Methyl Isobutyl Ketone	ug/g	<0.50	0.50	5930717	<0.50	0.50	5930717	<0.50	0.50	5930717
Methyl t-butyl ether (MTBE)	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Styrene	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
1,1,1,2-Tetrachloroethane	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
1,1,2,2-Tetrachloroethane	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717

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

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Maxxam Job #: B910652
Report Date: 2019/01/18

exp Services Inc
Client Project #: OTT-00250806-A0
Site Location: 5924 HAZELDEAN RD
Sampler Initials: ML

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		ITD435			ITD435			ITD436		
Sampling Date		2019/01/11 13:00			2019/01/11 13:00			2019/01/11 13:00		
COC Number		483688			483688			483688		
	UNITS	**BH2-AS1**	**RDL**	**QC Batch**	**BH2-AS1 Lab-Dup**	**RDL**	**QC Batch**	**DUPE**	**RDL**	**QC Batch**
Tetrachloroethylene	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Toluene	ug/g	<0.020	0.020	5930717	<0.020	0.020	5930717	<0.020	0.020	5930717
1,1,1-Trichloroethane	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
1,1,2-Trichloroethane	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Trichloroethylene	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	0.050	5930717	<0.050	0.050	5930717	<0.050	0.050	5930717
Vinyl Chloride	ug/g	<0.020	0.020	5930717	<0.020	0.020	5930717	<0.020	0.020	5930717
p+m-Xylene	ug/g	<0.020	0.020	5930717	<0.020	0.020	5930717	<0.020	0.020	5930717
o-Xylene	ug/g	<0.020	0.020	5930717	<0.020	0.020	5930717	<0.020	0.020	5930717
Total Xylenes	ug/g	<0.020	0.020	5930717	<0.020	0.020	5930717	<0.020	0.020	5930717
F1 (C6-C10)	ug/g	<10	10	5930717	<10	10	5930717	<10	10	5930717
F1 (C6-C10) - BTEX	ug/g	<10	10	5930717	<10	10	5930717	<10	10	5930717
Surrogate Recovery (%)										
4-Bromofluorobenzene	%	98		5930717	91		5930717	95		5930717
D10-o-Xylene	%	88		5930717	99		5930717	85		5930717
D4-1,2-Dichloroethane	%	88		5930717	91		5930717	86		5930717
D8-Toluene	%	107		5930717	94		5930717	101		5930717

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

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Maxxam Job #: B910652
Report Date: 2019/01/18

exp Services Inc
Client Project #: OTT-00250806-A0
Site Location: 5924 HAZELDEAN RD
Sampler Initials: ML

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		ITD435	ITD436	ITD436		
Sampling Date		2019/01/11 13:00	2019/01/11 13:00	2019/01/11 13:00		
COC Number		483688	483688	483688		
	UNITS	**BH2-AS1**	**DUPE**	**DUPE Lab-Dup**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	10	5928474
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	<50	50	5928474
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	<50	50	5928474
Reached Baseline at C50	ug/g	Yes	Yes	Yes		5928474
Surrogate Recovery (%)						
o-Terphenyl	%	92	95	100		5928474

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 #: B910652
Report Date: 2019/01/18

exp Services Inc
Client Project #: OTT-00250806-A0
Site Location: 5924 HAZELDEAN RD
Sampler Initials: ML

TEST SUMMARY

Maxxam ID: ITD435
Sample ID: BH2-AS1
Matrix: Soil

Collected: 2019/01/11
Shipped:
Received: 2019/01/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5927479	N/A	2019/01/18	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5928474	2019/01/15	2019/01/16	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5930434	2019/01/16	2019/01/16	Viviana Canzonieri
Moisture	BAL	5928684	N/A	2019/01/16	Samantha Arachchige
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5930717	N/A	2019/01/16	Liliana Gaburici

Maxxam ID: ITD435 Dup
Sample ID: BH2-AS1
Matrix: Soil

Collected: 2019/01/11
Shipped:
Received: 2019/01/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Moisture	BAL	5928684	N/A	2019/01/16	Samantha Arachchige
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5930717	N/A	2019/01/16	Liliana Gaburici

Maxxam ID: ITD436
Sample ID: DUPE
Matrix: Soil

Collected: 2019/01/11
Shipped:
Received: 2019/01/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5927479	N/A	2019/01/18	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5928474	2019/01/15	2019/01/16	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5930434	2019/01/16	2019/01/16	Viviana Canzonieri
Moisture	BAL	5928684	N/A	2019/01/16	Samantha Arachchige
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5930717	N/A	2019/01/16	Liliana Gaburici

Maxxam ID: ITD436 Dup
Sample ID: DUPE
Matrix: Soil

Collected: 2019/01/11
Shipped:
Received: 2019/01/14

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5928474	2019/01/15	2019/01/16	Mariana Vascan

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Maxxam Job #: B910652
Report Date: 2019/01/18

exp Services Inc
Client Project #: OTT-00250806-A0
Site Location: 5924 HAZELDEAN RD
Sampler Initials: ML

GENERAL COMMENTS

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

Package 1	0.3°C

Results relate only to the items tested.

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Maxxam Job #: B910652
Report Date: 2019/01/18

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-00250806-A0
Site Location: 5924 HAZELDEAN 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
5928474	o-Terphenyl	2019/01/16	93	30 - 130	92	30 - 130	100	%		
5930717	4-Bromofluorobenzene	2019/01/16	89	60 - 140	96	60 - 140	98	%		
5930717	D10-o-Xylene	2019/01/16	79	60 - 130	101	60 - 130	110	%		
5930717	D4-1,2-Dichloroethane	2019/01/16	103	60 - 140	96	60 - 140	87	%		
5930717	D8-Toluene	2019/01/16	97	60 - 140	98	60 - 140	103	%		
5928474	F2 (C10-C16 Hydrocarbons)	2019/01/16	94	50 - 130	81	80 - 120	<10	ug/g	NC	50
5928474	F3 (C16-C34 Hydrocarbons)	2019/01/16	94	50 - 130	81	80 - 120	<50	ug/g	NC	50
5928474	F4 (C34-C50 Hydrocarbons)	2019/01/16	94	50 - 130	81	80 - 120	<50	ug/g	NC	50
5928684	Moisture	2019/01/16							14	50
5930434	Acid Extractable Antimony (Sb)	2019/01/16	92	75 - 125	101	80 - 120	<0.20	ug/g	NC	30
5930434	Acid Extractable Arsenic (As)	2019/01/16	110	75 - 125	98	80 - 120	<1.0	ug/g	0.74	30
5930434	Acid Extractable Barium (Ba)	2019/01/16	NC	75 - 125	100	80 - 120	<0.50	ug/g	1.6	30
5930434	Acid Extractable Beryllium (Be)	2019/01/16	109	75 - 125	100	80 - 120	<0.20	ug/g	0.89	30
5930434	Acid Extractable Boron (B)	2019/01/16	100	75 - 125	101	80 - 120	<5.0	ug/g	2.2	30
5930434	Acid Extractable Cadmium (Cd)	2019/01/16	107	75 - 125	101	80 - 120	<0.10	ug/g	24	30
5930434	Acid Extractable Chromium (Cr)	2019/01/16	111	75 - 125	101	80 - 120	<1.0	ug/g	2.4	30
5930434	Acid Extractable Cobalt (Co)	2019/01/16	106	75 - 125	102	80 - 120	<0.10	ug/g	0.89	30
5930434	Acid Extractable Copper (Cu)	2019/01/16	105	75 - 125	102	80 - 120	<0.50	ug/g	3.2	30
5930434	Acid Extractable Lead (Pb)	2019/01/16	107	75 - 125	105	80 - 120	<1.0	ug/g	0.93	30
5930434	Acid Extractable Molybdenum (Mo)	2019/01/16	105	75 - 125	102	80 - 120	<0.50	ug/g	15	30
5930434	Acid Extractable Nickel (Ni)	2019/01/16	NC	75 - 125	106	80 - 120	<0.50	ug/g	0.50	30
5930434	Acid Extractable Selenium (Se)	2019/01/16	108	75 - 125	105	80 - 120	<0.50	ug/g	NC	30
5930434	Acid Extractable Silver (Ag)	2019/01/16	107	75 - 125	103	80 - 120	<0.20	ug/g	NC	30
5930434	Acid Extractable Thallium (Tl)	2019/01/16	107	75 - 125	103	80 - 120	<0.050	ug/g	10	30
5930434	Acid Extractable Uranium (U)	2019/01/16	105	75 - 125	102	80 - 120	<0.050	ug/g	0.027	30
5930434	Acid Extractable Vanadium (V)	2019/01/16	NC	75 - 125	98	80 - 120	<5.0	ug/g	4.3	30
5930434	Acid Extractable Zinc (Zn)	2019/01/16	NC	75 - 125	100	80 - 120	<5.0	ug/g	2.9	30
5930717	1,1,1,2-Tetrachloroethane	2019/01/16	90	60 - 140	93	60 - 130	<0.050	ug/g	NC	50
5930717	1,1,1-Trichloroethane	2019/01/16	95	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
5930717	1,1,2,2-Tetrachloroethane	2019/01/16	102	60 - 140	85	60 - 130	<0.050	ug/g	NC	50
5930717	1,1,2-Trichloroethane	2019/01/16	87	60 - 140	84	60 - 130	<0.050	ug/g	NC	50
5930717	1,1-Dichloroethane	2019/01/16	87	60 - 140	88	60 - 130	<0.050	ug/g	NC	50

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Maxxam Job #: B910652
Report Date: 2019/01/18

QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-00250806-A0
Site Location: 5924 HAZELDEAN 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
5930717	1,1-Dichloroethylene	2019/01/16	88	60 - 140	91	60 - 130	<0.050	ug/g	NC	50
5930717	1,2-Dichlorobenzene	2019/01/16	107	60 - 140	106	60 - 130	<0.050	ug/g	NC	50
5930717	1,2-Dichloroethane	2019/01/16	97	60 - 140	91	60 - 130	<0.050	ug/g	NC	50
5930717	1,2-Dichloropropane	2019/01/16	87	60 - 140	87	60 - 130	<0.050	ug/g	NC	50
5930717	1,3-Dichlorobenzene	2019/01/16	106	60 - 140	120	60 - 130	<0.050	ug/g	NC	50
5930717	1,4-Dichlorobenzene	2019/01/16	109	60 - 140	116	60 - 130	<0.050	ug/g	NC	50
5930717	Acetone (2-Propanone)	2019/01/16	85	60 - 140	83	60 - 140	<0.50	ug/g	NC	50
5930717	Benzene	2019/01/16	103	60 - 140	103	60 - 130	<0.020	ug/g	NC	50
5930717	Bromodichloromethane	2019/01/16	88	60 - 140	87	60 - 130	<0.050	ug/g	NC	50
5930717	Bromoform	2019/01/16	95	60 - 140	88	60 - 130	<0.050	ug/g	NC	50
5930717	Bromomethane	2019/01/16	105	60 - 140	105	60 - 140	<0.050	ug/g	NC	50
5930717	Carbon Tetrachloride	2019/01/16	95	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
5930717	Chlorobenzene	2019/01/16	99	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
5930717	Chloroform	2019/01/16	99	60 - 140	93	60 - 130	<0.050	ug/g	NC	50
5930717	cis-1,2-Dichloroethylene	2019/01/16	96	60 - 140	95	60 - 130	<0.050	ug/g	NC	50
5930717	cis-1,3-Dichloropropene	2019/01/16	98	60 - 140	96	60 - 130	<0.030	ug/g	NC	50
5930717	Dibromochloromethane	2019/01/16	92	60 - 140	89	60 - 130	<0.050	ug/g	NC	50
5930717	Dichlorodifluoromethane (FREON 12)	2019/01/16	78	60 - 140	81	60 - 140	<0.050	ug/g	NC	50
5930717	Ethylbenzene	2019/01/16	96	60 - 140	100	60 - 130	<0.020	ug/g	NC	50
5930717	Ethylene Dibromide	2019/01/16	102	60 - 140	95	60 - 130	<0.050	ug/g	NC	50
5930717	F1 (C6-C10) - BTEX	2019/01/16					<10	ug/g	NC	30
5930717	F1 (C6-C10)	2019/01/16	117	60 - 140	99	80 - 120	<10	ug/g	NC	30
5930717	Hexane	2019/01/16	106	60 - 140	106	60 - 130	<0.050	ug/g	NC	50
5930717	Methyl Ethyl Ketone (2-Butanone)	2019/01/16	94	60 - 140	84	60 - 140	<0.50	ug/g	NC	50
5930717	Methyl Isobutyl Ketone	2019/01/16	98	60 - 140	88	60 - 130	<0.50	ug/g	NC	50
5930717	Methyl t-butyl ether (MTBE)	2019/01/16	92	60 - 140	91	60 - 130	<0.050	ug/g	NC	50
5930717	Methylene Chloride(Dichloromethane)	2019/01/16	94	60 - 140	91	60 - 130	<0.050	ug/g	NC	50
5930717	o-Xylene	2019/01/16	111	60 - 140	103	60 - 130	<0.020	ug/g	NC	50
5930717	p+m-Xylene	2019/01/16	100	60 - 140	104	60 - 130	<0.020	ug/g	NC	50
5930717	Styrene	2019/01/16	111	60 - 140	101	60 - 130	<0.050	ug/g	NC	50
5930717	Tetrachloroethylene	2019/01/16	93	60 - 140	98	60 - 130	<0.050	ug/g	NC	50
5930717	Toluene	2019/01/16	99	60 - 140	101	60 - 130	<0.020	ug/g	NC	50

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Maxxam Job #: B910652
Report Date: 2019/01/18

QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-00250806-A0
Site Location: 5924 HAZELDEAN 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
5930717	Total Xylenes	2019/01/16					<0.020	ug/g	NC	50
5930717	trans-1,2-Dichloroethylene	2019/01/16	94	60 - 140	93	60 - 130	<0.050	ug/g	NC	50
5930717	trans-1,3-Dichloropropene	2019/01/16	91	60 - 140	87	60 - 130	<0.040	ug/g	NC	50
5930717	Trichloroethylene	2019/01/16	95	60 - 140	98	60 - 130	<0.050	ug/g	NC	50
5930717	Trichlorofluoromethane (FREON 11)	2019/01/16	95	60 - 140	100	60 - 130	<0.050	ug/g	NC	50
5930717	Vinyl Chloride	2019/01/16	89	60 - 140	91	60 - 130	<0.020	ug/g	NC	50

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

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

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

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

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

NC (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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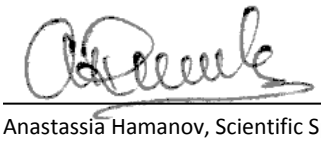
Maxxam Job #: B910652
Report Date: 2019/01/18

exp Services Inc
Client Project #: OTT-00250806-A0
Site Location: 5924 HAZELDEAN 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).



Anastassia Hamanov, Scientific Specialist

Liliana Gaburici, VOC Lab

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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CHAIN OF CUSTODY RECORD

Page 1 of 1

Maxxam Analytics Inc
6740 Campobello Road, Mississauga, ON L5N 2L8
Phone: 905-817-5700 Fax: 905-817-5778 Toll Free: (800) 563-6266

INVOICE INFORMATION	REPORT INFORMATION (if differs from invoice)	PROJECT INFORMATION	MAXXAM JOB NUMBER
Company Name: EXP Services Inc.	Company Name:	Quotation #:	
Contact Name: MARK McCALLA	Contact Name:	P.O. #:	CHAIN OF CUSTODY #
Address: 2650 QUEENSVIEW DR OTTAWA	Address:	Project #: OTT-00250806-AO	OO483688
Phone: 613 688-1899 Fax:	Phone: Fax:	Project Name: 5924 Hazeldean Rd	
Email: mark.mccalla@exp.com	Email:	Location: 5924 Hazeldean Rd	
		Sampled By: M. Leroux	

REGULATORY CRITERIA

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form.

- [ ] MISA — Reg. 153: [ ] Table 1 [ ] Table 2 [X] Table 3 — Sewer Use: [ ] Sanitary [ ] Storm — Region: ____
- [ ] PWQO
- [ ] Reg. 558
- [ ] Other — specify: ____
- Report Criteria on C of A? [ ]

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

ANALYSIS REQUESTED (Please be specific)

	Sample Identification	Date Sampled	Time Sampled	Matrix (GW, SW, Soil, etc.)	Regulated Drinking Water? (Y / N)	Metals Field Filtered? (Y / N)	VOC	PHC	Metals (MECP) ICP	# of Cont.	COMMENTS / TAT COMMENTS
1	BH2-AS1	Jan 11/19	1pm	SOIL			X	X	X	4	
2	Dupe	"	1pm	"			X	X	X	4	
3											
4											
5											
6											
7											
8											
9											
10											
11											
12											

TURNAROUND TIME (TAT) REQUIRED

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS.

Regular (Standard) TAT:
[X] 5 to 7 Working Days

Rush TAT: Rush Confirmation #: ____ (call Lab for #)
[ ] 1 day [ ] 2 days [ ] 3 days

DATE Required: ____

TIME Required: ____

Please note that TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

14-Jan-19 15:39
Alisha Williamson
B910652
OTT-001
RECEIVED IN OTTAWA

RELINQUISHED BY (Signature/Print)	RECEIVED BY (Signature/Print)	Date	Time	Laboratory Use Only
Mark Devlin	Serge Leger	Jan 14, 19	3:39	Temperature (°C) on Receipt: 0,0,(— Condition of Sample on Receipt: [ ] OK [ ] SIF

*MANDATORY SECTIONS IN GREY MUST BE FILLED OUT. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

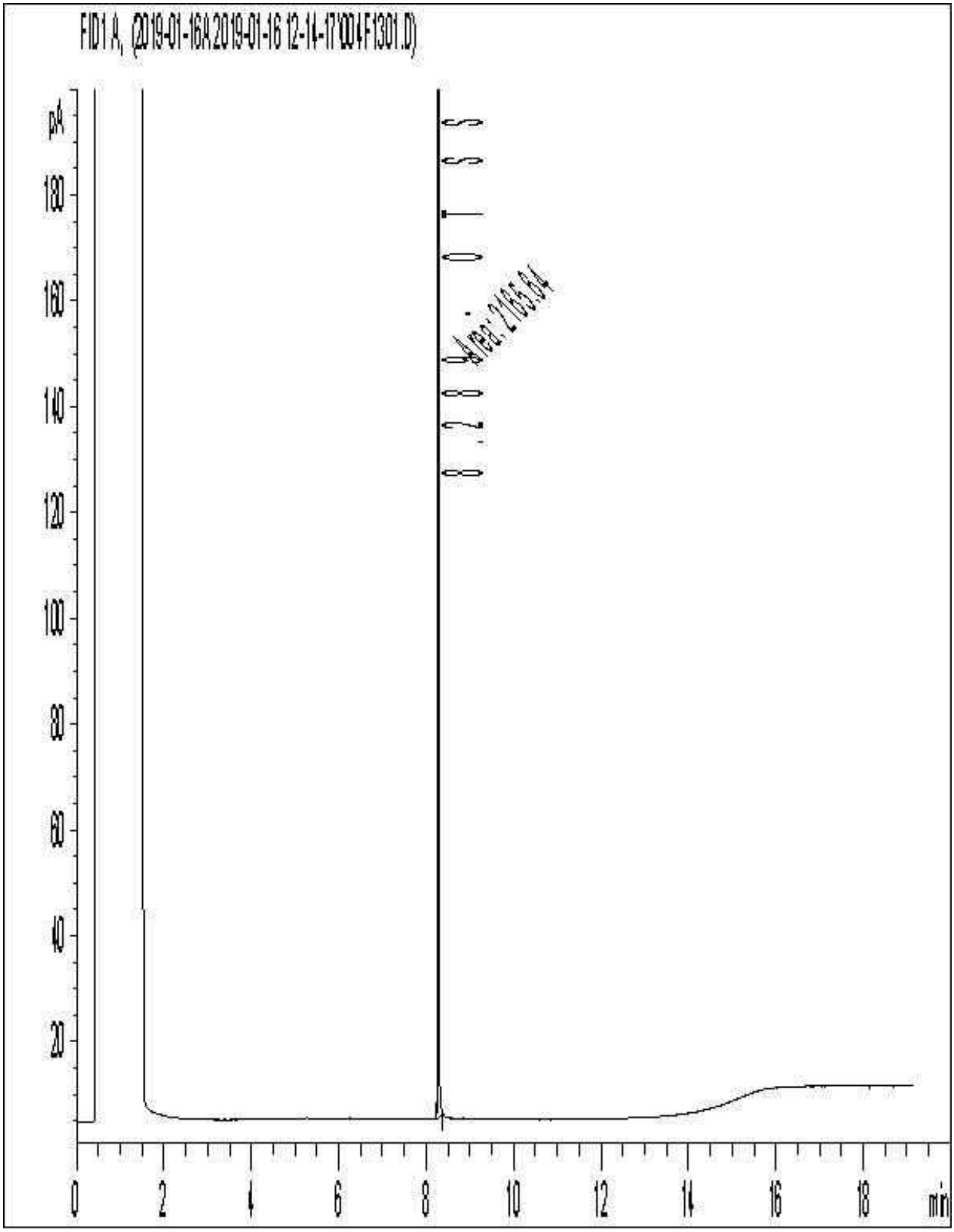
ENVCOC-ONT-05/06

White: Maxxam Yellow: Mail Pink: Client

Maxxam Job #: B910652
Report Date: 2019/01/18
Maxxam Sample: ITD435

exp Services Inc
Client Project #: OTT-00250806-A0
Project name: 5924 HAZELDEAN RD
Client ID: BH2-AS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

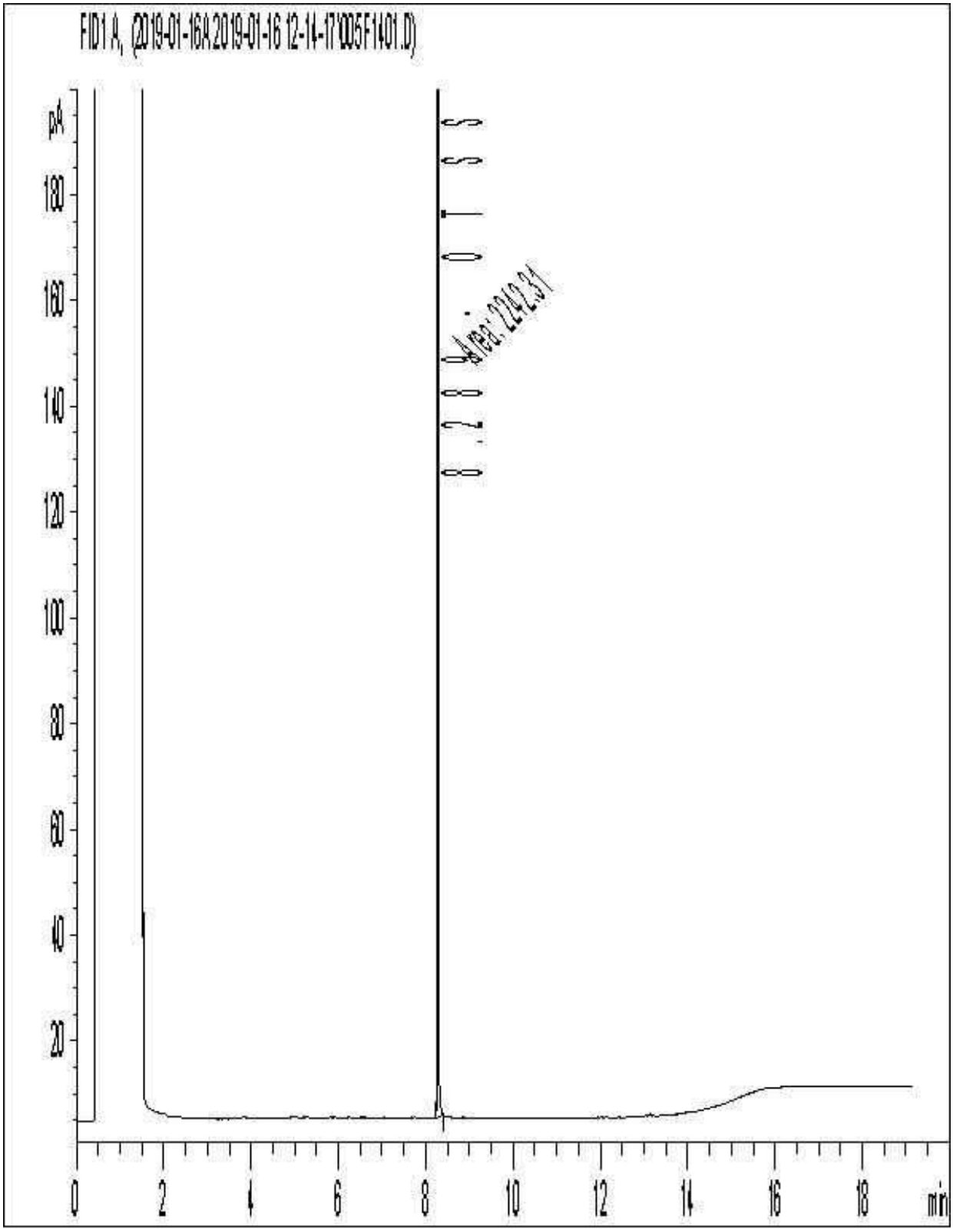


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B910652
Report Date: 2019/01/18
Maxxam Sample: ITD436

exp Services Inc
Client Project #: OTT-00250806-A0
Project name: 5924 HAZELDEAN RD
Client ID: DUPE

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

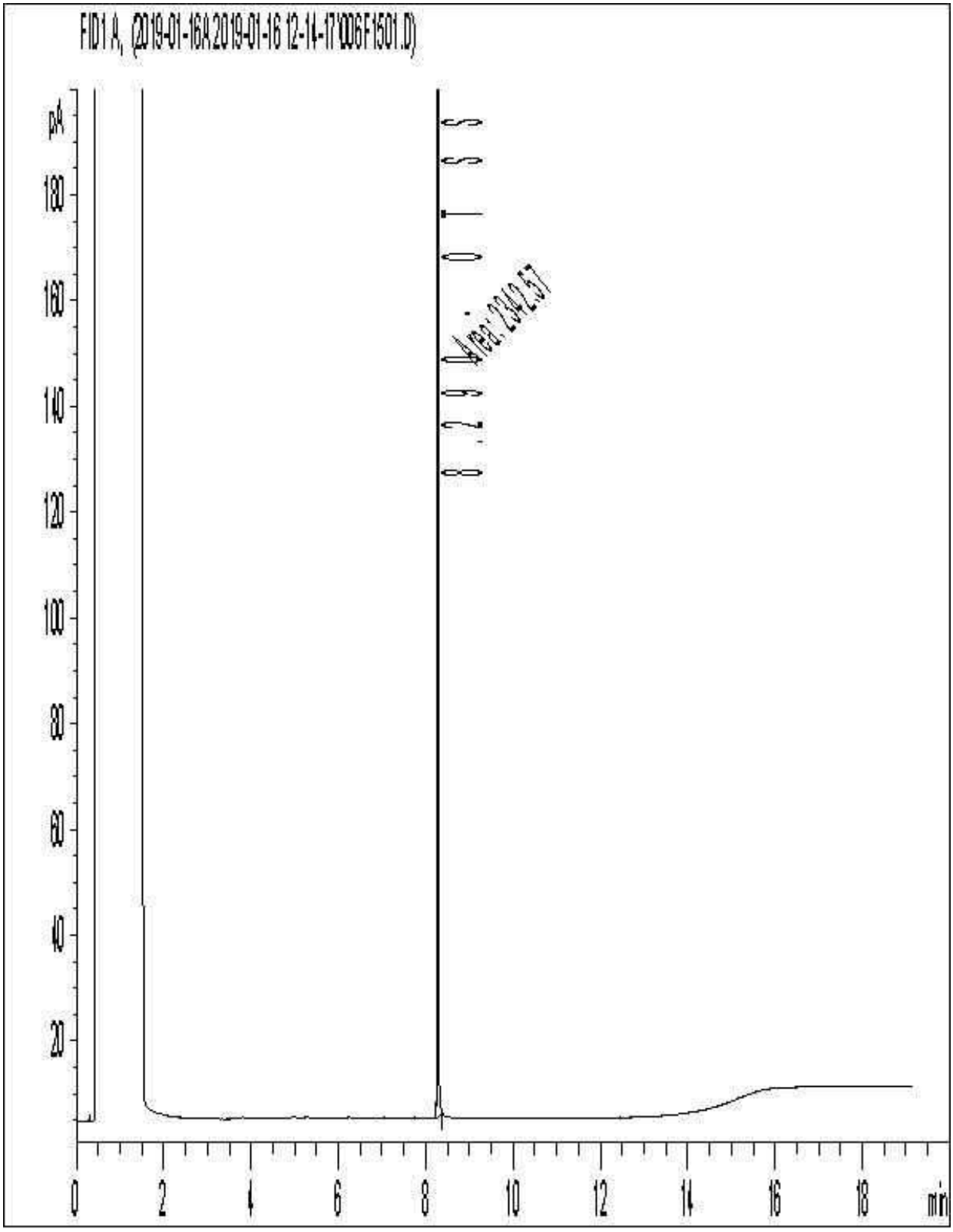


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B910652
Report Date: 2019/01/18
Maxxam Sample: ITD436 Lab-Dup

exp Services Inc
Client Project #: OTT-00250806-A0
Project name: 5924 HAZELDEAN RD
Client ID: DUPE

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.

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: Ismail M. Taki

PROJECT: OTT-250806

AGAT WORK ORDER: 19Z437613

SOIL ANALYSIS REVIEWED BY: Amanjot Bhela, Inorganic Supervisor

DATE REPORTED: Feb 20, 2019

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: 19Z437613

PROJECT: OTT-250806

CLIENT NAME: EXP SERVICES INC

ATTENTION TO: Ismail M. Taki

SAMPLING SITE:5924 Hazeldean Rd.

SAMPLED BY:exp

Inorganic Chemistry (soil)

DATE RECEIVED: 2019-02-14 **DATE REPORTED: 2019-02-20**

		SAMPLE DESCRIPTION:		BH3 As1 0-2'	TP5 S2 1'-3'
		SAMPLE TYPE:		Soil	Soil
		DATE SAMPLED:		2019-01-11	2019-02-12
Parameter	Unit	G / S	RDL	9902008	9902010
pH (2:1)	pH Units		N/A	7.85	7.79
Sulphate (2:1)	µg/g		2	83	7

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

9902008 pH and Sulphate were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil). Sample was received and analyzed beyond recommended hold times.

9902010 pH and Sulphate were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil).

Certified By:

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: 19Z437613

PROJECT: OTT-250806

ATTENTION TO: Ismail M. Taki

SAMPLING SITE:5924 Hazeldean Rd.

SAMPLED BY:exp

Soil Analysis

RPT Date:			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)	9902010	9902010	7.79	7.69	1.3%	N/A	101%	90%	110%	NA			NA		
Sulphate (2:1)	9902010	9902010	7	7	NA	< 2	104%	70%	130%	103%	70%	130%	105%	70%	130%

Comments: NA signifies Not Applicable.

Certified By:

Amanjot Bhela

CHARTERED CHEMIST AMANJOT BHELA

AGAT Laboratories

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

Method Summary

CLIENT NAME: EXP SERVICES INC

AGAT WORK ORDER: 19Z437613

PROJECT: OTT-250806

ATTENTION TO: Ismail M. Taki

SAMPLING SITE:5924 Hazeldean Rd.

SAMPLED BY:exp

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

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: Ismail Taki
Address: 2650 Queensview Dr Suite 100
Ottawa ON K2B 8H6
Phone: 613-688-1899 Fax:
Reports to be sent to:
1. Email: Ismail.taki@exp.com
2. Email:

Project Information:

Project: OTT-250806
Site Location: 5924 Hazeldean 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 #: 1924376 13
Cooler Quantity: one
Arrival Temperatures: 16.0 | 15.9 | 16.0
8.6 | 7.8 | 7.9
Custody Seal Intact: ☐ Yes ☐ No ☐ N/A
Notes: Noice

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	Y / N	Field Filtered - Metals, Hg, CrVI	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	Sulphate
BH 3 AS1 0-2'	Jan 11/19																				✓	✓
TP 5 S2 1'-3'	Feb 12/19																				✓	✓

Samples Relinquished By (Print Name and Sign): Ryan DiGiuseppe	Date: Feb 12/19	Time: 4:30pm	Samples Received By (Print Name and Sign): LBerthelet	Date: 19-02-14	Time: 8h04
Samples Relinquished By (Print Name and Sign): USPS to FedEx	Date: 19-02-14	Time: 16h00	Samples Received By (Print Name and Sign): Simon Z	Date: 19/2/15	Time: 9 55
Samples Relinquished By (Print Name and Sign):	Date:	Time:	Samples Received By (Print Name and Sign):	Date:	Time:

Page 1 of 1
N°: T078077

Maxxam
A Bureau Veritas Group Company

Your Project #: OTT-00250806-A
Site Location: HAZELDEAN RD
Your C.O.C. #: 117526

Attention: Mark Devlin

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

Report Date: 2019/01/28
Report #: R5573824
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B920663
Received: 2019/01/24, 08:55

Sample Matrix: Water
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
1,3-Dichloropropene Sum	1	N/A	2019/01/25	OTT SOP-00002	EPA 8260C m
1,3-Dichloropropene Sum	1	N/A	2019/01/28	OTT SOP-00002	EPA 8260C m
Petroleum Hydrocarbons F2-F4 in Water (2)	2	2019/01/24	2019/01/24	OTT SOP-00001	CCME Hydrocarbons
Dissolved Metals by ICPMS (1)	2	N/A	2019/01/25	CAM SOP-00447	EPA 6020B m
Volatile Organic Compounds and F1 PHCs	1	N/A	2019/01/24	OTT SOP-00002	EPA 8260C m
Volatile Organic Compounds and F1 PHCs	1	N/A	2019/01/25	OTT SOP-00002	EPA 8260C 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.

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-00250806-A
Site Location: HAZELDEAN RD
Your C.O.C. #: 117526

Attention: Mark Devlin

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

Report Date: 2019/01/28
Report #: R5573824
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B920663
Received: 2019/01/24, 08:55

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 #: B920663
Report Date: 2019/01/28

exp Services Inc
Client Project #: OTT-00250806-A
Site Location: HAZELDEAN RD
Sampler Initials: MAD

ELEMENTS BY ATOMIC SPECTROSCOPY (WATER)

Maxxam ID		IVG296	IVG296	IVG297		
Sampling Date		2019/01/23 12:00	2019/01/23 12:00	2019/01/23 12:00		
COC Number		117526	117526	117526		
	UNITS	**BH2**	**BH2 Lab-Dup**	**BH3**	**RDL**	**QC Batch**
Metals						
Dissolved Antimony (Sb)	ug/L	<0.50	<0.50	<0.50	0.50	5945794
Dissolved Arsenic (As)	ug/L	2.0	2.1	2.1	1.0	5945794
Dissolved Barium (Ba)	ug/L	79	81	81	2.0	5945794
Dissolved Beryllium (Be)	ug/L	<0.50	<0.50	<0.50	0.50	5945794
Dissolved Boron (B)	ug/L	23	22	21	10	5945794
Dissolved Cadmium (Cd)	ug/L	<0.10	<0.10	<0.10	0.10	5945794
Dissolved Chromium (Cr)	ug/L	<5.0	<5.0	<5.0	5.0	5945794
Dissolved Cobalt (Co)	ug/L	3.2	3.3	3.2	0.50	5945794
Dissolved Copper (Cu)	ug/L	2.9	2.9	3.2	1.0	5945794
Dissolved Lead (Pb)	ug/L	1.9	1.9	2.0	0.50	5945794
Dissolved Molybdenum (Mo)	ug/L	6.8	6.9	6.9	0.50	5945794
Dissolved Nickel (Ni)	ug/L	5.1	5.2	5.2	1.0	5945794
Dissolved Selenium (Se)	ug/L	<2.0	<2.0	<2.0	2.0	5945794
Dissolved Silver (Ag)	ug/L	<0.10	<0.10	<0.10	0.10	5945794
Dissolved Thallium (Tl)	ug/L	0.055	0.054	0.059	0.050	5945794
Dissolved Uranium (U)	ug/L	1.1	1.1	1.1	0.10	5945794
Dissolved Vanadium (V)	ug/L	<0.50	<0.50	<0.50	0.50	5945794
Dissolved Zinc (Zn)	ug/L	20	20	21	5.0	5945794

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

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Maxxam Job #: B920663
Report Date: 2019/01/28

exp Services Inc
Client Project #: OTT-00250806-A
Site Location: HAZELDEAN RD
Sampler Initials: MAD

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		IVG296	IVG297		
Sampling Date		2019/01/23 12:00	2019/01/23 12:00		
COC Number		117526	117526		
	UNITS	**BH2**	**BH3**	**RDL**	**QC Batch**
Calculated Parameters					
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	<0.50	0.50	5943924
Volatile Organics					
Acetone (2-Propanone)	ug/L	600	640	10	5943944
Benzene	ug/L	1.9	1.8	0.20	5943944
Bromodichloromethane	ug/L	1.1	1.1	0.50	5943944
Bromoform	ug/L	<1.0	<1.0	1.0	5943944
Bromomethane	ug/L	<0.50	<0.50	0.50	5943944
Carbon Tetrachloride	ug/L	<0.20	<0.20	0.20	5943944
Chlorobenzene	ug/L	<0.20	<0.20	0.20	5943944
Chloroform	ug/L	4.5	7.6	0.20	5943944
Dibromochloromethane	ug/L	<0.50	<0.50	0.50	5943944
1,2-Dichlorobenzene	ug/L	<0.50	<0.50	0.50	5943944
1,3-Dichlorobenzene	ug/L	<0.50	<0.50	0.50	5943944
1,4-Dichlorobenzene	ug/L	<0.50	<0.50	0.50	5943944
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	<1.0	1.0	5943944
1,1-Dichloroethane	ug/L	<0.20	<0.20	0.20	5943944
1,2-Dichloroethane	ug/L	<0.50	<0.50	0.50	5943944
1,1-Dichloroethylene	ug/L	<0.20	<0.20	0.20	5943944
cis-1,2-Dichloroethylene	ug/L	<0.50	<0.50	0.50	5943944
trans-1,2-Dichloroethylene	ug/L	<0.50	<0.50	0.50	5943944
1,2-Dichloropropane	ug/L	<0.20	<0.20	0.20	5943944
cis-1,3-Dichloropropene	ug/L	<0.30	<0.30	0.30	5943944
trans-1,3-Dichloropropene	ug/L	<0.40	<0.40	0.40	5943944
Ethylbenzene	ug/L	0.74	0.71	0.20	5943944
Ethylene Dibromide	ug/L	<0.20	<0.20	0.20	5943944
Hexane	ug/L	<1.0	<1.0	1.0	5943944
Methylene Chloride(Dichloromethane)	ug/L	3.4	4.2	2.0	5943944
Methyl Ethyl Ketone (2-Butanone)	ug/L	54	55	10	5943944
Methyl Isobutyl Ketone	ug/L	<5.0	<5.0	5.0	5943944
Methyl t-butyl ether (MTBE)	ug/L	<0.50	<0.50	0.50	5943944
Styrene	ug/L	<0.50	<0.50	0.50	5943944
1,1,1,2-Tetrachloroethane	ug/L	<0.50	<0.50	0.50	5943944
1,1,2,2-Tetrachloroethane	ug/L	<0.50	<0.50	0.50	5943944

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B920663
Report Date: 2019/01/28

exp Services Inc
Client Project #: OTT-00250806-A
Site Location: HAZELDEAN RD
Sampler Initials: MAD

VOLATILE ORGANICS BY GC/MS (WATER)

Maxxam ID		IVG296	IVG297		
Sampling Date		2019/01/23 12:00	2019/01/23 12:00		
COC Number		117526	117526		
	UNITS	**BH2**	**BH3**	**RDL**	**QC Batch**
Tetrachloroethylene	ug/L	<0.20	<0.20	0.20	5943944
Toluene	ug/L	9.1	6.9	0.20	5943944
1,1,1-Trichloroethane	ug/L	<0.20	<0.20	0.20	5943944
1,1,2-Trichloroethane	ug/L	<0.50	<0.50	0.50	5943944
Trichloroethylene	ug/L	<0.20	<0.20	0.20	5943944
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	<0.50	0.50	5943944
Vinyl Chloride	ug/L	<0.20	<0.20	0.20	5943944
p+m-Xylene	ug/L	3.2	3.3	0.20	5943944
o-Xylene	ug/L	1.2	1.3	0.20	5943944
Total Xylenes	ug/L	4.4	4.5	0.20	5943944
F1 (C6-C10)	ug/L	<25	<25	25	5943944
F1 (C6-C10) - BTEX	ug/L	<25	<25	25	5943944
Surrogate Recovery (%)					
4-Bromofluorobenzene	%	109	97		5943944
D4-1,2-Dichloroethane	%	106	98		5943944
D8-Toluene	%	104	74		5943944

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B920663
Report Date: 2019/01/28

exp Services Inc
Client Project #: OTT-00250806-A
Site Location: HAZELDEAN RD
Sampler Initials: MAD

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		IVG296	IVG297	IVG297		
Sampling Date		2019/01/23 12:00	2019/01/23 12:00	2019/01/23 12:00		
COC Number		117526	117526	117526		
	UNITS	**BH2**	**BH3**	**BH3 Lab-Dup**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons						
F2 (C10-C16 Hydrocarbons)	ug/L	160	<100	<100	100	5943927
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	<200	200	5943927
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	<200	200	5943927
Reached Baseline at C50	ug/L	Yes	Yes	Yes		5943927
Surrogate Recovery (%)						
o-Terphenyl	%	99	104	103		5943927

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

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Maxxam Job #: B920663
Report Date: 2019/01/28

exp Services Inc
Client Project #: OTT-00250806-A
Site Location: HAZELDEAN RD
Sampler Initials: MAD

TEST SUMMARY

Maxxam ID: IVG296
Sample ID: BH2
Matrix: Water

Collected: 2019/01/23
Shipped:
Received: 2019/01/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5943924	N/A	2019/01/25	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5943927	2019/01/24	2019/01/24	Mariana Vascan
Dissolved Metals by ICPMS	ICP/MS	5945794	N/A	2019/01/25	Thao Nguyen
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5943944	N/A	2019/01/25	Liliana Gaburici

Maxxam ID: IVG296 Dup
Sample ID: BH2
Matrix: Water

Collected: 2019/01/23
Shipped:
Received: 2019/01/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Dissolved Metals by ICPMS	ICP/MS	5945794	N/A	2019/01/25	Thao Nguyen

Maxxam ID: IVG297
Sample ID: BH3
Matrix: Water

Collected: 2019/01/23
Shipped:
Received: 2019/01/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5943924	N/A	2019/01/28	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5943927	2019/01/24	2019/01/24	Mariana Vascan
Dissolved Metals by ICPMS	ICP/MS	5945794	N/A	2019/01/25	Thao Nguyen
Volatile Organic Compounds and F1 PHCs	GC/MSFD	5943944	N/A	2019/01/24	Liliana Gaburici

Maxxam ID: IVG297 Dup
Sample ID: BH3
Matrix: Water

Collected: 2019/01/23
Shipped:
Received: 2019/01/24

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5943927	2019/01/24	2019/01/24	Mariana Vascan

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 #: B920663
Report Date: 2019/01/28

exp Services Inc
Client Project #: OTT-00250806-A
Site Location: HAZELDEAN RD
Sampler Initials: MAD

GENERAL COMMENTS

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

Package 1	0.3°C

VOLATILE ORGANICS BY GC/MS (WATER)

Volatile Organic Compounds and F1 PHCs: VOCF1 Analysis: the matrix spike was not calculated (NC) for Acetone due to high concentration of target analytes.

Results relate only to the items tested.

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Maxxam Job #: B920663
Report Date: 2019/01/28

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-00250806-A
Site Location: HAZELDEAN RD
Sampler Initials: MAD

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5943927	o-Terphenyl	2019/01/24	113	30 - 130	118	30 - 130	103	%		
5943944	4-Bromofluorobenzene	2019/01/24	103	70 - 130	104	70 - 130	104	%		
5943944	D4-1,2-Dichloroethane	2019/01/24	112	70 - 130	112	70 - 130	101	%		
5943944	D8-Toluene	2019/01/24	102	70 - 130	100	70 - 130	99	%		
5943927	F2 (C10-C16 Hydrocarbons)	2019/01/24	84	50 - 130	87	80 - 120	<100	ug/L	NC	50
5943927	F3 (C16-C34 Hydrocarbons)	2019/01/24	84	50 - 130	87	80 - 120	<200	ug/L	NC	50
5943927	F4 (C34-C50 Hydrocarbons)	2019/01/24	84	50 - 130	87	80 - 120	<200	ug/L	NC	50
5943944	1,1,1,2-Tetrachloroethane	2019/01/24	93	70 - 130	95	70 - 130	<0.50	ug/L	NC	30
5943944	1,1,1-Trichloroethane	2019/01/24	96	70 - 130	103	70 - 130	<0.20	ug/L	NC	30
5943944	1,1,2,2-Tetrachloroethane	2019/01/24	94	70 - 130	90	70 - 130	<0.50	ug/L	NC	30
5943944	1,1,2-Trichloroethane	2019/01/24	95	70 - 130	92	70 - 130	<0.50	ug/L	NC	30
5943944	1,1-Dichloroethane	2019/01/24	99	70 - 130	104	70 - 130	<0.20	ug/L	NC	30
5943944	1,1-Dichloroethylene	2019/01/24	89	70 - 130	99	70 - 130	<0.20	ug/L	NC	30
5943944	1,2-Dichlorobenzene	2019/01/24	97	70 - 130	96	70 - 130	<0.50	ug/L	NC	30
5943944	1,2-Dichloroethane	2019/01/24	100	70 - 130	101	70 - 130	<0.50	ug/L	NC	30
5943944	1,2-Dichloropropane	2019/01/24	91	70 - 130	93	70 - 130	<0.20	ug/L	NC	30
5943944	1,3-Dichlorobenzene	2019/01/24	92	70 - 130	94	70 - 130	<0.50	ug/L	NC	30
5943944	1,4-Dichlorobenzene	2019/01/24	93	70 - 130	94	70 - 130	<0.50	ug/L	NC	30
5943944	Acetone (2-Propanone)	2019/01/24	NC	60 - 140	100	60 - 140	<10	ug/L	5.3	30
5943944	Benzene	2019/01/24	96	70 - 130	102	70 - 130	<0.20	ug/L	3.6	30
5943944	Bromodichloromethane	2019/01/24	95	70 - 130	100	70 - 130	<0.50	ug/L	NC	30
5943944	Bromoform	2019/01/24	93	70 - 130	90	70 - 130	<1.0	ug/L	NC	30
5943944	Bromomethane	2019/01/24	91	60 - 140	99	60 - 140	<0.50	ug/L	NC	30
5943944	Carbon Tetrachloride	2019/01/24	97	70 - 130	104	70 - 130	<0.20	ug/L	NC	30
5943944	Chlorobenzene	2019/01/24	93	70 - 130	96	70 - 130	<0.20	ug/L	NC	30
5943944	Chloroform	2019/01/24	101	70 - 130	99	70 - 130	<0.20	ug/L	NC	30
5943944	cis-1,2-Dichloroethylene	2019/01/24	91	70 - 130	95	70 - 130	<0.50	ug/L	NC	30
5943944	cis-1,3-Dichloropropene	2019/01/24	80	70 - 130	88	70 - 130	<0.30	ug/L	NC	30
5943944	Dibromochloromethane	2019/01/24	86	70 - 130	86	70 - 130	<0.50	ug/L	NC	30
5943944	Dichlorodifluoromethane (FREON 12)	2019/01/24	75	60 - 140	86	60 - 140	<1.0	ug/L	NC	30
5943944	Ethylbenzene	2019/01/24	98	70 - 130	101	70 - 130	<0.20	ug/L	4.0	30
5943944	Ethylene Dibromide	2019/01/24	89	70 - 130	86	70 - 130	<0.20	ug/L	NC	30

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Maxxam Job #: B920663
Report Date: 2019/01/28

QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-00250806-A
Site Location: HAZELDEAN RD
Sampler Initials: MAD

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5943944	F1 (C6-C10) - BTEX	2019/01/24					<25	ug/L		
5943944	F1 (C6-C10)	2019/01/24	96	60 - 140	100	60 - 140	<25	ug/L	5.2	30
5943944	Hexane	2019/01/24	91	70 - 130	100	70 - 130	<1.0	ug/L	NC	30
5943944	Methyl Ethyl Ketone (2-Butanone)	2019/01/24	95	60 - 140	99	60 - 140	<10	ug/L	6.0	30
5943944	Methyl Isobutyl Ketone	2019/01/24	90	70 - 130	88	70 - 130	<5.0	ug/L	NC	30
5943944	Methyl t-butyl ether (MTBE)	2019/01/24	95	70 - 130	97	70 - 130	<0.50	ug/L	NC	30
5943944	Methylene Chloride(Dichloromethane)	2019/01/24	96	70 - 130	97	70 - 130	<2.0	ug/L	NC	30
5943944	o-Xylene	2019/01/24	97	70 - 130	101	70 - 130	<0.20	ug/L	11	30
5943944	p+m-Xylene	2019/01/24	91	70 - 130	96	70 - 130	<0.20	ug/L	3.7	30
5943944	Styrene	2019/01/24	91	70 - 130	95	70 - 130	<0.50	ug/L	NC	30
5943944	Tetrachloroethylene	2019/01/24	87	70 - 130	92	70 - 130	<0.20	ug/L	NC	30
5943944	Toluene	2019/01/24	92	70 - 130	96	70 - 130	<0.20	ug/L	2.5	30
5943944	Total Xylenes	2019/01/24					<0.20	ug/L	3.6	30
5943944	trans-1,2-Dichloroethylene	2019/01/24	87	70 - 130	94	70 - 130	<0.50	ug/L	NC	30
5943944	trans-1,3-Dichloropropene	2019/01/24	79	70 - 130	88	70 - 130	<0.40	ug/L	NC	30
5943944	Trichloroethylene	2019/01/24	95	70 - 130	102	70 - 130	<0.20	ug/L	NC	30
5943944	Trichlorofluoromethane (FREON 11)	2019/01/24	105	70 - 130	113	70 - 130	<0.50	ug/L	NC	30
5943944	Vinyl Chloride	2019/01/24	95	70 - 130	107	70 - 130	<0.20	ug/L	NC	30
5945794	Dissolved Antimony (Sb)	2019/01/25	103	80 - 120	98	80 - 120	<0.50	ug/L	NC	20
5945794	Dissolved Arsenic (As)	2019/01/25	101	80 - 120	98	80 - 120	<1.0	ug/L	5.8	20
5945794	Dissolved Barium (Ba)	2019/01/25	96	80 - 120	98	80 - 120	<2.0	ug/L	2.4	20
5945794	Dissolved Beryllium (Be)	2019/01/25	98	80 - 120	100	80 - 120	<0.50	ug/L	NC	20
5945794	Dissolved Boron (B)	2019/01/25	98	80 - 120	99	80 - 120	<10	ug/L	2.7	20
5945794	Dissolved Cadmium (Cd)	2019/01/25	100	80 - 120	96	80 - 120	<0.10	ug/L	NC	20
5945794	Dissolved Chromium (Cr)	2019/01/25	94	80 - 120	97	80 - 120	<5.0	ug/L	NC	20
5945794	Dissolved Cobalt (Co)	2019/01/25	96	80 - 120	98	80 - 120	<0.50	ug/L	2.1	20
5945794	Dissolved Copper (Cu)	2019/01/25	99	80 - 120	98	80 - 120	<1.0	ug/L	0.97	20
5945794	Dissolved Lead (Pb)	2019/01/25	94	80 - 120	96	80 - 120	<0.50	ug/L	1.2	20
5945794	Dissolved Molybdenum (Mo)	2019/01/25	105	80 - 120	101	80 - 120	<0.50	ug/L	2.3	20
5945794	Dissolved Nickel (Ni)	2019/01/25	92	80 - 120	96	80 - 120	<1.0	ug/L	2.6	20
5945794	Dissolved Selenium (Se)	2019/01/25	101	80 - 120	100	80 - 120	<2.0	ug/L	NC	20
5945794	Dissolved Silver (Ag)	2019/01/25	99	80 - 120	97	80 - 120	<0.10	ug/L	NC	20

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Maxxam Job #: B920663
Report Date: 2019/01/28

QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-00250806-A
Site Location: HAZELDEAN RD
Sampler Initials: MAD

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5945794	Dissolved Thallium (Tl)	2019/01/25	94	80 - 120	97	80 - 120	<0.050	ug/L	1.8	20
5945794	Dissolved Uranium (U)	2019/01/25	92	80 - 120	96	80 - 120	<0.10	ug/L	1.3	20
5945794	Dissolved Vanadium (V)	2019/01/25	93	80 - 120	95	80 - 120	<0.50	ug/L	NC	20
5945794	Dissolved Zinc (Zn)	2019/01/25	97	80 - 120	98	80 - 120	<5.0	ug/L	1.2	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).

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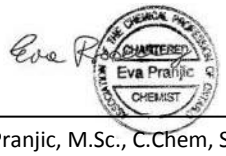
Maxxam Job #: B920663
Report Date: 2019/01/28

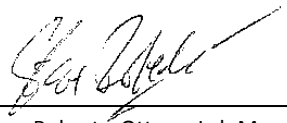
exp Services Inc
Client Project #: OTT-00250806-A
Site Location: HAZELDEAN RD
Sampler Initials: MAD

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

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

CHAIN OF CUSTODY RECORD 117526 Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: Exp Services Inc.	Company Name:	Quotation #: Stream 3	☐ Regular TAT (5-7 days) Most analyses
Contact Name: Mark Devlin/Mark McCalla	Contact Name:	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 100-2650 Queensview Dr. Ottawa, ON	Address:	Project #: OTT-00250806-A	Rush TAT (Surcharges will be applied)
Phone: (613) 688-1899 Fax:	Phone: Fax:	Site Location: Hazeldean Rd.	☐ 1 Day ☒ 2 Days ☐ 3-4 Days
Email:	Email:	Site #:	Date Required:
		Sampled By: MAD	Rush Confirmation #:

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

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

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

Include Criteria on Certificate of Analysis: Y / N

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

LABORATORY USE ONLY
CUSTODY SEAL Y / N (Present, Intact)
COOLER TEMPERATURES: 1, -1, / °C
COOLING MEDIA PRESENT: Y / N

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE Metals / Hg / CrVI)	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	HOLD- DO NOT ANALYZE	COMMENTS
1	BH2	2019/01/23	12:00	GW	6	Y	X	X	X		X			
2	BH3	2019/01/23	12:00	GW	6	Y	X	X	X		X			
3														
4														
5														
6														
7														
8														on snow pack
9														
10														

24-Jan-19 08:55
lisha Williamson
B920663
OTT-001

RECEIVED IN OTTAWA

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mark Devlin	2019/01/24	8:46 am	J. Urban / J. Urban	19/01/24	8:55	
Mark Devlin						

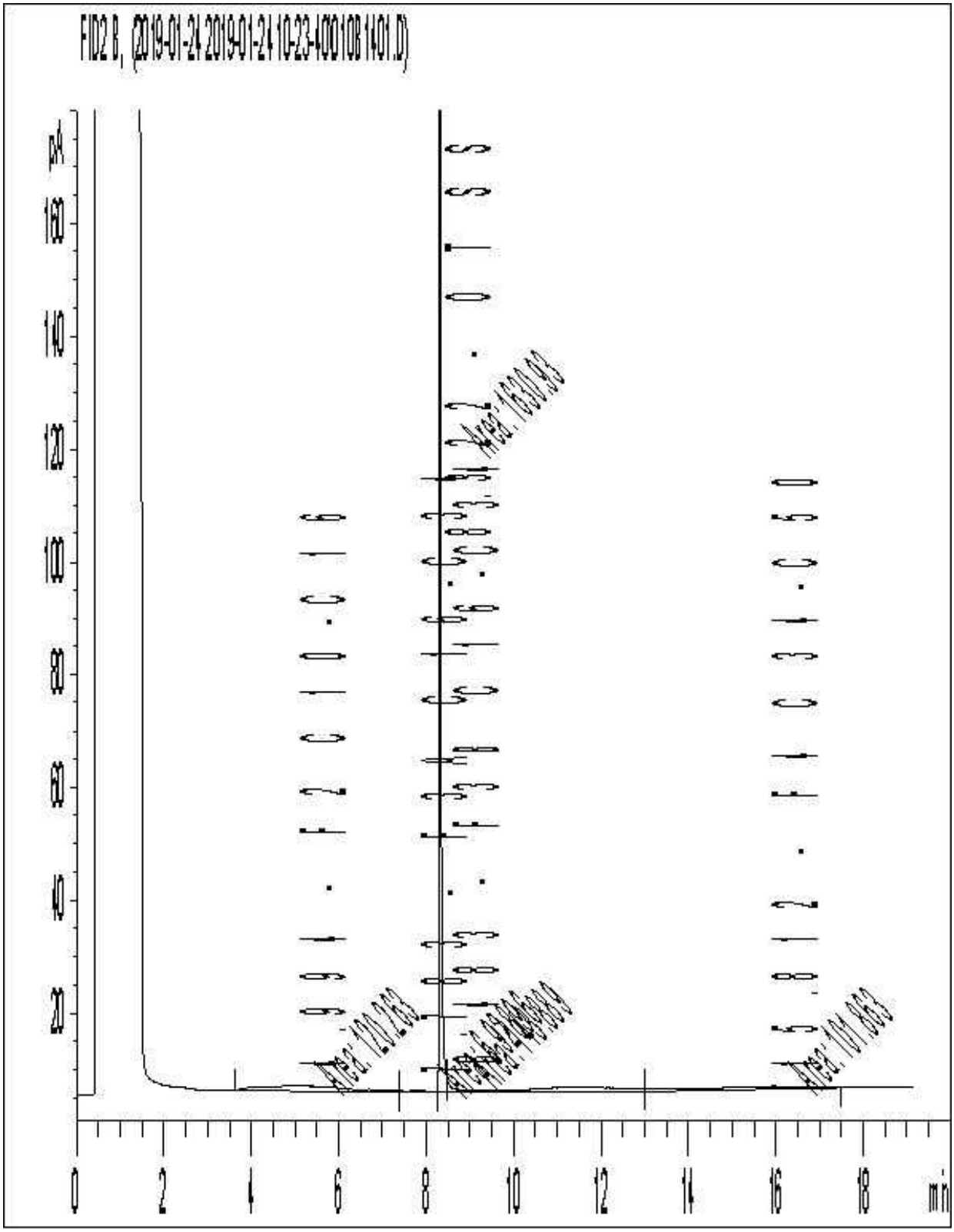
Unless otherwise agreed to in writing, work submitted on this Chain of Custody is subject to Maxxam's standard Terms and Conditions. Signing of this Chain of Custody document is acknowledgment and acceptance of our terms which are available for viewing at www.maxxam.ca/terms. Sample container, preservation,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

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

Maxxam Job #: B920663
Report Date: 2019/01/28
Maxxam Sample: IVG296

exp Services Inc
Client Project #: OTT-00250806-A
Project name: HAZELDEAN RD
Client ID: BH2

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

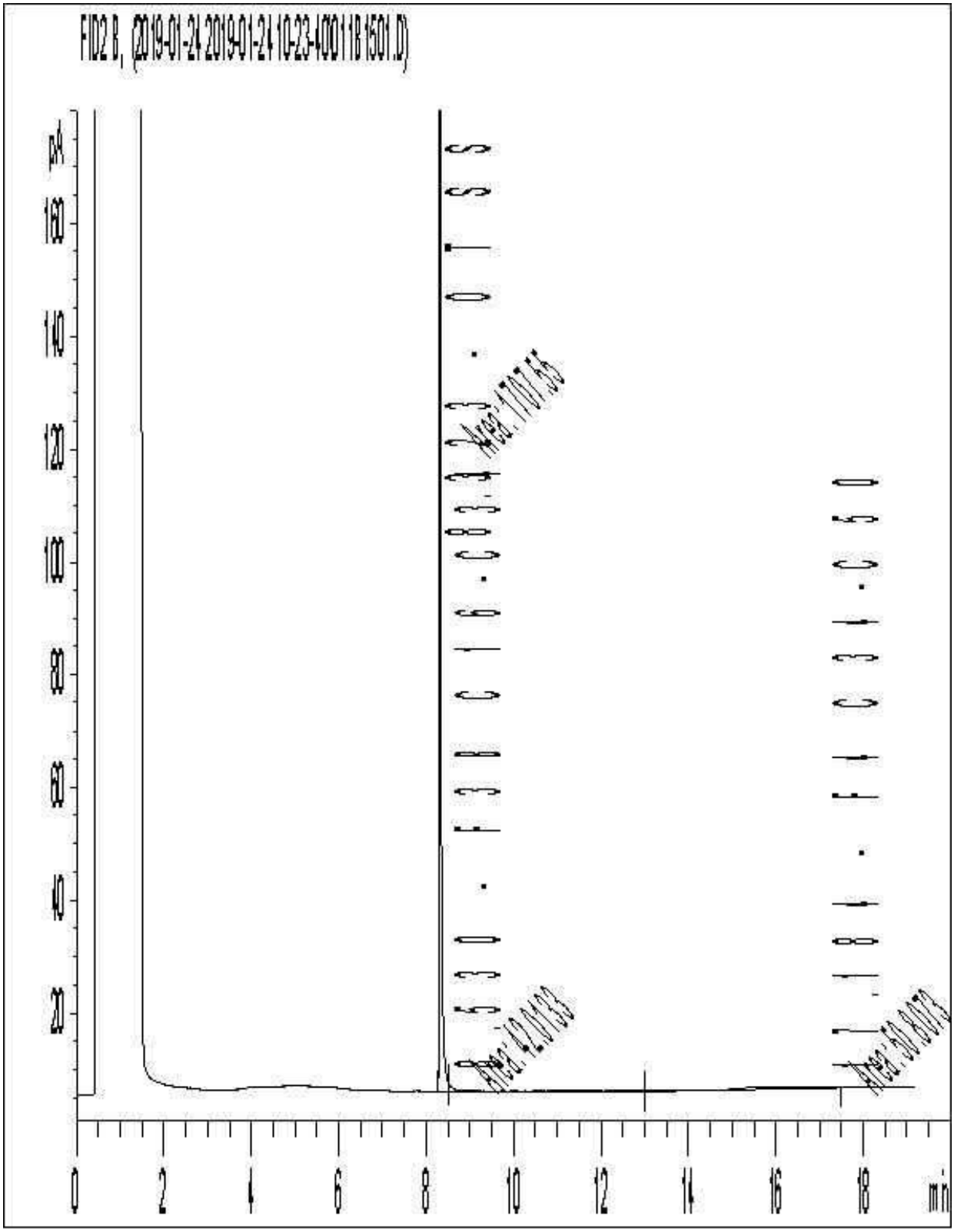


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B920663
Report Date: 2019/01/28
Maxxam Sample: IVG297

exp Services Inc
Client Project #: OTT-00250806-A
Project name: HAZELDEAN RD
Client ID: BH3

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

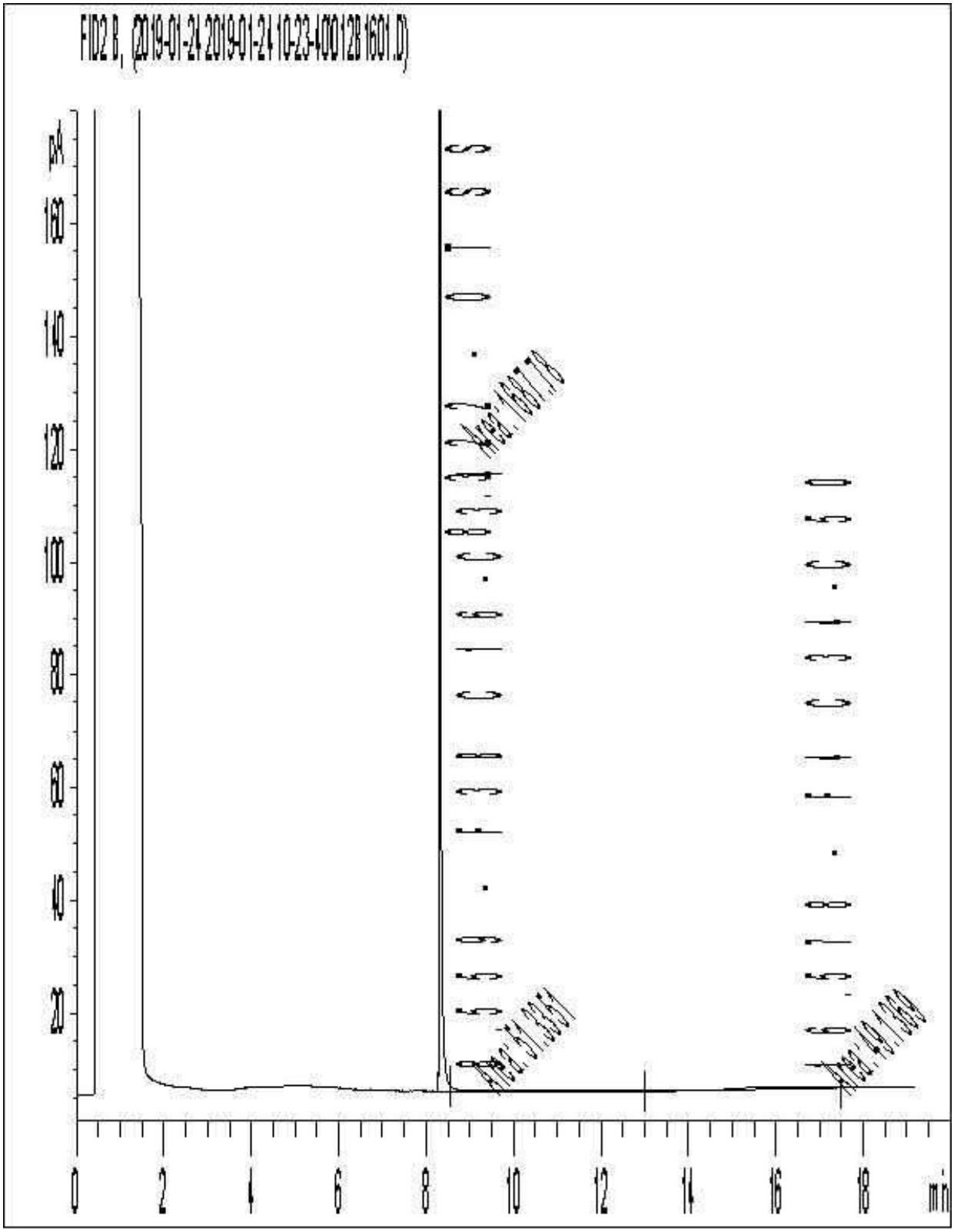


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B920663
Report Date: 2019/01/28
Maxxam Sample: IVG297 Lab-Dup

exp Services Inc
Client Project #: OTT-00250806-A
Project name: HAZELDEAN RD
Client ID: BH3

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.

Your Project #: OTT-00250806
Site Location: HAZELDEAN
Your C.O.C. #: 117538

Attention: Mark Devlin

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

Report Date: 2019/02/07
Report #: R5586146
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B932122
Received: 2019/02/06, 09:55

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Petroleum Hydro. CCME F1 & BTEX in Water	1	N/A	2019/02/07	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Water (1)	1	2019/02/06	2019/02/06	OTT SOP-00001	CCME Hydrocarbons

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) 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-00250806
Site Location: HAZELDEAN
Your C.O.C. #: 117538

Attention: Mark Devlin

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

Report Date: 2019/02/07
Report #: R5586146
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B932122
Received: 2019/02/06, 09:55

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
==========
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Maxxam Job #: B932122
Report Date: 2019/02/07

exp Services Inc
Client Project #: OTT-00250806
Site Location: HAZELDEAN
Sampler Initials: MAD

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		IXQ299	IXQ299		
Sampling Date		2019/02/06 09:00	2019/02/06 09:00		
COC Number		117538	117538		
	UNITS	**BH2**	**BH2 Lab-Dup**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons					
Benzene	ug/L	0.29	0.29	0.20	5962458
Toluene	ug/L	1.1	1.1	0.20	5962458
Ethylbenzene	ug/L	<0.20	<0.20	0.20	5962458
o-Xylene	ug/L	<0.20	<0.20	0.20	5962458
p+m-Xylene	ug/L	<0.40	<0.40	0.40	5962458
Total Xylenes	ug/L	<0.40	<0.40	0.40	5962458
F1 (C6-C10)	ug/L	<25	<25	25	5962458
F1 (C6-C10) - BTEX	ug/L	<25	<25	25	5962458
F2-F4 Hydrocarbons					
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	100	5962390
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	200	5962390
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	200	5962390
Reached Baseline at C50	ug/L	Yes	Yes		5962390
Surrogate Recovery (%)					
1,4-Difluorobenzene	%	101	100		5962458
4-Bromofluorobenzene	%	98	99		5962458
D10-Ethylbenzene	%	106	106		5962458
D4-1,2-Dichloroethane	%	95	95		5962458
o-Terphenyl	%	116	118		5962390

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

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Maxxam Job #: B932122
Report Date: 2019/02/07

exp Services Inc
Client Project #: OTT-00250806
Site Location: HAZELDEAN
Sampler Initials: MAD

TEST SUMMARY

Maxxam ID: IXQ299
Sample ID: BH2
Matrix: Water

Collected: 2019/02/06
Shipped:
Received: 2019/02/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	5962458	N/A	2019/02/07	Fatemeh Habibagahi
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5962390	2019/02/06	2019/02/06	Mariana Vascan

Maxxam ID: IXQ299 Dup
Sample ID: BH2
Matrix: Water

Collected: 2019/02/06
Shipped:
Received: 2019/02/06

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	5962458	N/A	2019/02/07	Fatemeh Habibagahi
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5962390	2019/02/06	2019/02/06	Mariana Vascan

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Maxxam Job #: B932122
Report Date: 2019/02/07

exp Services Inc
Client Project #: OTT-00250806
Site Location: HAZELDEAN
Sampler Initials: MAD

GENERAL COMMENTS

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

Package 1	0.7°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 #: B932122
Report Date: 2019/02/07

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-00250806
Site Location: HAZELDEAN
Sampler Initials: MAD

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5962390	o-Terphenyl	2019/02/06	119	30 - 130	122	30 - 130	118	%		
5962458	1,4-Difluorobenzene	2019/02/06	98	70 - 130	102	70 - 130	103	%		
5962458	4-Bromofluorobenzene	2019/02/06	99	70 - 130	99	70 - 130	96	%		
5962458	D10-Ethylbenzene	2019/02/06	101	70 - 130	105	70 - 130	103	%		
5962458	D4-1,2-Dichloroethane	2019/02/06	96	70 - 130	92	70 - 130	94	%		
5962390	F2 (C10-C16 Hydrocarbons)	2019/02/06	98	50 - 130	99	80 - 120	<100	ug/L	NC	50
5962390	F3 (C16-C34 Hydrocarbons)	2019/02/06	98	50 - 130	99	80 - 120	<200	ug/L	NC	50
5962390	F4 (C34-C50 Hydrocarbons)	2019/02/06	98	50 - 130	99	80 - 120	<200	ug/L	NC	50
5962458	Benzene	2019/02/07	96	70 - 130	92	70 - 130	<0.20	ug/L	2.1	40
5962458	Ethylbenzene	2019/02/07	90	70 - 130	91	70 - 130	<0.20	ug/L	NC	40
5962458	F1 (C6-C10) - BTEX	2019/02/07					<25	ug/L	NC	40
5962458	F1 (C6-C10)	2019/02/07	82	70 - 130	103	70 - 130	<25	ug/L	NC	40
5962458	o-Xylene	2019/02/07	89	70 - 130	88	70 - 130	<0.20	ug/L	NC	40
5962458	p+m-Xylene	2019/02/07	89	70 - 130	89	70 - 130	<0.40	ug/L	NC	40
5962458	Toluene	2019/02/07	90	70 - 130	97	70 - 130	<0.20	ug/L	0.44	40
5962458	Total Xylenes	2019/02/07					<0.40	ug/L	NC	40

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

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

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

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

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

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

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 #: B932122
Report Date: 2019/02/07

exp Services Inc
Client Project #: OTT-00250806
Site Location: HAZELDEAN
Sampler Initials: MAD

VALIDATION SIGNATURE PAGE

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

Liliana Gaburici, VOC Lab

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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CAM FCD-01191/3

CHAIN OF CUSTODY RECORD 117538 Page 1 of 1

Invoice Information	Report Information (if differs from invoice)	Project Information (where applicable)	Turnaround Time (TAT) Required
Company Name: EXP Services Inc.	Company Name: EXP	Quotation #: Stream 3	☐ Regular TAT (5-7 days) Most analyses
Contact Name: Mark Devlin / Mark McCulla	Contact Name: Same	P.O. #/ AFE#:	PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address: 100-2650 Queensview Dr. Ottawa	Address:	Project #: OTT-00230806	Rush TAT (Surcharges will be applied)
Phone: 613 688 1899 Fax:	Phone: Fax:	Site Location: Hazeldean	☒ 1 Day ☐ 2 Days ☐ 3-4 Days
Email:	Email:	Site #:	Date Required:
		Sampled By: MAD	Rush Confirmation #:

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

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

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

Include Criteria on Certificate of Analysis: Y / N

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

LABORATORY USE ONLY
CUSTODY SEAL: Present (Y) N / Intact (Y) N
COOLER TEMPERATURES: X / X / 1.0, 1
COOLING MEDIA PRESENT: (Y) / N

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)	HOLD- DO NOT ANALYZE	COMMENTS
1	BH2	2019/02/06	9:00am	GW	4		X	X						
2														
3														
4														
5														
6														
7														
8														
9														
10														

06-Feb-19 09:55
Alisha Williamson
B932122
KIY OTT-001

RECEIVED IN OTTAWA
on ice

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mark Devlin	2019/02/06	9:52am	Serge Legar	2019/02/06	9:55	
Mark Devlin						

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

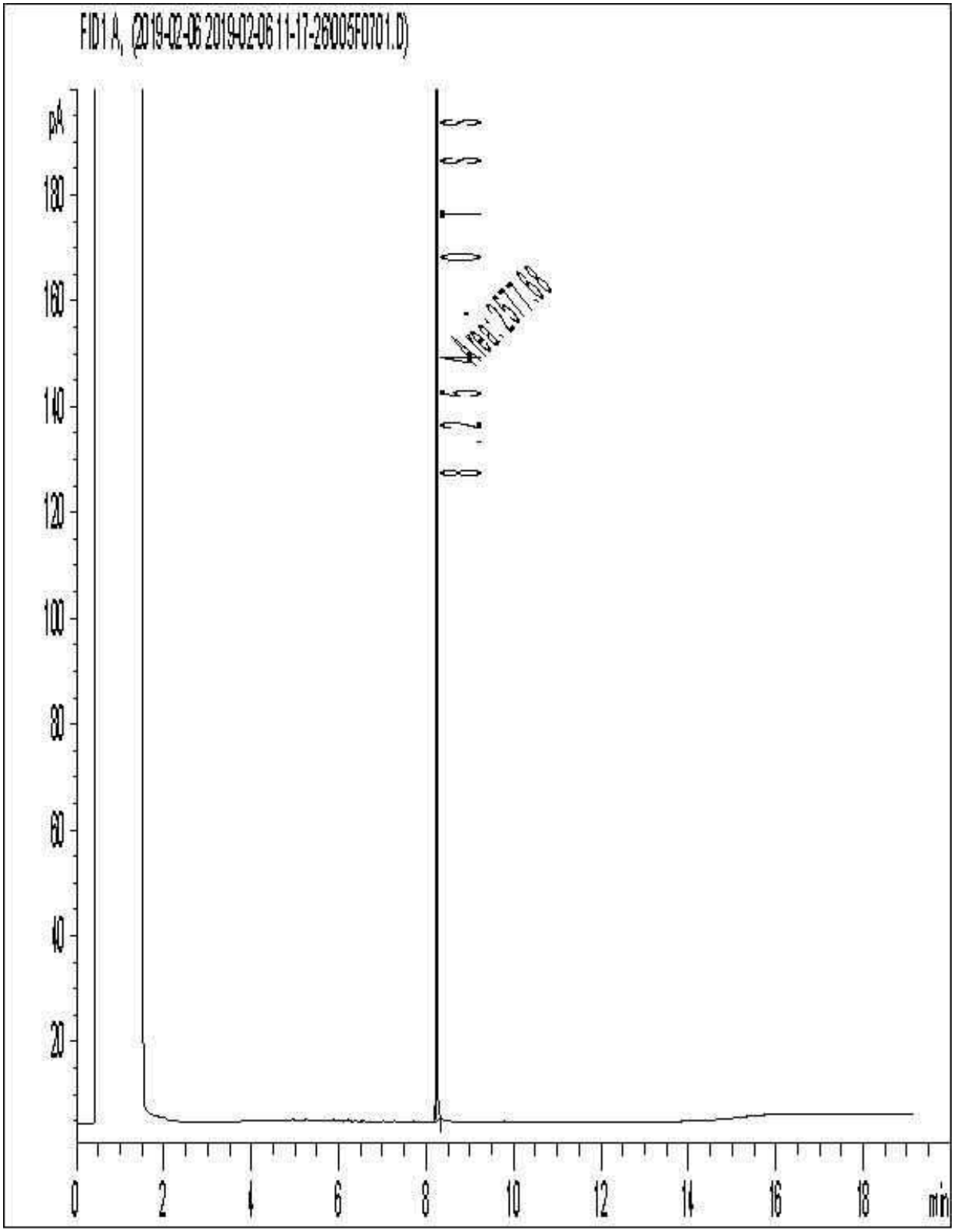
COC-1004 (03/17)

White: Maxxam ~ Yellow: Client

Maxxam Job #: B932122
Report Date: 2019/02/07
Maxxam Sample: IXQ299

exp Services Inc
Client Project #: OTT-00250806
Project name: HAZELDEAN
Client ID: BH2

Petroleum Hydrocarbons F2-F4 in Water Chromatogram

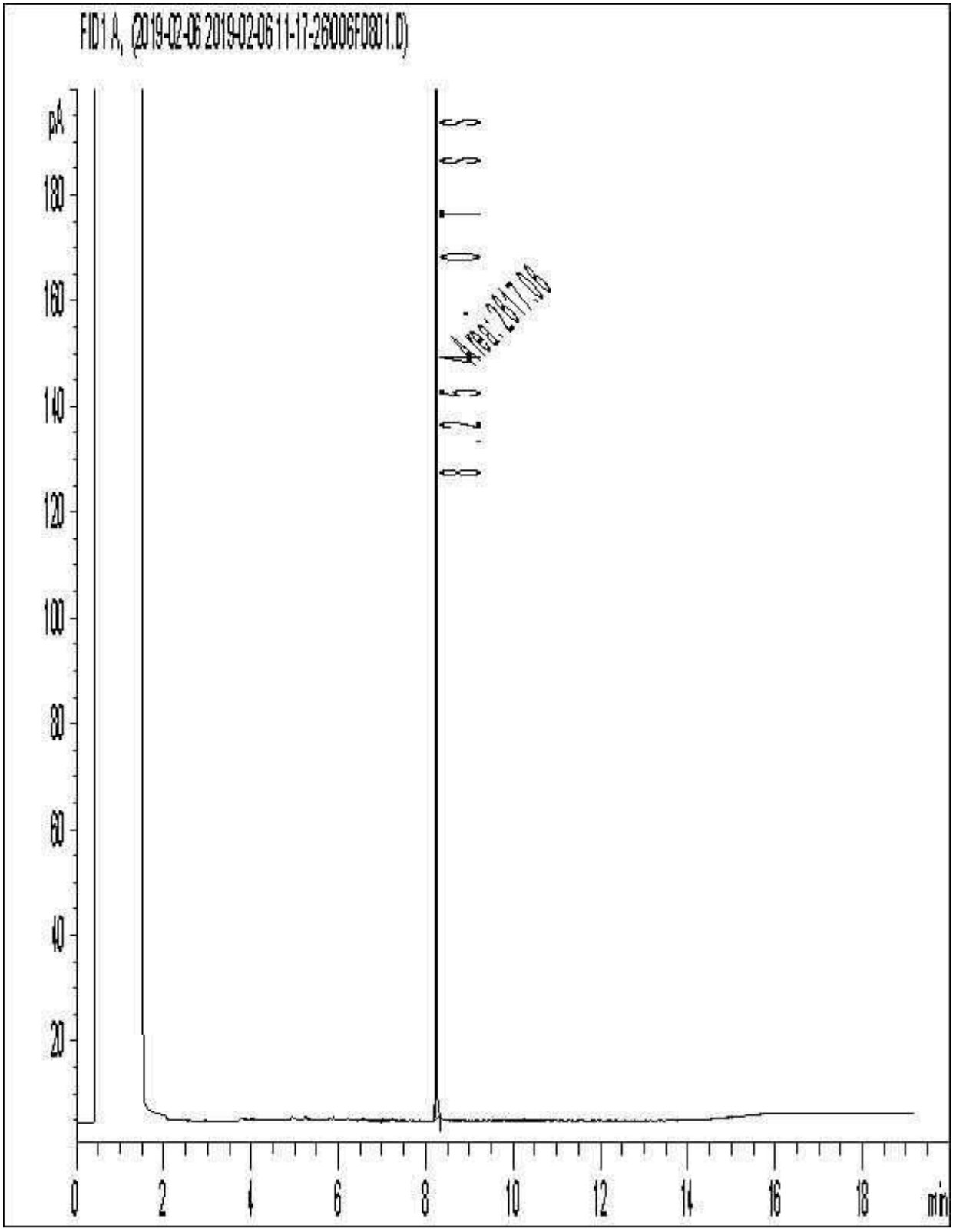


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B932122
Report Date: 2019/02/07
Maxxam Sample: IXQ299 Lab-Dup

exp Services Inc
Client Project #: OTT-00250806
Project name: HAZELDEAN
Client ID: BH2

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.