Phase Two Environmental Site Assessment

6171 Hazeldean Road, Ottawa, Ontario

Type of Document:
Final

Client:
11654128 Canada Inc.
100-768 St, Joseph Boulevard
Gatineau, Quebec J8Y 4B8

Project Number:
OTT-00258780-C0

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Date Submitted:
July 24, 2020

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The Qualified Person can confirm that the Phase Two Environmental Site Assessment was conducted per the requirements of Ontario Regulation 153/04, as amended, and in accordance with generally accepted professional practices.

Date Submitted:
July 24, 2020

Legal Notification

This report was prepared by EXP Services Inc. for the account of **11654128 Canada Inc.**

Any use which a third party makes of this report, or any reliance on or decisions to be made based on it, are the responsibility of such third parties unless a reliance letter has been addressed to, or otherwise provides reliance to, such third party. EXP Services Inc. accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this project.

Executive Summary

EXP Services Inc. (EXP) was retained by 11654128 Canada Inc. to conduct a Phase Two Environmental Site Assessment (ESA) of the property located at 6171 Hazeldean Road in Ottawa (Stittsville), Ontario hereinafter referred to as the "Phase Two property". The objective of the Phase Two ESA was to address areas of potential environmental concern (APECs) identified in a Phase One ESA conducted at the Phase Two property by EXP.

The Phase Two property is currently vacant and has not been used for any purpose defined by Ontario Regulation 153/04. EXP understands that the proposed future property use is residential.

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.

The findings of the Phase One ESA were presented in a report entitled *Phase One Environmental Site Assessment, 6171 Hazeldean Road, Ottawa, Ontario,* EXP Services Inc., dated April 7, 2020. The Phase One ESA identified the following Potentially Contaminating Activities (PCA) and Area of Potential Environmental Concern (APEC):

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA) as per O. Reg 153/04	Location of PCA (On-Site or Off-Site)	Potential Contaminants of Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
APEC 1 – Fill material for site is from unknown source	Entire property	PCA#30 – Importation of Fill Material of Unknown Quality	On-site	Benzene, toluene, ethylbenzene, xylene (BTEX), petroleum hydrocarbons (PHC), and/or metals	Soil

The Phase Two ESA consisted of advancing a total of six boreholes and 16 test pits at the Phase Two property. Soil samples were collected and submitted for laboratory analysis of PHC, BTEX, and metals.

For assessment purposes, EXP selected the 2011 Table 3 Site Condition Standards (SCS) in a non-potable groundwater condition for residential/parkland/institutional property use and coarse textured soil. The results were also compared to Table 1 full depth background SCS. Based on the Phase Two ESA results, the following summary is provided:

- The investigation revealed that the subsurface conditions is comprised of a surficial layer of topsoil or granular fill overlying heterogenous fill material, which is underlain by glacial till or by bedrock. On the south side of the property, near Hazeldean Road, peat was encountered in the boreholes and test pits. The peat and marl layer were encountered at depths between 0.75 to 3.1 mbgs.
- Bedrock, or refusal at probable bedrock, was encountered in all of the boreholes and test pits. Depth to bedrock varied across the property between 0.6 mbgs to 6.2 mbgs. BH-1 to BH-3 were advanced into the bedrock for characterization, all other boreholes and all test pits were terminated at bedrock. Bedrock consisted of dark grey limestone with shale laminations.

- Groundwater measurements taken on May 14, 2020 and July 2, 2020 in monitoring wells installed in three of the boreholes indicate that the groundwater table to be at a depth of 1.2 to 2.6 m in May and 2.02 m to 2.75 m below grade in July. Groundwater flow is interpreted to be towards the northeast. The groundwater table is subject to seasonal fluctuation and may be at higher depths during wet weather conditions.
- Ten soil samples were submitted for laboratory analysis of BTEX and PHC. Twelve soil samples were submitted for metals and inorganics.
- For assessment purposes, EXP selected the 2011 Table 1 (Ontario Background) and Table 3 SCS in a non-potable groundwater condition for residential/parkland/institutional property use and coarse textured soil.
- All of the soil samples were within the MECP (Ministry of the Environment, Conservation and Parks) Table 3 SCS for all parameters that were analysed. All but one soil sample met the criteria for MECP Table 1 SCS.
- Based on the results of the Phase Two ESA, the site meets the SCS for the intended residential land use.
- Soil samples were submitted for laboratory analysis of BTEX, PHC, and metals. All of the soil samples were within the MECP Table 3 SCS for all parameters that were analysed. All but one soil sample met the criteria for MECP Table 1 SCS.
- Based on the results of the Phase Two ESA, the site meets the SCS for the intended residential land use.

The Qualified Person has confirmed that the Phase Two Environmental Site Assessment was conducted per the requirements of Ontario Regulation 153/04, as amended, and in accordance with generally accepted professional practices.

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1 Introduction

EXP Services Inc. (EXP) was retained by 11654128 Canada Inc. to conduct a Phase Two Environmental Site Assessment (ESA) of the property located at 6171 Hazeldean Road in Ottawa (Stittsville), Ontario hereinafter referred to as the "Phase Two property". The objective of the Phase Two ESA was to address areas of potential environmental concern (APECs) identified in a Phase One ESA that was conducted by EXP.

The Phase Two property is currently vacant and has not been used for any purpose as defined by Ontario Regulation 153/04. EXP understands that the proposed future property use is residential.

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 located on the north side of Hazeldean Road, 160 m east of Carp Road, at 6171 Hazeldean Road in Ottawa, Ontario. The Phase Two property is rectangular in shape and has an area of approximately 9.0 hectares. The property is currently vacant. A Site Location Plan is provided as Figure 1 in Appendix A.

The Phase Two property is in an arterial main street zoned area. The property is legally described as PART OF LOT 23 CONCESSION 12, GOULBOURN, PARTS 2, 4 AND 6 PLAN 4R23045 CITY OF OTTAWA and property identification number (PIN) 044871709.

The surrounding area of the Phase Two property was observed to be residential and vacant properties to the north, and residential and commercial properties to the east, south, and west. No environmentally sensitive activities or infrastructures that could present any environmental concerns to the Phase Two property were observed on the adjacent properties based on observations made from the boundaries of the Phase Two property.

1.2 Property Ownership

The Phase Two property is currently owned by Kavanagh Family Investments Limited. Authorization to proceed with this investigation was provided by Carmine Zayoun. Contact information for Mr. Zayoun is 100-768 St. Joseph Boulevard Gatineau, Quebec J8Y 4B8.

1.3 Current and Proposed Future Uses

At the time of the investigation, the Phase Two property was not used for any purpose defined by Ontario Regulation 153/04. The proposed future use for the Phase Two property is residential.

1.4 Applicable Site Condition Standards

Analytical results obtained for soil and groundwater samples were compared to Site Condition Standards (SCS) established under subsection 169.4(1) of the Environmental Protection Act, and presented in the document entitled *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, (MOE, 2011). This document provides 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. 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).

Table 1 to 9 SCS are summarized as follows:

- Table 1 – applicable to sites where background concentrations must be met (full depth), such as sensitive sites where site-specific criteria have not been derived
- Table 2 – applicable to sites with potable groundwater and full depth restoration
- Table 3 – applicable to sites with non-potable groundwater and full depth restoration
- Table 4 – applicable to sites with potable groundwater and stratified restoration
- Table 5 – applicable to sites with non-potable groundwater and stratified restoration
- Table 6 – applicable to sites with potable groundwater and shallow soils (bedrock encountered at depths of 2 metres or less across one-third or more of the site)
- Table 7 – applicable to sites with non-potable groundwater and shallow soils (bedrock encountered at depths of 2 metres or less across one-third or more of the site)
- Table 8 – applicable to sites with potable groundwater and that are within 30 m of a water body
- Table 9 – applicable to sites with non-potable groundwater and that are within 30 m of a water body

Application of the generic or background SCS to a specific site is based on a consideration of site conditions related to soil pH, thickness and extent of overburden material, and proximity to an area of environmental sensitivity or of natural significance. For some chemical parameters, 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 2011 Table 3 SCS in a non-potable groundwater condition for residential/parkland/institutional property use and coarse textured soil. The selection of this category was based on the following factors:

- Both medium and fine textured and coarse textured soils were identified during the current investigation, coarse texture was selected as the more conservative criteria;
- Bedrock is more than 2 metres below grade for greater than 2/3 of the subject property;
- There are no surface water bodies within 30 metres of the subject property;
- 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, as confirmed during the current investigation;
- The Phase Two property is not located within an area of natural significance, does not include nor is adjacent to an area of natural significance, and does not include land that is within 30 metres of an area of natural significance;
- Properties surrounding the subject property are supplied with potable water from the City of Ottawa through its water distribution system;
- The Phase Two property is not located in an area designated in a municipal official plan as a well-head protection area;
- The Phase Two property is planned for residential use; and
- It is the opinion of the Qualified Person who oversaw this work that the Phase Two property is not a sensitive site.

For reference, the analytical results were also compared to Table 1 full depth background SCS.

2 Background Information

2.1 Physical Setting

The Phase One property is located on the north side of Hazeldean Road, 160 m east of Carp Road, at 6171 Hazeldean Road in Ottawa, Ontario. The site has a total area of 9.0 hectares and is approximately rectangular in shape. The site is zoned AM9, arterial main street zoning.

The Phase Two property is located in a residential area. Potable water is available from the City of Ottawa.

Topographically, the Phase Two property is relatively flat, regionally topography slopes to the northeast. Given the topography at the site, groundwater is inferred to flow north to the northeast towards Feedmill Creek, which is approximately 200 m north 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. In addition, 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 not a shallow soil property as defined in Section 43.1 of the regulation. It does not 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.

A review of geological maps revealed that, under any fill, the natural overburden deposits in the area is glacial till that would consist of clay, silt, sand, and gravel. Bedrock geology maps indicated limestone of the Bobcaygeon Formation. Based on well records, bedrock is expected approximately 0.5 to 4.5 mbgs.

2.2 Past Investigations

The findings of the Phase One ESA were presented in a report entitled *Phase One Environmental Site Assessment, 6171 Hazeldean Road, Ottawa, Ontario,* EXP Services Inc., dated April 7, 2020. The Phase One ESA identified the following Potentially Contaminating Activities (PCA) and Areas of Potential Environmental Concern (APEC):

Table 2.1 - Areas of Potential Environmental Concern and Potentially Contaminating Activity

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA) as per O. Reg 153/04	Location of PCA (On-Site or Off-Site)	Potential Contaminants of Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
APEC 1 – Fill material for site is from unknown source	Entire property	PCA#30 – Importation of Fill Material of Unknown Quality	On-site	Benzene, toluene, ethylbenzene, xylene (BTEX), petroleum hydrocarbons (PHC), and/or metals	Soil

Other findings of the Phase One ESA are included in Section 3.4 of this report.

The Phase One ESA was conducted per the requirements of Ontario Regulation 153/04, as amended, and in accordance with generally accepted professional practices. A copy of the Phase One conceptual site model is provided as Figure 3 in Appendix A.

3 Scope of the Investigation

3.1 Overview of Site Investigation

The purpose of the Phase Two ESA was to investigate the soil quality at the Phase Two property and to obtain soil data to further characterize conditions in the soil related to the PCA described above and within the APEC shown on Figure 2 in Appendix A.

The property is currently vacant, and not used for any purpose defined by Ontario Regulation 153/04. EXP understands that the property has always been vacant and that the proposed future property use is residential.

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 Two 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 six boreholes and complete three of them as piezometers;
- Excavate a total of 16 test pits;
- Collect representative soil samples for chemical analysis of PHC, BTEX, and metals;
- Measure groundwater levels in the piezometers;
- Complete a survey of the piezometer 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.

Gary Cui, E.I.T. conducted the field assessment work and Leah Wells, B.A.Sc., E.I.T. was the report author for this project. Both were supervised by Chris Kimmerly, M.Sc., P. Geo. Mr. Kimmerly is a Qualified Person, as defined by Ontario Regulation 153/04.

3.3 Media Investigated

The Phase Two ESA included the investigation of soil on the Phase Two property. Based on the nature of the APEC identified in the Phase One, groundwater was not investigated. As there are no water bodies on the Phase Two property, no surface water or sediment sampling was required.

The contaminants of potential concern (COPC) identified in the Phase One ESA were identified as target parameters for this Phase Two ESA. The APEC and COPC identified in the Phase One ESA are outlined in Section 2.2.

3.4 Conceptual Site Model

The Phase Two property is located at 6171 Hazeldean Road in Ottawa, Ontario, as shown on Figure 1 in Appendix A. At the time of the investigation the Phase Two property was vacant, the proposed future property use is residential. The surrounding properties are used for residential and commercial purposes. The Phase Two property has an area of approximately 9.0 hectares. A site plan is presented as Figure 2 in Appendix A.

The Phase One ESA conducted by EXP identified the following on-site PCA. No off-site PCA were identified.

- PCA #30 – Importation of Fill of Unknown Quality

The location of the APEC that may be affected by the PCA are shown on Figure 2 in Appendix A.

3.5 Deviations from Sampling and Analysis Plan

The field investigative and sampling program was carried out following the requirements of the Phase Two property, as described in Section 4. No significant deviations from the sampling and analysis plan (SAAP), as provided in Appendix C, were reported that affected the sampling and data quality objectives for the Phase Two property.

The samples were logged and screened in the field for indications of impact based on visual, olfactory observations and combustible gas measurements however only the first six test pits were field screened with a combustible gas monitor, as the weather prohibited screening of the remainder of the samples. The field screening measurements, in parts per million by volume (ppmv), are presented in the borehole logs provided in Appendix D.

3.6 Impediments

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

4 Investigation Method

4.1 General

The Phase Two property investigative activities consisted of the drilling of boreholes and excavating test pits to facilitate the collection of soil samples for chemical analysis and the installation of piezometers for hydrogeological property characterization.

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 March 24, 2020 six boreholes (BH1 to BH6) were advanced at the Phase Two property by George Downing Estate Drilling Ltd. (Downing), a licensed well contractor, under the full-time supervision of EXP staff. A CME 55 track mounted drill rig was used to advance the boreholes. Piezometers were installed in BH-1, BH-3 and BH-5 to facilitate groundwater monitoring. The locations of the boreholes are presented on Figure 3 in Appendix A.

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 D.

4.3 Test Pitting

The site investigative activities consisted of the advancement of 16 test pits to facilitate the collection of soil samples for chemical analysis and to record relevant geotechnical information.

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

On March 17, 2020, 16 test pits (TP-01 to TP-16) were advanced at the Phase Two property by Thomas Cavanagh Construction (Cavanagh), under the full-time supervision of EXP staff. A Caterpillar 320D LLR excavator was used to complete the test pits. Dedicated nitrile gloves (one pair per sample) were used during sample handling. TP-01 and TP-02 did not penetrate the frozen ground and were therefore not recorded as part of the investigation, as the conditions observed at these test pits did not accurately reflect the subsurface conditions of the site.

Soil samples for geologic characterization were collected at regular depth intervals to a maximum of 4.2 m in the overburden materials. EXP staff continuously monitored the excavating activities to log the stratigraphy observed from the pits, to record the depth of the samples, to record total depths of excavation, and to screen the samples by recording visual or olfactory observations of potential impacts and measuring petroleum vapours. Field observations are documented on the test pit logs provided in Appendix B.

The locations of the test pits are shown on Figure 3 in Appendix A.

4.4 Soil Sampling

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

Grab soil samples for geologic characterization were collected on a continuous basis in the overburden materials during test pit excavation. Soil samples were not collected during the borehole drilling program.

Geologic details of the test pits and recovered cores were logged by EXP field staff. EXP staff continuously monitored the drilling and excavation 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/excavation, and to record visual or olfactory observations of potential impacts. Field observations are summarized on the borehole logs provided in Appendix D.

Soil samples identified for possible laboratory analysis were collected from the test pits and placed directly into pre-cleaned, laboratory-supplied glass sample jars/vials. Samples to be analysed for PHC fraction F1 and BTEX were collected using a soil core sampler and placed into vials containing methanol as a preservative. The jars and vials were sealed with Teflon-lined lids to minimize headspace 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, Bureau Veritas Laboratories (BV Labs) of Ottawa, Ontario. The samples were transported/submitted within 24 hours of collection to the laboratory following chain of custody protocols for chemical analysis.

4.5 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 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.

Readings of potential hydrocarbon vapour concentrations in the soil samples collected during the test pitting investigation were recorded using an RKI Eagle 2, where there was sufficient recovery. This instrument is designed to detect and measure concentrations of combustible gas in the atmosphere to within 5 parts per million by volume (ppmv) from 0 ppmv to 200 ppmv, 10 ppmv increments from 200 ppmv to 1,000 ppmv, 50 ppmv increments from 1,000 ppmv to 10,000 ppmv, and 250 ppmv increments above 10,000 ppmv. It is equipped with two ranges of measurement, reading concentrations in ppmv or in percentage lower explosive limit (% LEL). The RKI Eagle 2 instrument can determine combustible vapour concentrations in the range equivalent to 0 to 11,000 ppmv of hexane.

The instrument was configured to eliminate any response from methane for all sampling conducted at the subject property. Instrument calibration is checked on a daily basis in both the ppmv range and % LEL range using standard gases comprised of known concentrations of hexane (400 ppmv, 40% LEL) in air. If the instrument readings are within ±10% of the standard gas value, then the instrument is deemed to be calibrated, however if the readings are greater than ±10% of the standard gas value then the instrument is re-calibrated prior to use.

Only the first six test pits were field screened, as the weather prohibited screening of the remainder of the samples. The field screening measurements, in parts per million by volume (ppmv), are presented in the borehole logs provided in Appendix D.

Soil samples were selected for laboratory analysis based on combustible vapour measurements and visual and olfactory evidence of impacts, where observed. Six fill samples and four native soil samples were submitted for laboratory analysis of PHC and BTEX. Seven fill samples, four native soil samples and on duplicate were submitted for laboratory analysis of metals. All samples were also analysed for pH.

4.6 Groundwater: Piezometer Installation

Piezometers were installed in three of the boreholes. The piezometers were installed in general accordance with the Ontario Water Resources Act - R.R.O. 1990, Regulation 903 (as amended) and were installed by Downing, a licensed well contractor, using a CME 45 track-mounted drill rig.

The piezometers consisted of a 25 mm diameter Schedule 40 PVC screen that was no more than 3.0 m long and a 31 mm diameter Schedule 40 PVC riser pipe that was at least 0.8 m long. The annular space around the wells 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. Details of the monitoring well installations are shown on the borehole logs provided in Appendix D.

4.7 Groundwater: Field Measurement of Water Quality Parameters

On May 14, 2019, the monitoring wells were inspected for general physical condition and groundwater depth. Groundwater elevations were measured again on July 2, 2020

Table 4.1 – Monitoring and Elevation Data

Monitoring Well ID	Ground Elevation (m)	Date of Last Reading	Depth to Water (m)	Elevation of Groundwater (m)
BH-01	117.1	May 14, 2020	1.20	115.94
		July 2, 2020	2.02	115.08
BH-03	120.4	May 14, 2020	1.60	118.77
		July 2, 2020	2.11	118.29
BH-05	116.5	May 14, 2020	2.60	113.90
		July 2, 2020	2.75	113.75
TP -7	117.6	Completion	1.7	115.9
TP-11	119.2	Completion	0.9	118.3
TP-12	119.6	Completion	1.5	118.1
TP-13	119.4	Completion	2.6	116.8
TP-17	120.8	Completion	3.1	117.70

Water levels observations were made in the exploratory boreholes at the times and under the conditions stated in the scope of services. These data were reviewed and EXP's interpretation of them discussed in the text of the report. Note that fluctuations in the level of the groundwater may occur due to seasonal variation such as precipitation, snowmelt, rainfall activities, and other factors not evident at the time of measurement and therefore may be at a higher level during wet weather periods.

Water levels observations were made in the exploratory boreholes at the times and under the conditions stated in the scope of services. These data were reviewed and EXP's interpretation of them discussed in the text of the report. Note that fluctuations in the level of the groundwater may occur due to seasonal variation such as precipitation, snowmelt, rainfall activities, and other factors not evident at the time of measurement and therefore may be at a higher level during wet weather periods

Groundwater flow direction was determined to be to the northeast.

4.8 Groundwater: Sampling

Based on the nature of the APEC identified in the Phase One report, groundwater sampling was not determined to be required at the Phase Two property.

4.9 Sediment: Sampling

As no water body was present at the Phase Two 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 samples was BV Labs. BV Labs 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 Residue Management

The drill cuttings from drilling activities and soil excavated from test pits were disposed of on site. Fluids from cleaning drilling equipment were disposed of by the driller at their facility.

4.12 Elevation Surveying

A geodetic elevation survey was conducted to obtain vertical control of the piezometer locations. The ground surface elevation of each test pit and borehole location was surveyed using a level and Universal Transverse Mercator (UTM) coordinates.

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. 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:

- Collecting and analysing blind duplicate soil samples to ensure analytical precision
- Using dedicated and/or disposable sampling equipment
- Following proper decontamination protocols to minimize cross-contamination
- Maintaining field notes and completing field forms to document field activities
- Using only laboratory-supplied sample containers and following prescribed sample protocols, including using proper preservation techniques, meeting sample hold times, and documenting sample transmission on chains of custody, to ensure the integrity of the samples is maintained

BV Lab'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 and test pits are provided on the borehole and test pit logs in Appendix D. 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 100 mm to 200 mm thick layer of topsoil was encountered at the surface in Borehole Nos. 2, 6 and at Test Pit Nos. 5, 11, 12 and 13.

Heterogeneous fill material was encountered at all borehole and test pit locations and extended to depths ranging between 0.3 m to 2.9 m (Elevations 119.8 m to 114.2 m). The fill extends to the surface of the bedrock/auger refusal depths of 0.3 m 2.3 m (Elevation 117.8 m to 115.7 m) in Borehole Nos. 1, 3 and 4 and in Test Pit Nos. 3 to 5,10, 11, 13 and 14.

Peat/marl complex deposit was encountered underlying the fill material in Borehole Nos. 2, 4 and 5 and in Test Pit Nos. 6 to 9, 12, and 15 at depths ranging from 0.8 m to 2.3 (Elevations 118.8 m to 114.2) and extended to depths ranging from 1.4 m to 3.6 m (Elevations 118.5 m to 113.5 m).

The organic peat in Borehole No. 5 is underlain by a deposit of silty sand with some gravel which extends to 5.3 m depth (Elevation 111.2 m).

The peat/marl in Borehole No. 2 and in Test Pit Nos. 7, 8, 15, fill in Borehole No. 6, Test Pit 16 to 18 and the silty sand in Borehole No. 5 are underlain by glacial till deposit which extends to auger refusal depth, i.e. inferred surface of the bedrock contacted at depths of 1.8 m to 6.2 m (Elevation 118.1 m to 110.3 m). The glacial till is grey and comprised of silty sand with clay and numerous cobbles and boulders.

Refusal to augers or to excavator bucket advancement was encountered in all boreholes/test pits at depths ranging between 0.3 and 6.2 m below the existing ground surface (Elevation 115.3 m to 118.1 m).

Based on the geological profile, a cross-section of the site was prepared, as shown on Figure 5 in Appendix A.

5.2 Groundwater: Elevations

Three piezometers were installed on Phase Two property. The maximum depth of borehole advancement was 7.2 metres below ground surface.

Groundwater elevations and water levels were measured at the Phase Two property on May 14, 2020 and July 2, 2020. These are provided in Table 4.1. Groundwater flow was determined to be to the northeast.

EXP notes that groundwater levels can be influenced by seasonal changes, the presence of subsurface structures, or fill, however based on the presence of Feedmill Creek approximately 200 metres north of the Phase Two property and the lack of utilities on the Phase Two property, it is unlikely that any of these factors will affect the groundwater flow direction at the Phase Two property. Similarly, no buried utilities are present on the Phase Two property; therefore, it is unlikely that the presence of subsurface utilities has affected the direction of groundwater flow.

5.3 Groundwater: Hydraulic Gradients

Horizontal hydraulic gradients were not calculated for the groundwater flow. Groundwater flow direction was determined to be to the northeast.

5.4 Soil Texture

Based on field observations and grain size analysis, the soil texture was determined to be primarily coarse textured, as silty sand and gravel fill is the predominant soil type on site. Grain-size analyses performed on four (4) fill samples (Appendix D). A review of these figures revealed a fill composition of 7 to 51 percent gravel, 39 to 86 percent sand and 7 to 31 percent silt and clay.

5.5 Soil: Field Screening

Field screening involved using the combustible vapour meter to measure vapour concentrations, in ppmv, in the collected soil samples in order to assess the presence of soil gases which would imply potential petroleum hydrocarbon impact. Vapour readings were observed for the first six test pits, after which the weather prohibited vapour readings. The test pit vapour readings ranged from non-detectable to 5 ppmv. No staining or odours were observed in any of the soil samples.

5.6 Soil Quality

In accordance with the scope of work, chemical analyses were performed on selected soil samples recovered from the test pits. The selection of representative “worst case” soil samples from the testpits was based on field visual or olfactory evidence of impacts and/or presence of potential water bearing zones. Copies of the laboratory Certificates of Analysis are provided in Appendix F.

The MECP Table 3 SCS are applicable if soil pH is in the range of 5 to 9 for surficial soil (less than 1.5 m below soil surface) and 5 to 11 for subsurface soil (greater than 1.5 m below soil surface). The Certificates of Analysis include twelve pH measurements. Samples were collected from both depths less than 1.5 mbgs, depths greater than 1.5 mbgs. The pH results for all samples were between 7.12 and 7.80 which is within the acceptable range for the application of MECP Table 3 SCS.

5.6.1 Petroleum Hydrocarbons

Ten soil samples were submitted for chemical analysis of PHC and BTEX. All of the soil samples were within the MECP Table 3 SCS. Nine of the ten soil samples submitted were within the MECP Table 1 SCS.

The PHC and BTEX results are provided in Table 1 in Appendix E and shown on Figures 6 and 6A in Appendix A.

5.6.2 Metals

Twelve soil samples and one field duplicate were submitted for chemical analysis of metals. All of the soil samples were within the MECP Table 3 SCS and the Table 1 Ontario background concentrations

The metals results are provided in Table 2 in Appendix E and shown on Figures 7 and 7A in Appendix A.

5.6.3 Chemical Transformation and Soil Contaminant Sources

There are no soil contaminant sources on the Phase Two property. All parameters met the applicable Table 3 SCS and as such chemical transformations are not a significant concern at the Phase Two property.

5.6.4 Evidence of Non-Aqueous Phase Liquid

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

5.6.5 Maximum Concentrations

None of the soil samples exceeded the applicable Table 3 SCS. Maximum soil concentrations are provided in Table 3 in Appendix E.

5.7 Groundwater Quality

Based on the nature of the APEC identified in the Phase One report, groundwater sampling was not determined to be required at the Phase Two property.

5.8 Sediment Quality

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

5.9 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:

- Collecting and analysing blind duplicate soil samples to ensure analytical precision
- Using dedicated and/or disposable sampling equipment
- Following proper decontamination protocols to minimize cross-contamination
- Maintaining field notes and completing field forms to document field activities
- Using only laboratory-supplied sample containers and following prescribed sample protocols, including using proper preservation techniques, meeting sample hold times, and documenting sample transmission on chains of custody, to ensure the integrity of the samples is maintained

Duplicate soil sample pairs TP11-Fill and TP21-Fill were submitted for chemical analysis of 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. Since laboratory duplicates are a measure of laboratory precision, while field duplicates are a measure of both field and laboratory precision, the RPD alert limits for field duplicates were determined to be twice the limits for laboratory duplicates. The RPD are provided in Table 4 in Appendix E. All of the RPD were either within the alert limits or not calculable.

Certificates of Analysis were received from BV Labs reporting the results of all the chemical analyses performed on the submitted soil and groundwater samples. Copies of the BV Labs Certificates of Analysis are provided in Appendix F. A review of the Certificates of Analysis prepared by BV Labs indicates that they were in compliance with the requirements set out under subsection 47(3) of Ontario Regulation 153/04 (as amended).

The analytical program conducted by BV Labs 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 BV Labs 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. The laboratory QA/QC results are presented in the Quality Assurance Report provided in the Certificate of Analysis prepared by Maxxam. 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 BV Labs 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 BV Labs 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 BV Labs are of acceptable quality and data qualifications are not required.

5.10 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.

5.10.1 Introduction

The Phase Two ESA Property is located at 6171 Hazeldean Road in Ottawa, as shown on Figure 1 in Appendix A. The Phase Two property is vacant and has never been developed. The surrounding properties are used for residential and commercial purposes. Future use of the property is intended to be residential.

Refer to Table 5.1 for the Site identification information.

Table 5.1 – Site Identification Details

Civic Address	6171 Hazeldean Road, Ottawa, Ontario
Current Land Use	Not used for any purpose defined by Ontario Regulation 153/04, vacant land
Proposed Future Land Use	Residential
Property Identification Number	044871709
UTM Coordinates	NAD83 Zone 18 426475.08 m E, 5013477.78 m N
Site Area	9.0 ha
Property Owner	Kavanagh Family Investments Limited

5.10.2 Physical Site Description

The Phase Two property is located on the north side of Hazeldean Road, 160 m east of Carp Road, at 6171 Hazeldean Road in Ottawa, Ontario. The Phase Two property is rectangular in shape and has an area of approximately 9.0 hectares. The property is currently vacant field. A Site Location Plan is provided as Figure 1 in Appendix A.

The Phase Two property is in an arterial main street zoned area. The property is legally described as PART OF LOT 23 CONCESSION 12, GOULBOURN, PARTS 2, 4 AND 6 PLAN 4R23045 CITY OF OTTAWA and property identification number (PIN) 044871709.

The surrounding area of the Phase Two property was observed to be residential and vacant properties to the north, and residential and commercial properties to the east, south, and west. No environmentally sensitive activities or infrastructures that could present any environmental concerns to the Phase Two property were observed on the adjacent properties based on observations made from the boundaries of the Phase Two property.

The review of the topographic map indicated that the Phase One property and surrounding area were slope to the northeast. Given the topography at the site, groundwater is inferred to flow north to the northeast towards Feedmill Creek. Feedmill Creek is a tributary to Carp River and located 200 m north of the site.

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

5.10.3 Geological and Hydrogeological Setting

The detailed soil profiles encountered in the boreholes and test pits are provided on the borehole and test pit logs in Appendix D. 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

The investigation revealed that the subsurface conditions is comprised of a surficial layer of topsoil or granular fill overlying heterogenous fill material, which is underlain by glacial till or by bedrock.

On the south side of the property, near Hazeldean Road, peat was encountered in the boreholes and test pits. The inferred horizontal extent of the peat layer is illustrated on Figure 3. The peat and marl layer was encountered at depths between 0.75 to 3.1 mbgs.

Bedrock, or refusal at probable bedrock, was encountered in all of the boreholes and test pits. Depth to bedrock varied across the property between 0.6 mbgs to 6.2 mbgs. BH-1 to BH-3 were advanced into the bedrock for characterization, all other boreholes and all test pits were terminated at bedrock. Bedrock consisted of dark grey limestone with shale laminations.

Based on the geological profile, a cross-section of the site was prepared, as shown on Figure 5 in Appendix A.

A summary of factors that apply to the Phase Two property is provided in Table 5.2

Table 5.2 Site Characteristics

Characteristic	Description
Minimum Depth to Bedrock	0.3 mbgs
Minimum Depth to Overburden Groundwater	1.2 mbgs (May 14, 2019)
Shallow Soil Property	No, majority of bedrock is greater than 2.0 mbgs
Proximity to water body or ANSI	200 m
Soil pH	7.12 - 7.80
Soil Texture	Coarse
Current Property Use	Not defined by O.Reg 153

Future Property Use	Residential
Proposed Future Building	Single and multi-unit residences
Areas Containing Suspected Fill	Entire property

5.10.4 Underground Utilities

Active utilities are not expected to be present at the Phase Two property. The site is located in an area of municipally supplied water and sewer.

5.10.5 Potentially Contaminating Activities

Ontario Regulation 153/04 defines a PCA as one of 59 operations set out in Table 2 of Schedule D that occurs or has occurred in a Phase Two study area. The following PCA was identified:

- PCA #30 – Importation of Fill of Unknown Quality; and

5.10.6 Areas of Potential Environmental Concern/Potential Contaminants of Concern

Ontario Regulation 153/04 defines an APEC as an area on a property where one or more contaminants are potentially present. The following APEC were identified on the Phase Two property, as shown on Figure 2 in Appendix A:

- APEC #1 – Entirety of the Phase Two property

5.10.7 Investigation

The Phase Two ESA was conducted to assess the soil quality at the Phase Two property. As indicated above, the analytical program of the Phase Two ESA included testing of soil for PHC, BTEX, and metals from the boreholes and test pits on the Phase Two property. The boreholes and test pit locations are shown on Figure 3 in Appendix A.

5.10.8 Contaminants of Concern (COC)

Based on the results of the investigation, no COC at the Phase Two property exceeded the applicable MECP Table 3 SCS. Soil analytical results are provided in Figures 6 and 6A and 7 and 7A in Appendix A.

5.10.9 Contaminant Fate and Transport

Based on the nature of the APEC identified in the Phase One report, groundwater sampling was not determined to be required at the Phase Two property.

6 Conclusions

For assessment purposes, EXP selected the 2011 Table 3 Site Condition Standards (SCS) in a non-potable groundwater condition for residential/parkland/institutional property use and coarse textured soil. The results were also compared to Table 1 full depth background SCS. Based on the Phase Two ESA results, the following summary is provided:

- The investigation revealed that the subsurface conditions is comprised of a surficial layer of topsoil or granular fill overlying heterogenous fill material, which is underlain by glacial till or by bedrock. On the south side of the property, near Hazeldean Road, peat was encountered in the boreholes and test pits. The peat and marl layer were encountered at depths between 0.75 to 3.1 mbgs.
- Bedrock, or refusal at probable bedrock, was encountered in all of the boreholes and test pits. Depth to bedrock varied across the property between 0.6 mbgs to 6.2 mbgs. BH-1 to BH-3 were advanced into the bedrock for characterization, all other boreholes and all test pits were terminated at bedrock. Bedrock consisted of dark grey limestone with shale laminations.
- Groundwater measurements taken on May 14, 2020 and July 2, 2020 in monitoring wells installed in three of the boreholes indicate that the groundwater table to be at a depth of 1.2 to 2.6 m in May and 2.02 m to 2.75 m below grade in July. Groundwater flow is interpreted to be towards the northeast. The groundwater table is subject to seasonal fluctuation and may be at higher depths during wet weather conditions.
- Ten soil samples were submitted for laboratory analysis of BTEX and PHC. Twelve soil samples were submitted for metals and inorganics.
- For assessment purposes, EXP selected the 2011 Table 1 (Ontario Background) and Table 3 SCS in a non-potable groundwater condition for residential/parkland/institutional property use and coarse textured soil.
- All of the soil samples were within the MECP (Ministry of the Environment, Conservation and Parks) Table 3 SCS for all parameters that were analysed. All but one soil sample met the criteria for MECP Table 1 SCS.
- Based on the results of the Phase Two ESA, the site meets the SCS for the intended residential land use.
- Soil samples were submitted for laboratory analysis of BTEX, PHC, and metals. All of the soil samples were within the MECP Table 3 SCS for all parameters that were analysed. All but one soil sample met the criteria for MECP Table 1 SCS.
- Based on the results of the Phase Two ESA, the site meets the SCS for the intended residential land use.

The Qualified Person can confirm that the Phase Two Environmental Site Assessment was conducted per the requirements of Ontario Regulation 153/04, as amended, and in accordance with generally accepted professional practices.

7 Limitation of Liability, Scope of Report, and Third Party Reliance

Basis of Report

This report ("Report") is based on site conditions known or inferred by the investigation undertaken as of the date of the Report. Should changes occur which potentially impact the condition of the site the recommendations of EXP may require re-evaluation. Where special concerns exist, or 11654128 Canada Inc. ("the Client") has special considerations or requirements, these should be disclosed to EXP to allow for additional or special investigations to be undertaken not otherwise within the scope of investigation conducted for the purpose of the Report.

Reliance on Information Provided

The evaluation and conclusions contained in the Report are based on conditions in evidence at the time of site inspections and information provided to EXP by the Client and others. The Report has been prepared for the specific site, development, building, design or building assessment objectives and purpose as communicated by the Client. EXP has relied in good faith upon such representations, information and instructions and accepts no responsibility for any deficiency, misstatement or inaccuracy contained in the Report as a result of any misstatements, omissions, misrepresentation or fraudulent acts of persons providing information. Unless specifically stated otherwise, the applicability and reliability of the findings, recommendations, suggestions or opinions expressed in the Report are only valid to the extent that there has been no material alteration to or variation from any of the information provided to exp. If new information about the environmental conditions at the Site is found, the information should be provided to EXP so that it can be reviewed and revisions to the conclusions and/or recommendations can be made, if warranted.

Standard of Care

The Report has been prepared in a manner consistent with the degree of care and skill exercised by engineering consultants currently practicing under similar circumstances and locale. No other warranty, expressed or implied, is made. Unless specifically stated otherwise, the Report does not contain environmental consulting advice.

Complete Report

All documents, records, data and files, whether electronic or otherwise, generated as part of this assignment form part of the Report. This material includes, but is not limited to, the terms of reference given to EXP by the Client, communications between EXP and the Client, other reports, proposals or documents prepared by EXP for the Client in connection with the site described in the Report. In order to properly understand the suggestions, recommendations and opinions expressed in the Report, reference must be made to the Report in its entirety. EXP is not responsible for use by any party of portions of the Report.

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The information and opinions expressed in the Report, or any document forming part of the Report, are for the sole benefit of the Client. No other party may use or rely upon the Report in whole or in part without the written consent of EXP. Any use of the Report, or any portion of the Report, by a third party are the sole responsibility of such third party. EXP is not responsible for damages suffered by any third party resulting from unauthorised use of the Report.

Report Format

Where EXP has submitted both electronic file and a hard copy of the Report, or any document forming part of the Report, only the signed and sealed hard copy shall be the original documents for record and working purposes. In the event of a dispute or discrepancy, the hard copy shall govern. Electronic files transmitted by EXP utilize specific software and hardware systems. EXP makes no representation about the compatibility of these files with the Client's current or future software and hardware systems. Regardless of format, the documents described herein are EXP's instruments of professional service and shall not be altered without the written consent of EXP.

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:

- EXP Services Inc., *Phase One Environmental Site Assessment, 6171 Hazeldean Road, Ottawa, Ontario*, April 7, 2020.
- Freeze and Cheery, *Groundwater*, Prentice Hall, 1979. Prentice Hall
- Ontario Ministry of the Environment, Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario, December 1996
- Ontario Ministry of the Environment, *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, April 15, 2011
- Ontario Ministry of the Environment, *Guide for Completing Phase Two Environmental Site Assessments under Ontario Regulation 153/04,* June 2011.
- Ontario Ministry of the Environment, *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act,* July 1, 2011.
- Ontario Regulation 153/04, made under the Environmental Protection Act, as amended
- Ontario Regulation 903/90, made under the Water Resources Act, as amende

Appendices

Appendix A : Figures

0 200m 400m 800m

HORIZONTAL 1:20,000

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DATE: MAY 2020	CLIENT: 11654128 CANADA LTD. 6171 HAZELDEAN ROAD, OTTAWA, ON	project no. OTT-00258780-B0
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DRAWN BY: G.C.	TITLE: SITE LOCATION PLAN	FIG 1

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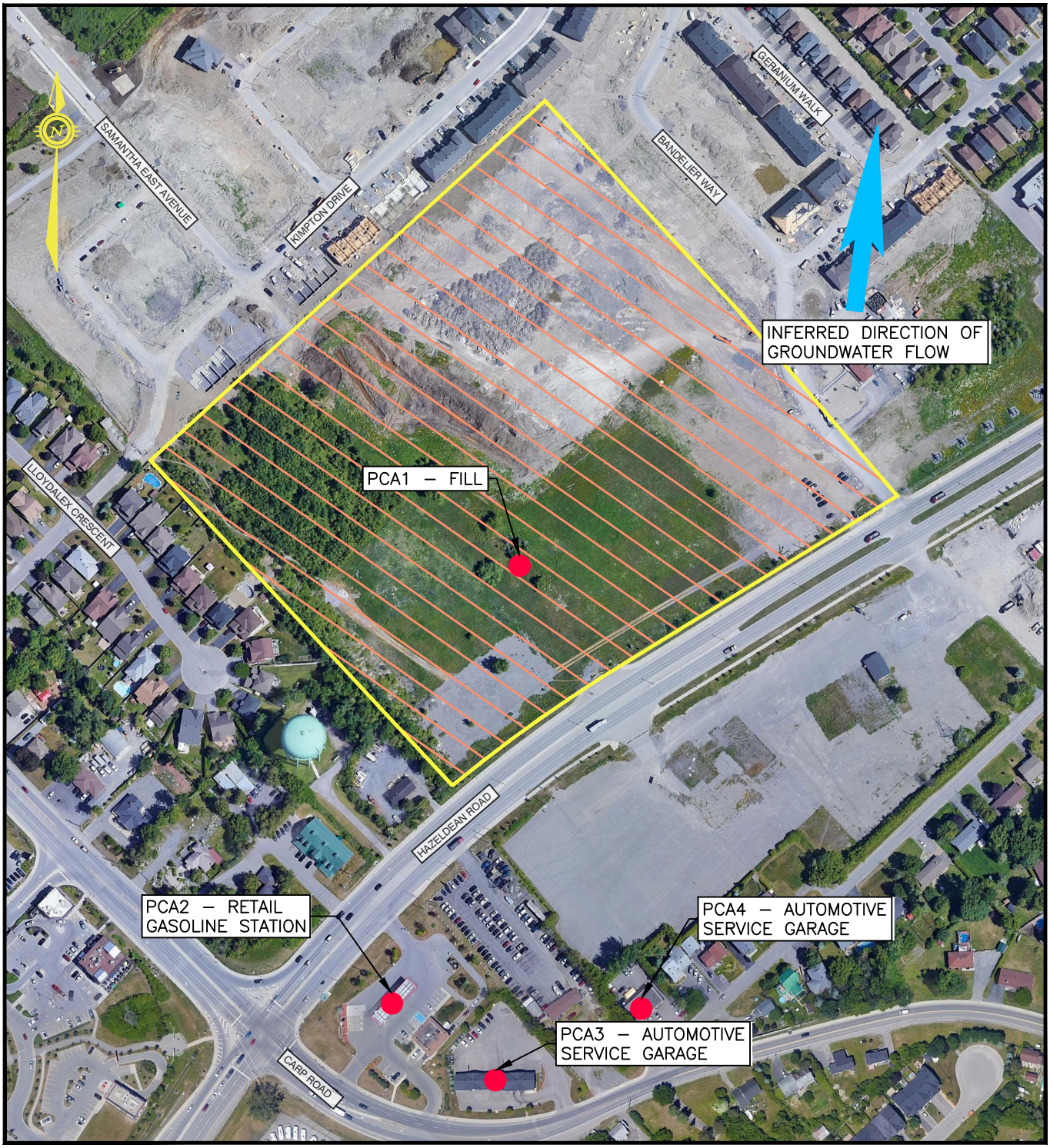

LEGEND

PHASE ONE PROPERTY BOUNDARY

APEC #1

0 30m 60m 120m

HORIZONTAL 1:3,000

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DRAWN BY: G.C.	TITLE: POTENTIALLY CONTAMINATING ACTIVITIES (PCA) & AREAS OF POTENTIAL ENVIRONMENTAL CONCERN (APEC)	FIG 2

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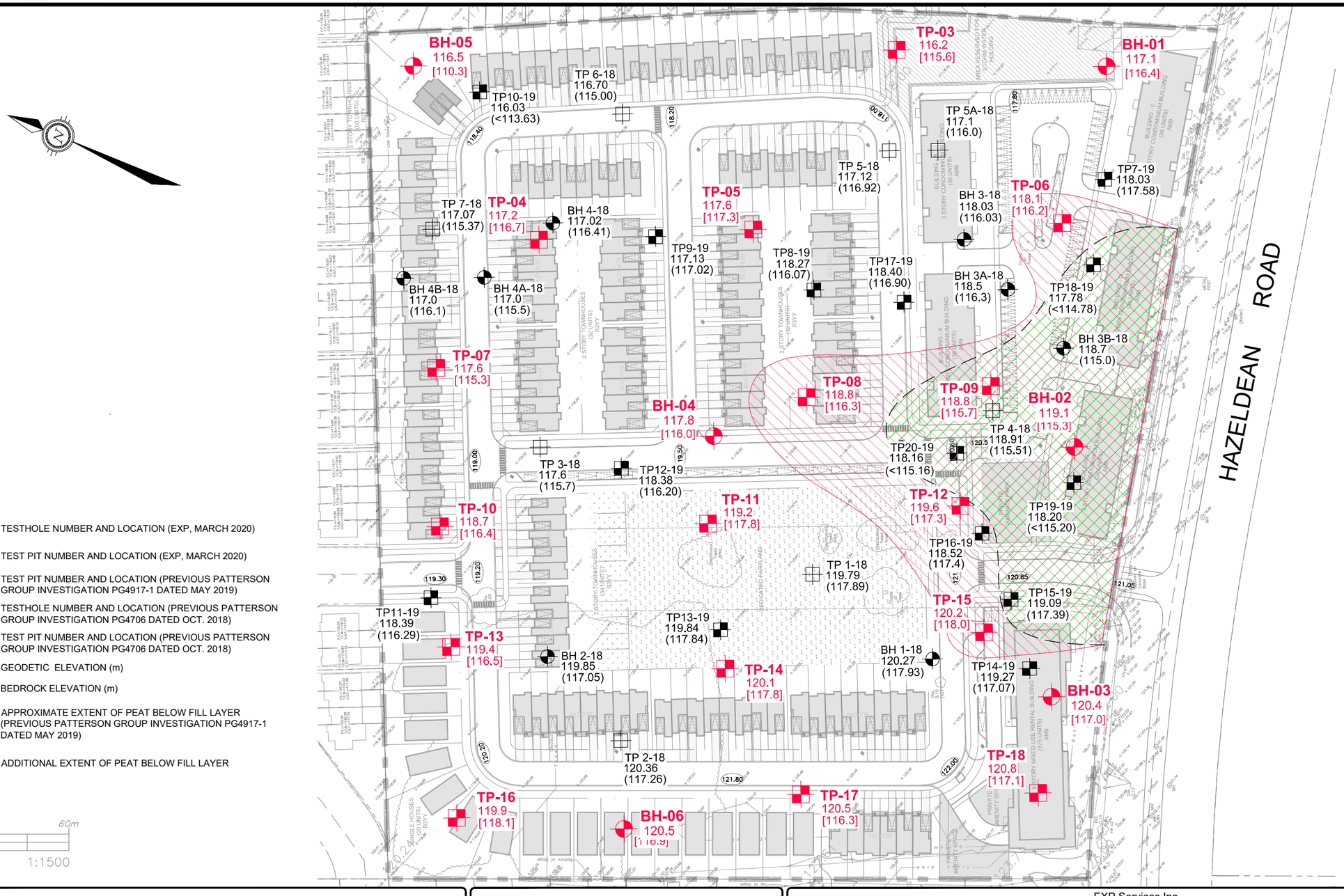

LEGEND

BH-01	TESTHOLE NUMBER AND LOCATION (EXP, MARCH 2020)
TP-03	TEST PIT NUMBER AND LOCATION (EXP, MARCH 2020)
TP 1-19	TEST PIT NUMBER AND LOCATION (PREVIOUS PATTERSON GROUP INVESTIGATION PG4917-1 DATED MAY 2019)
BH 1-18	TESTHOLE NUMBER AND LOCATION (PREVIOUS PATTERSON GROUP INVESTIGATION PG4706 DATED OCT. 2018)
TP 1-18	TEST PIT NUMBER AND LOCATION (PREVIOUS PATTERSON GROUP INVESTIGATION PG4706 DATED OCT. 2018)
117.0 116.2	GEODETIC ELEVATION (m)
(115.5) [116.6]	BEDROCK ELEVATION (m)
	APPROXIMATE EXTENT OF PEAT BELOW FILL LAYER (PREVIOUS PATTERSON GROUP INVESTIGATION PG4917-1 DATED MAY 2019)
	ADDITIONAL EXTENT OF PEAT BELOW FILL LAYER

0 15m 30m 60m

HORIZONTAL 1:1500

NOTES :

1. THE BOUNDARIES, ROCK TYPES AND SOIL TYPES HAVE BEEN ESTABLISHED ONLY AT BOREHOLE LOCATIONS. BETWEEN BOREHOLES THEY ARE ASSUMED AND MAY BE SUBJECT TO CONSIDERABLE ERROR.
2. ROCK CORES AND SOIL SAMPLES WILL BE RETAINED IN STORAGE FOR THREE MONTHS AND THEN DESTROYED UNLESS THE CLIENT ADVISES THAT AN EXTENDED TIME PERIOD IS REQUIRED.
3. ASPHALT AND TOPSOIL QUANTITIES SHOULD NOT BE ESTABLISHED FROM THE INFORMATION PROVIDED AT THE BOREHOLE LOCATIONS.
4. TESTHOLE ELEVATIONS SHOULD NOT BE USED TO DESIGN BUILDING(S) OR FLOOR SLABS OR PARKING LOT(S) GRADES.
5. THIS DRAWING FORMS PART OF THE REPORT PROJECT NUMBER AS REFERENCED AND SHOULD BE USED ONLY IN CONJUNCTION WITH THIS REPORT.
6. BASE PLAN OBTAINED FROM SURVEY PLAN BY FAIRHALL, MOFFATT & WOODLAND LTD., JOB NO. Z38800, REFERENCE NO. 415(A) - 12 GOULBOURN, DATED JANUARY 14, 2020.
7. TESTHOLES LOCATION BY OTHERS ARE APPROXIMATE - REFER TO ORIGINAL SITE PLAN FOR ACCURATE POSITION

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DATE: JUNE 2020	CLIENT: 11654128 CANADA INC		project no. OTT-00258780-B0
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DRAWN BY: S.K.			FIG 3

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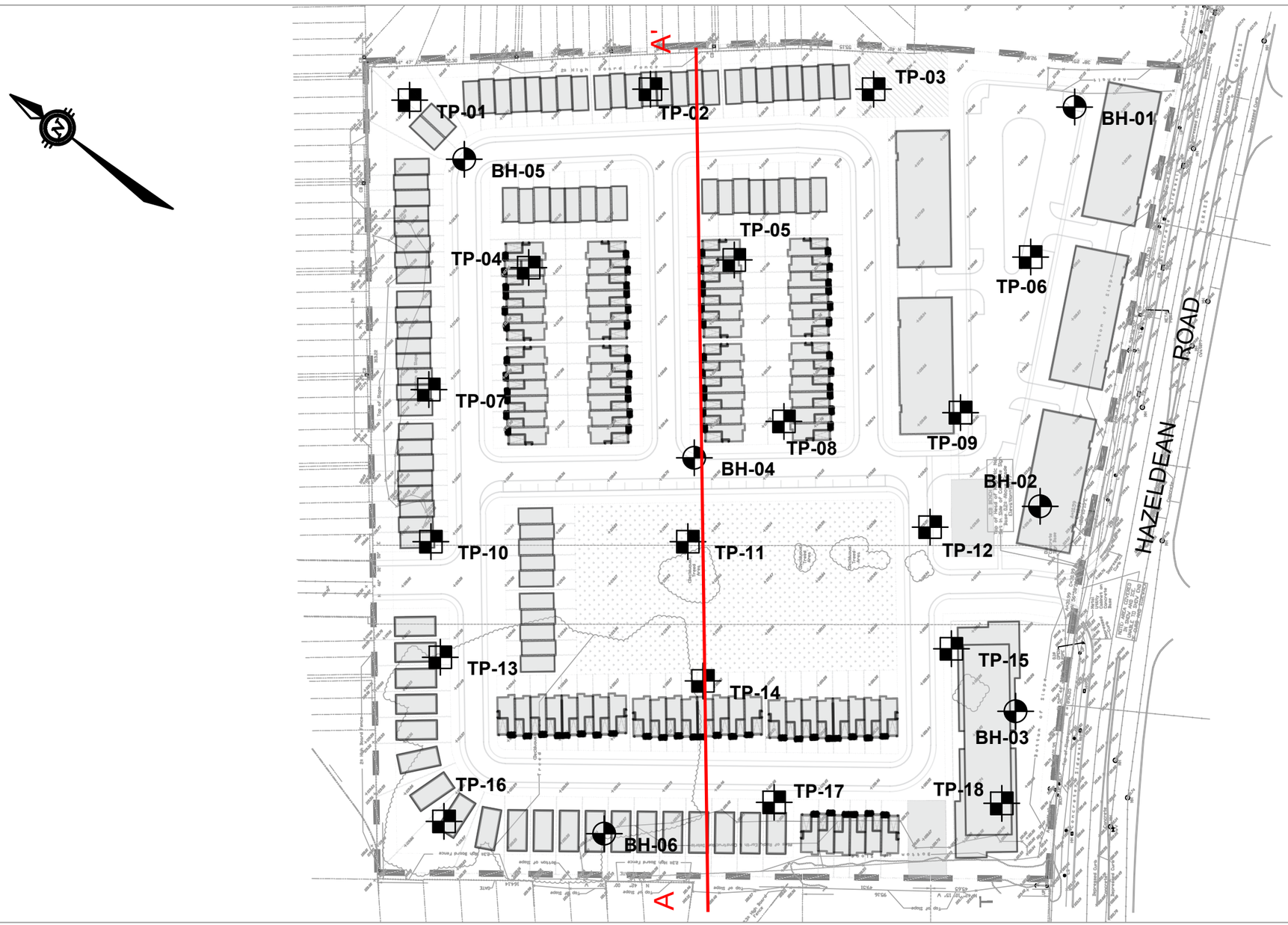

LEGEND

- TEST PIT
- BOREHOLE
- PROPERTY LINE

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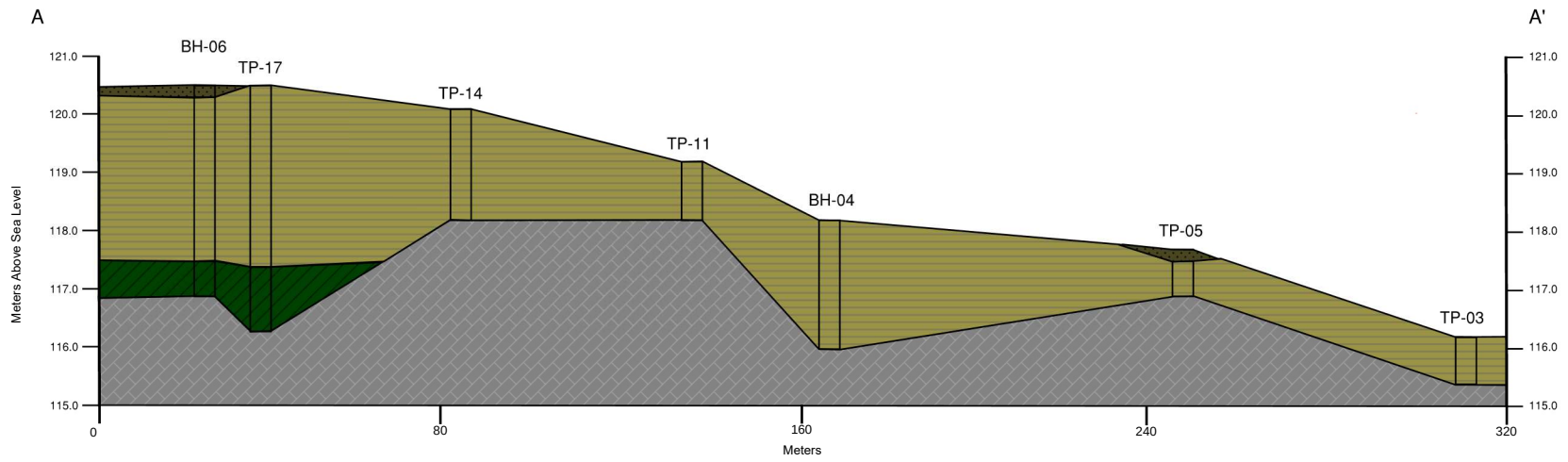

LEGEND

- TOPSOIL
- FILL
- GACIAL TILL
- BEDROCK

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DATE: APRIL 2020	CLIENT: 11654128 CANADA INC	project no. OTT-00258780-C0
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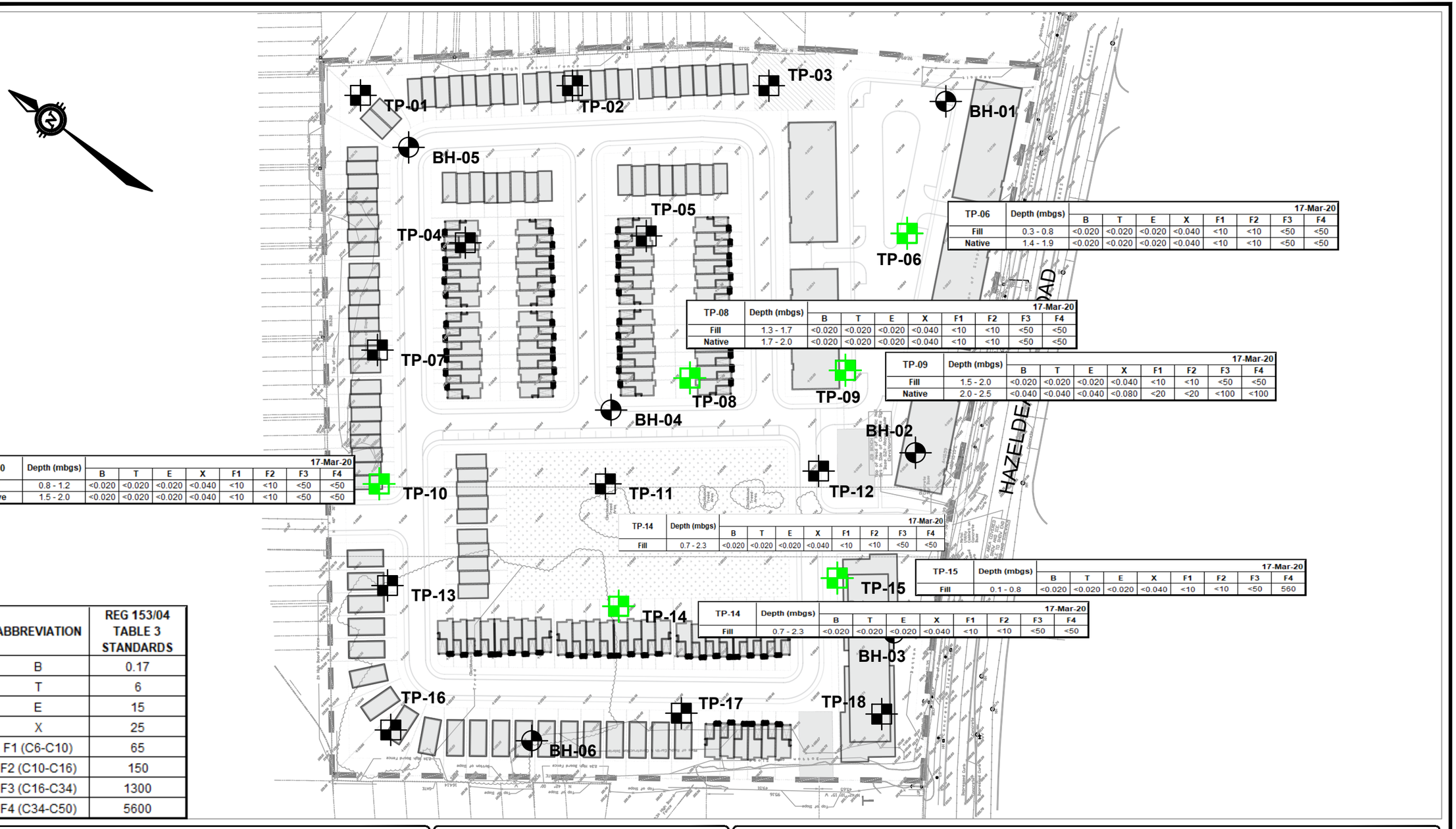

TP-06	Depth (mbgs)	17-Mar-20							
		B	T	E	X	F1	F2	F3	F4
Fill	0.3 - 0.8	<0.020	<0.020	<0.020	<0.040	<10	<10	<50	<50
Native	1.4 - 1.9	<0.020	<0.020	<0.020	<0.040	<10	<10	<50	<50

TP-08	Depth (mbgs)	17-Mar-20							
		B	T	E	X	F1	F2	F3	F4
Fill	1.3 - 1.7	<0.020	<0.020	<0.020	<0.040	<10	<10	<50	<50
Native	1.7 - 2.0	<0.020	<0.020	<0.020	<0.040	<10	<10	<50	<50

TP-09	Depth (mbgs)	17-Mar-20							
		B	T	E	X	F1	F2	F3	F4
Fill	1.5 - 2.0	<0.020	<0.020	<0.020	<0.040	<10	<10	<50	<50
Native	2.0 - 2.5	<0.040	<0.040	<0.040	<0.080	<20	<20	<100	<100

TP-10	Depth (mbgs)	17-Mar-20							
		B	T	E	X	F1	F2	F3	F4
Fill	0.8 - 1.2	<0.020	<0.020	<0.020	<0.040	<10	<10	<50	<50
Native	1.5 - 2.0	<0.020	<0.020	<0.020	<0.040	<10	<10	<50	<50

TP-14	Depth (mbgs)	17-Mar-20							
		B	T	E	X	F1	F2	F3	F4
Fill	0.7 - 2.3	<0.020	<0.020	<0.020	<0.040	<10	<10	<50	<50

TP-15	Depth (mbgs)	17-Mar-20							
		B	T	E	X	F1	F2	F3	F4
Fill	0.1 - 0.8	<0.020	<0.020	<0.020	<0.040	<10	<10	<50	560

TP-14	Depth (mbgs)	17-Mar-20							
		B	T	E	X	F1	F2	F3	F4
Fill	0.7 - 2.3	<0.020	<0.020	<0.020	<0.040	<10	<10	<50	<50

PARAMETERS	ABBREVIATION	REG 153/04 TABLE 3 STANDARDS
Benzene	B	0.17
Toluene	T	6
Ethylbenzene	E	15
Total Xylenes	X	25
F1	F1 (C6-C10)	65
F2	F2 (C10-C16)	150
F3	F3 (C16-C34)	1300
F4	F4 (C34-C50)	5600

STANDARDS APPLIED ARE FOR RESIDENTIAL PROPERTY USE AND COARSE TEXTURED SOIL.

LOCATION WHERE SOIL SAMPLE IS WITHIN O.REG 153/04 TABLE 3 STADARDS FOR ALL PARAMETERS ANLYSED IS SHOWN IN GREEN.
LOCATION WHERE SOIL SAMPLE EXCEEDS O.REG 153/04 TABLE 3 STADARDS FOR AT LEAST ONE PARAMETER ANLYSED IS SHOWN IN RED.
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 3 STANDARD SHOWN IN TEXT AS RED UNDERLINED.

mbgs - METERS BELOW GROUND SURFACE
ALL RESULTS IN ug/g UNLESS OTHERWISE NOTED
NA - NOT ANALYZED

LEGEND

- TEST PIT
- BOREHOLE
- PROPERTY LINE

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www.exp.com

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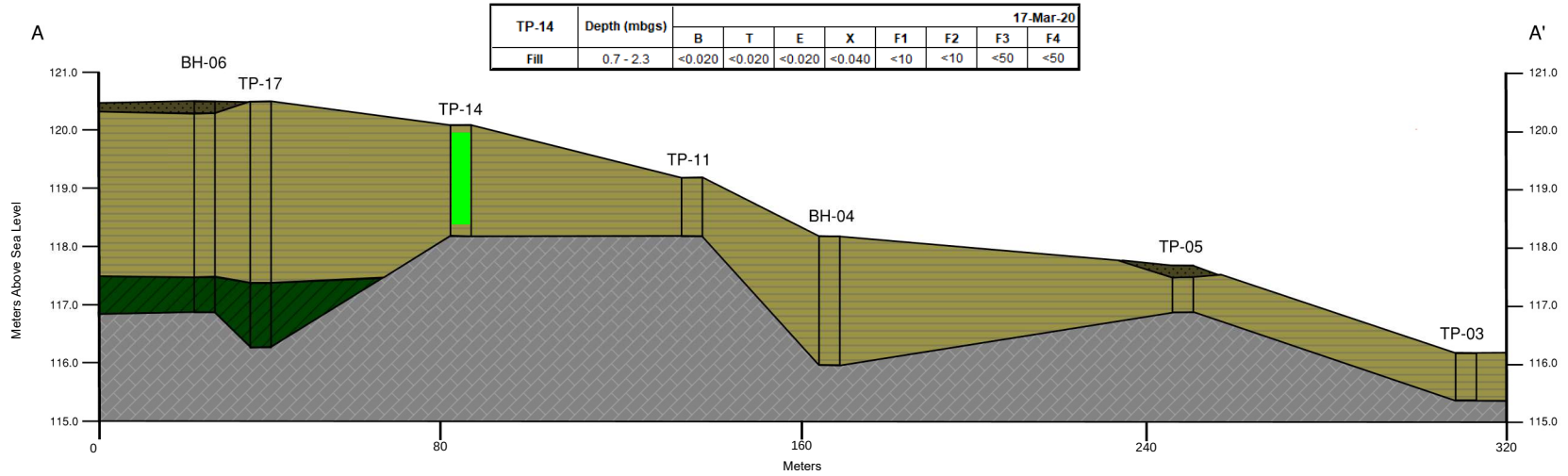
DATE: APRIL 2020	CLIENT: 11654128 CANADA INC		project no. OTT-00258780-C0
DESIGN: L.W.	CHECKED: C.K.	TITLE: SOIL ANALYTICAL RESULTS - PETROLEM HYDROCARBONS	scale N.T.S.
DRAWN BY: L.W.			FIG 7A

Filename: e:\ott\ott-00258780-b0\60 execution\65 drawings\proposed bh & tp layout.dwg
Last Saved: 3/18/2020 7:32:13 PM
Last Plotted: 3/18/2020 7:33:22 PM
Plotted by: CuiG
Pen Table:: exp.ctb

TP-14	Depth (mbgs)	17-Mar-20							
		B	T	E	X	F1	F2	F3	F4
Fill	0.7 - 2.3	<0.020	<0.020	<0.020	<0.040	<10	<10	<50	<50



PARAMETERS	ABBREVIATION	REG 153/04 TABLE 3 STANDARDS
Benzene	B	0.17
Toluene	T	6
Ethylbenzene	E	15
Total Xylenes	X	25
F1	F1 (C6-C10)	65
F2	F2 (C10-C16)	150
F3	F3 (C16-C34)	1300
F4	F4 (C34-C50)	5600

STANDARDS APPLIED ARE FOR RESIDENTIAL PROPERTY USE AND COARSE TEXTURED SOIL.

LOCATION WHERE SOIL SAMPLE IS WITHIN O.REG 153/04 TABLE 3 STADARDS FOR ALL PARAMETERS ANLYSED IS SHOWN IN GREEN.
LOCATION WHERE SOIL SAMPLE EXCEEDS O.REG 153/04 TABLE 3 STADARDS FOR AT LEAST ONE PARAMETER ANLYSED IS SHOWN IN RED.
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 3 STANDARD SHOWN IN TEXT AS RED UNDERLINED.

mbgs - METERS BELOW GROUND SURFACE
ALL RESULTS IN ug/g UNLESS OTHERWISE NOTED
NA - NOT ANALYZED

LEGEND

- TOPSOIL
- FILL
- GACIAL TILL
- BEDROCK

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DATE	CLIENT:	project no.
APRIL 2020	11654128 CANADA INC	OTT-00258780-C0
DESIGN L.W. / CHECKED C.K.	TITLE: SOIL ANALYTICAL RESULTS - PETROLEUM HYDROCARBONS	scale N.T.S.
DRAWN BY L.W.		FIG 6A

Filename: e:\ott\ott-00258780-b0\60 execution\65 drawings\proposed ish & tp layout.dwg
Last Saved: 3/18/2020 7:32:13 PM
Last Plotted: 3/18/2020 7:33:22 PM
Plotted by: CuiG
Pen Table:: exp.ctb

TP-08	Depth (mbgs)	17-Mar-20																			
		Sb	As	Ba	Be	B (HWS)	B	Cd	Cr	Cr IV	Co	Cu	Mo	Hg	Ni	Na	Se	Ag	Tl	U	V	Zn
Fill	1.3 - 1.7	<0.20	<1.0	83	0.33	0.12	<5.0	<0.10	16	<0.18	5.3	12	5.1	<0.050	<0.50	9.5	<0.50	<0.20	0.11	0.61	29	27
Native	1.7 - 2.0	<0.20	<1.0	80	0.30	<0.050	<5.0	<0.10	15	<0.18	5.2	11	3.8	<0.050	<0.50	10	<0.50	<0.20	0.093	0.52	27	25

TP-06	Depth (mbgs)	17-Mar-20																			
		Sb	As	Ba	Be	B (HWS)	B	Cd	Cr	Cr IV	Co	Cu	Pb	Hg	Mo	Ni	Se	Ag	Tl	U	V	Zn
Fill	0.3 - 0.8	0.38	2.0	110	0.37	0.18	<5.0	0.16	18	<0.18	7.4	6.4	47	<0.050	<0.50	9.0	<0.50	<0.20	0.13	0.55	38	37
Native	1.4 - 1.9	<0.20	1.2	48	0.21	<0.050	<5.0	<0.10	14	<0.18	5.2	13	3.1	<0.050	1.2	8.9	<0.50	<0.20	0.075	1.1	28	23

TP-09	Depth (mbgs)	17-Mar-20																			
		Sb	As	Ba	Be	B (HWS)	B	Cd	Cr	Cr IV	Co	Cu	Mo	Hg	Ni	Na	Se	Ag	Tl	U	V	Zn
Fill	1.5 - 2.0	<0.20	<1.0	59	0.24	0.085	<5.0	<0.10	13	<0.18	4.5	10	5.0	0.058	<0.50	8.0	<0.50	<0.20	0.080	0.62	26	26
Native	2.0 - 2.5	<0.20	<1.0	190	<0.20	0.094	<5.0	<0.10	1.1	<0.18	0.58	4.3	<1.0	<0.050	0.99	3.5	<0.50	<0.20	0.15	2.0	<5.0	9.7

TP-11	Depth (mbgs)	17-Mar-20																			
		Sb	As	Ba	Be	B (HWS)	B	Cd	Cr	Cr IV	Co	Cu	Mo	Hg	Ni	Na	Se	Ag	Tl	U	V	Zn
Fill	0.9 - 1.4	<0.20	1.3	65	0.35	0.11	<5.0	0.11	15	<0.18	5.2	10	9.0	<0.050	<0.50	9.3	<0.50	<0.20	0.10	0.52	29	33
Duplicate	0.9 - 1.4	<0.20	1.4	65	0.35	0.08	<5.0	0.15	16	<0.18	5.4	10	8.9	<0.050	<0.50	9.8	<0.50	<0.20	0.087	0.50	29	34

TP-14	Depth (mbgs)	17-Mar-20																			
		Sb	As	Ba	Be	B (HWS)	B	Cd	Cr	Cr IV	Co	Cu	Mo	Hg	Ni	Na	Se	Ag	Tl	U	V	Zn
Fill	0.7 - 2.3	<0.20	2.7	66	0.56	0.055	5.3	<0.10	18	<0.18	11	15	7.1	<0.050	<0.50	15	<0.50	<0.20	0.25	0.65	42	69

TP-15	Depth (mbgs)	17-Mar-20																			
		Sb	As	Ba	Be	B (HWS)	B	Cd	Cr	Cr IV	Co	Cu	Mo	Hg	Ni	Na	Se	Ag	Tl	U	V	Zn
Fill	0.1 - 0.8	<0.20	3.5	110	0.66	0.11	5.6	0.29	24	<0.18	11	13	20	0.067	0.67	18	<0.50	<0.20	0.27	0.58	46	66

PARAMETERS	ABBREVIATION	REG 153/04 TABLE 3 STANDARDS
Antimony	Sb	7.5
Arsenic	As	18
Barium	Ba	390
Beryllium	Be	5
Boron (Hot Water Soluble)	B (HWS)	1.5
Boron	B	120
Cadmium	Cd	1.2
Chromium	Cr	160
Chromium IV	Cr IV	8
Cobalt	Co	22
Copper	Cu	180
Lead	Pb	120
Mercury	Hg	0.27
Molybdenum	Mo	6.9
Nickel	Ni	130
Selenium	Se	2.4
Silver	Ag	25
Thallium	Tl	1
Uranium	U	23
Vanadium	V	86
Zinc	Zn	290

STANDARDS APPLIED ARE FOR RESIDENTIAL PROPERTY USE AND COARSE TEXTURED SOIL.

LOCATION WHERE SOIL SAMPLE IS WITHIN O.REG 153/04 TABLE 3 STADARDS FOR ALL PARAMETERS ANLYSED IS SHOWN IN GREEN.
LOCATION WHERE SOIL SAMPLE EXCEEDS O.REG 153/04 TABLE 3 STADARDS FOR AT LEAST ONE PARAMETER ANLYSED IS SHOWN IN RED.
CONCENTRATION OF CONTAMINANT EXCEEDING TABLE 3 STANDARD SHOWN IN TEXT AS RED UNDERLINED.

mbgs - METERS BELOW GROUND SURFACE
ALL RESULTS IN ug/g UNLESS OTHERWISE NOTED
NA - NOT ANALYZED

LEGEND

TEST PIT

BOREHOLE

PROPERTY LINE

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DATE: APRIL 2020	CLIENT: 11654128 CANADA INC		project no.: OTT-00258780-C0
DESIGN: L.W.	CHECKED: C.K.	TITLE: SOIL ANALYTICAL RESULTS - METALS	scale: N.T.S.
DRAWN BY: L.W.			FIG 8A

Filename: e:\ott\ott-00258780-b0\60 execution\65 drawings\proposed bh & tp layout.dwg
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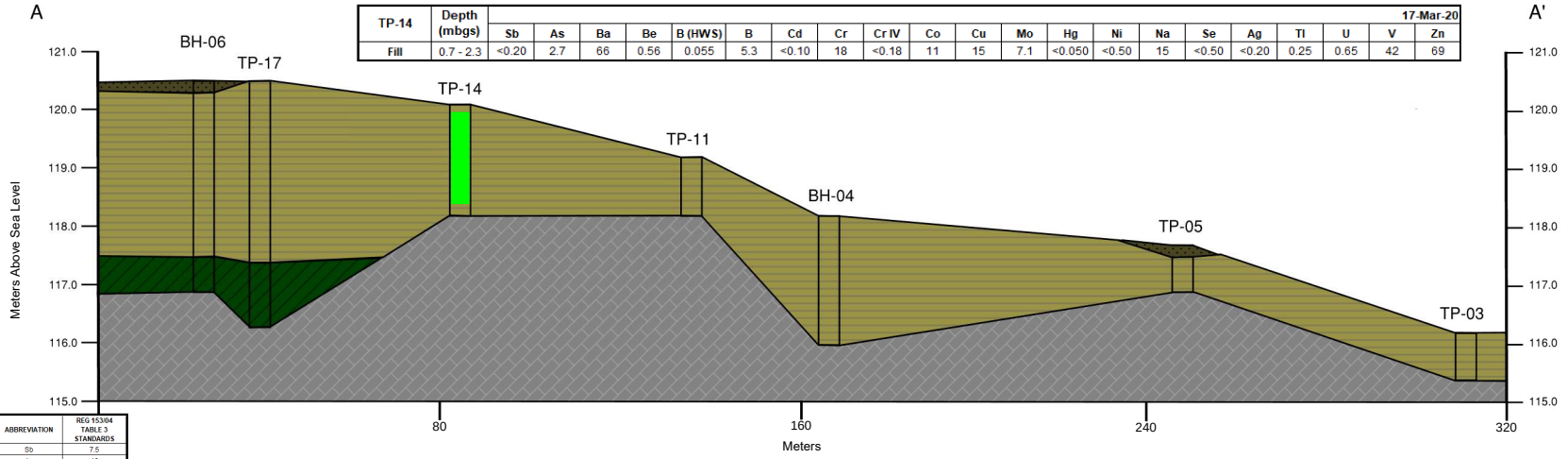

TP-14	Depth (mbgs)	17-Mar-20																			
		Sb	As	Ba	Be	B (HWS)	B	Cd	Cr	Cr IV	Co	Cu	Mo	Hg	Ni	Na	Se	Ag	Tl	U	V	Zn
Fill	0.7 - 2.3	<0.20	2.7	66	0.56	0.055	5.3	<0.10	18	<0.18	11	15	7.1	<0.050	<0.50	15	<0.50	<0.20	0.25	0.65	42	69

PARAMETERS	ABBREVIATION	REG 153/04 TABLE 3 STANDARDS
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Arsenic	As	18
Barium	Ba	390
Beryllium	Be	5
Boron (Hot Water Soluble)	B (HWS)	1.5
Boron	B	120
Cadmium	Cd	1.2
Chromium	Cr	160
Chromium IV	Cr IV	8
Cobalt	Co	22
Copper	Cu	180
Lead	Pb	120
Mercury	Hg	0.27
Molybdenum	Mo	6.9
Nickel	Ni	130
Selenium	Se	2.4
Silver	Ag	25
Thallium	Tl	1
Uranium	U	23
Vanadium	V	86
Zinc	Zn	290

STANDARDS APPLIED ARE FOR RESIDENTIAL PROPERTY USE AND COARSE TEXTURED SOIL.

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mbgs - METERS BELOW GROUND SURFACE
ALL RESULTS IN ug/g UNLESS OTHERWISE NOTED
NA - NOT ANALYZED

LEGEND

- TOPSOIL
- FILL
- GACIAL TILL
- BEDROCK

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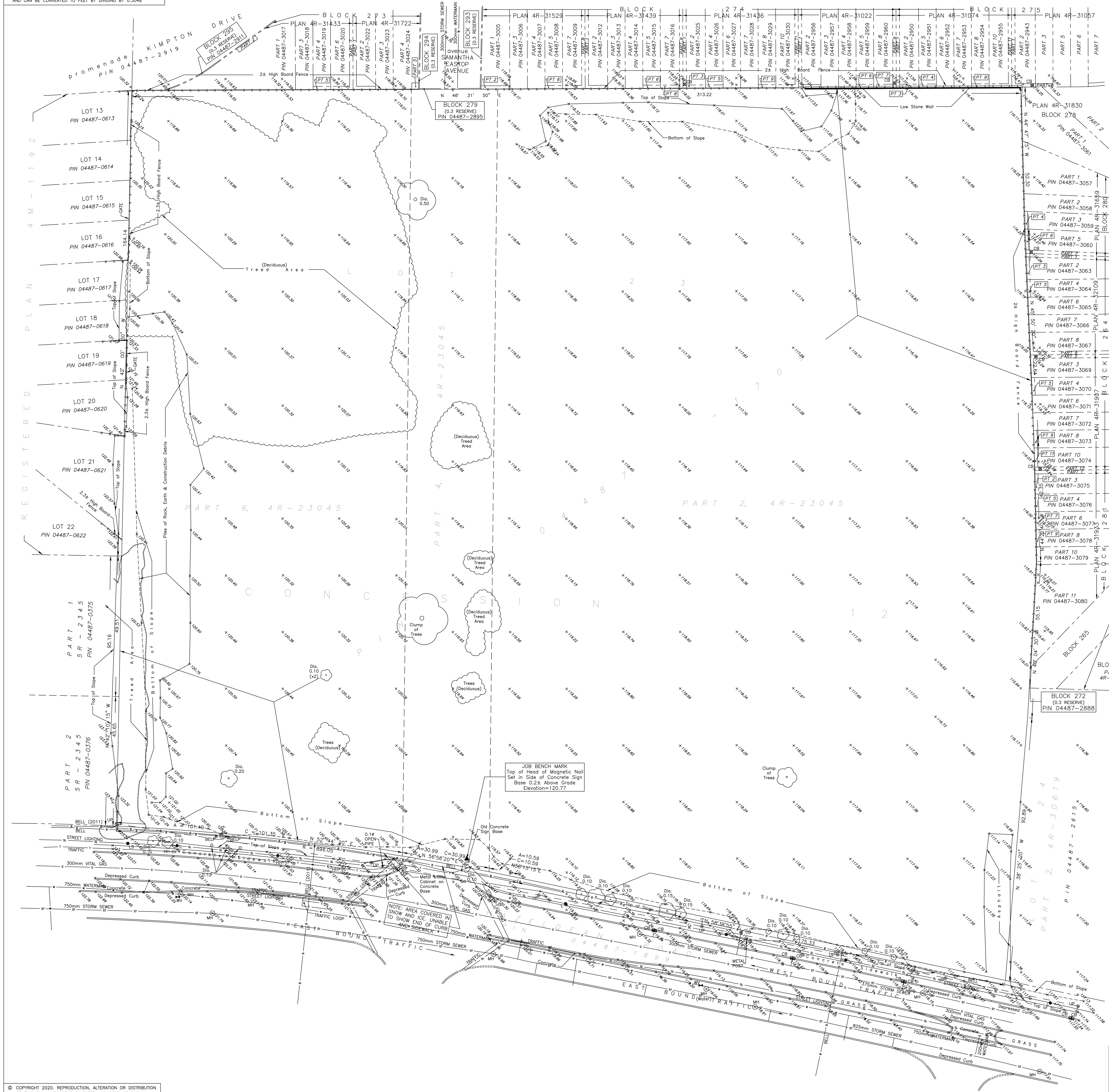
DATE: APRIL 2020	CLIENT: 11654128 CANADA INC		project no. OTT-00258780-C0
DESIGN: L.W. / CHECKED: C.K.	TITLE: SOIL ANALYTICAL RESULTS - METALS		scale N.T.S.
DRAWN BY: L.W.			FIG 7A

Filename: e:\ott\ott-00258780-b0\60 execution\65 drawings\proposed bh & tp layout.dwg
Last Saved: 3/18/2020 7:32:13 PM
Last Plotted: 3/18/2020 7:33:22 PM
Plotted by: CuiG
Pen Table:: exp.ctb

Appendix B : Survey Plan

METRIC
DISTANCES AND ELEVATIONS SHOWN ON THIS PLAN ARE IN METRES AND CAN BE CONVERTED TO FEET BY DIVIDING BY 0.3048



TOPOGRAPHIC PLAN OF
PART OF LOT 23
CONCESSION 12
GEOGRAPHIC TOWNSHIP OF GOULBOURN
CITY OF OTTAWA

SCALE 1 : 500

0 10 20 50 metres

FAIRHALL, MOFFATT & WOODLAND LIMITED

ONTARIO LAND SURVEYORS

ELEVATION NOTES

1. ELEVATIONS ARE REFERRED TO GEODETIC DATUM (CGVD28).
2. ELEVATIONS FOR MANHOLE COVERS AND CATCH BASINS HAVE TO BE INDEPENDENTLY CONFIRMED BEFORE THEY CAN BE ACCEPTED FOR FINAL DESIGN OR CONSTRUCTION PURPOSES.
3. IT IS THE RESPONSIBILITY OF THE USER OF THIS INFORMATION TO VERIFY THAT THE JOB BENCH MARK HAS NOT BEEN ALTERED OR DISTURBED AND THAT THE RELATIVE ELEVATION AND DESCRIPTION AGREE WITH THE INFORMATION SHOWN ON THIS DRAWING.

UTILITY NOTES

1. UNDERGROUND UTILITY INFORMATION HAS BEEN COMPILED FROM PLANS P-Q-18, P-P-13 AND RECORD DRAWING No. 131003-P10 PROVIDED BY THE CITY OF OTTAWA AND CONFIRMED IN THE FIELD WHERE POSSIBLE.
2. THIS DRAWING CANNOT BE ACCEPTED AS ACKNOWLEDGING ALL OF THE UNDERGROUND UTILITIES AND IT WILL BE THE RESPONSIBILITY OF THE USER TO CONTACT THE RESPECTIVE UTILITY AUTHORITIES FOR CONFIRMATION OR LOCATION.
3. BEFORE ANY WORK INVOLVING PROBING, EXCAVATING, ETC., A FIELD LOCATION OF UNDERGROUND PLANT BY THE PERTINENT UTILITY AUTHORITY IS MANDATORY.

NOTES

1. BOUNDARY DIMENSIONS HAVE BEEN TAKEN FROM PLAN 4R-23045.
2. THIS SURVEY WAS CARRIED OUT UNDER WINTER CONDITIONS.
3. THE CAD FILE IS REFERENCED TO THE MTM GRID SYSTEM, ZONE 9, NAD83 (ORIGINAL).
4. DISTANCES ARE GROUND AND CAN BE CONVERTED TO GRID BY MULTIPLYING BY THE COMBINED SCALE FACTOR 0.99991.

LEGEND

DIA.	–	DIAMETER
ø	–	DIAMETER
PIN	–	PROPERTY IDENTIFIER NUMBER
PT	–	PART
CB	–	CATCH BASIN
MH	–	MANHOLE
WV	–	WATER VALVE
LS	–	LAMP STANDARD
L	–	LAMP
UP	–	UTILITY POLE
HH	–	HAND HOLE
BELP	–	BELL PEDESTAL
	–	GUY WIRE AND ANCHOR
	–	SIGN
	–	DECIDUOUS TREE
— · —	–	OVERHEAD UTILITY WIRES
══	–	CURB (ELEVATIONS AT BOTTOM OF CURB, CURBS 0.15± HIGH)
======	–	CURB (UNABLE TO LOCATE – ASSUMED)
—ST—	–	STORM SEWER
—W—	–	WATERMAIN
—G—	–	GAS LINE
—B—	–	BELL
—T—	–	TRAFFIC
—SL—	–	STREET LIGHTING

DATE OF SURVEY: JANUARY 14, 2020.

Fairhall Moffatt & Woodland LIMITED
ONTARIO LAND SURVEYORS
OTTAWA
Surveying and Land Information Services
235 TERENCE MATTHEWS CRESCENT, KANATA, ONTARIO K2M 2B3
TEL: (613) 591-2580 FAX: (613) 591-1495
www.fmw.on.ca

JOB No. Z38800

REFERENCE No. 415(a) – 12 GOULBOURN

S:\JOBS\Z38800\DWGS 2020-01-15
tp388z.DWG (kb)

Appendix C : Sampling & Analysis Plan

OTT-00258780-C0
6171 Hazeldean Road, Ottawa, Ontario
Sampling and Analysis Plan

Project Objective

Future use of the property is intended to be residential. Based on a Phase One ESA completed by EXP, the previous use of the RSC property was not defined, based on the definitions outlined in Ontario Regulation 153/04. Regulation 153/04 requires that an RSC be filed if the proposed future land use is more sensitive than the previous use.

SAFETY FIRST

- Lead Safety Discussion
- All workers to orient themselves to site
- Plan sequence of drilling and take note of terrain conditions between BH/MW locations
- Check locates
- Review HASP
- Review forecast and plan for changing weather conditions

Drilling

A total of 6 BH will be drilled and piezometers will be installed in 2 of them. A total of 18 test pits will be excavated.

Based on the previous uses of the Phase Two property, the following on-site potentially contaminating activities (PCA) were identified:

- PCA #30 – Importation of Fill of Unknown Quality

No off-site PCA were identified.

Consequently, the following areas of potential environmental concern (APEC) were identified:

- APEC #1 – Entirety of Phase Two property

Drilling requirements are as follows:

- 6 boreholes to be drilled for geotechnical analysis, no soil samples will be taken during the drilling.
- One piezometer to be screened across in the overburden, one piezometer to be screened in the bedrock (3.0 metre screen).
- Bedrock is expected to be present between 0.5 to 4.5 mbgs across the site across the site.

- As drilling progresses, log stratigraphy, describing soil type, colour, staining, odour.

Excavation and soil sampling are as follows:

- All test pits to be excavated to bedrock/refusal.
- Bedrock is expected to be present between 0.5 to 4.5 mbgs across the site
- As drilling/excavation progresses, log each sample, describing soil type, colour, staining, odour, petroleum vapour.
- 2 soil samples from each test pit – 1 fill and 1 native/worst case (water table depth) – to be collected from each test pit. Ten samples shall be submitted for analysis of BTEX, PHC F1 to F4, ICPMS Metals, pH; one field duplicate shall be submitted for analysis of metals.

Locates

- See project folder and HASP binder.

Soil Sampling

- Soil samples should be submitted to Maxxam
- All soil samples should be submitted for analysis of BTEX, PHC F1 to F4, ICPMS metals
- All soil samples from the test pits should be submitted for analysis of pH (make sure the surficial sample is entirely above 1.5 m and the worst case sample is entirely below 1.5 m)
- Based on the above, there should be 10 samples and 1 field duplicate.

Soil Cuttings

- Soil cuttings may be left on site

Appendix D : Borehole Logs

Log of Borehole BH-01

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 3

Page. 1 of 1

Date Drilled: 'March 24, 2020

Drill Type: CME 45 Track-Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation m	Depth
		FILL Sandy silt, trace gravel, trace clay, contains organics and rootlets, dark brown, moist (compact)	117.1	0
		LIMESTONE BEDROCK Limestone with minor shaley laminations and turbidites, grey to dark grey, lightly weathered, moderate to closely spaced fractures, (poor to good quality)	116.4	
			115.08	2
			112.9	4
		Borehole Terminated at 4.2 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: SS1
Natural Unit Wt. kN/m³

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00258780-B0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
'March 24, 2020	Dry	
'May 14, 2020	1.2	
July 2, 2020	2.0	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	0.71 - 1.17	100	61
2	1.17 - 2.67	100	34
3	2.67 - 4.22	98	72

LOG OF BOREHOLE BH LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

Log of Borehole BH-02

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 4

Page. 1 of 1

Date Drilled: 'March 24, 2020

Drill Type: CME 45 Track-Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation 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 ~150 mm thick	119.1	0				
		FILL Silty gravelly sand, trace clay, contains rootlets and organics, brown, moist, no odor	119.0		35	×	SS1	
				1	20	×	SS2	
		PEAT Organic, contains numerous bark pieces and roots, dark brown, very moist, no odor	117.7		4	× 100	SS3	11.1
		MARL Grey, very moist, no odor	116.8	2	1/HW		SS4	
				3	5	×	SS5	
		GLACIAL TILL Gravelly sand, trace silt, trace clay, grey, moist, no odor (very dense)	115.5 115.3		50/25 mm	× ×	Run 1	
		LIMESTONE BEDROCK Limestone with minor shaley laminations and turbidites, grey to dark grey, lightly weathered, moderate to closely spaced fractures, (fair to good quality)		4				
				5			Run 2	
				6			Run 3	
				7				
		Borehole Terminated at 7.2 m Depth	111.9					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00258780-B0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
'March 24, 2020	Dry	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	3.79 - 4.17	100	47
2	4.17 - 5.74	97	39
3	5.74 - 7.24	100	61

LOG OF BOREHOLE BH LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

Log of Borehole BH-03

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 5

Page. 1 of 1

Date Drilled: 'March 24, 2020

Drill Type: CME 45 Track-Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation 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
		GRANULAR FILL ~50 mm thick	120.4	0				
		FILL Sandy silt to sandy gravelltrace clay, some rootlets, organics and asphalt pieces, boulders and cobbles, brown, moist, no odor (compact) Frozen to 0.6 m depth	120.4	0	24	×	SS1	
				1	26	×	SS2	
				1	89/280 mm	×	SS3	
		BOULDERS AND COBBLES FILL some silty sand filling between boulders and cobbles.	118.4 118.29	2				
				3			Run 1	
		LIMESTONE BEDROCK Limestone with minor shaley laminations and turbidites, grey to dark grey, lightly weathered, moderate to closely spaced fractures, (very poor to fair quality)	117.0	4			Run 2	
				5			Run 3	
			114.3	6				
		Borehole Terminated at 6.2 m Depth						

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Combustible Vapour Reading (ppm): 250 500 750

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

LOG OF BOREHOLE BH LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00258780-B0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
'March 24, 2020	Dry	
'May 14, 2020	1.6	
July 2, 2020	2.1	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	2.03 - 3.2	48	26
2	3.2 - 3.45	100	0
3	3.45 - 4.62	61	30
4	4.62 - 6.15	85	48

Log of Borehole BH-04

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 6

Page. 1 of 1

Date Drilled: 'March 24, 2020

Drill Type: CME 45 Track-Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation 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
		FILL Silty gravelly sand to silty sand, trace clay, rootlets and organics, cobbles and boulders, asphalt fill between 0.4 to 0.7 m depth, brown, moist, no odor Frozen to 0.4 m depth	117.8	0	60		SS1	
		ORGANIC SANDY SILT Some peat inclusions, green-grey, very moist, no odor	117.1	1	9		SS2	20.5
		FILL Silty sand, grey, wet, no odor	116.4		50 for 130 mm		SS3	
		Refusal to Augers at 1.8 m Depth	116.0					

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

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00258780-B0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
'March 24, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF BOREHOLE BH LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

Log of Borehole BH-05

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 7

Page. 1 of 1

Date Drilled: 'March 24, 2020

Drill Type: CME 45 Track-Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation 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
		FILL Gravelly silty sand to sandy silt, cobbles and bolders, grey to brown, moist, no odor Frozen to 0.7 m depth	116.5	0	50 for 130 mm		SS1	
				1	26		SS2	
				2	60 for 280 mm		SS3	
		PEAT TO ORGANIC SANDY SILT Numerous bark pieces and rootlets, dark brown to green grey, very moist, no odor	114.2		2		SS4	
		SILTY SAND Some sandy gravel seams or pcokets grey to wet, no odor, (compact)	113.75 / 113.5	3	15		SS5	
				4	24		SS6	
				5	22		SS7	
		GLACIAL TILL Silty sand, grace gravel, grey, cobbles, occasional boulders, very moist to wet, no dor, (dense to very dense)	111.2	6	41		SS8	
			110.3		50 for 80 mm		SS9	
		Refusal to Augers at 6.2 m Depth						

LOG OF BOREHOLE BH LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 32 mm diameter monitoring well installed as shown.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00258780-B0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
'March 24, 2020	Dry	
'May 14, 2020	2.4	
July 2, 2020	2.8	

CORE DRILLING RECORD

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

Log of Borehole BH-06

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 8

Page. 1 of 1

Date Drilled: 'March 24, 2020

Drill Type: CME 45 Track-Mounted Drill Rig

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation 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 ~200 mm, frozen	120.5	0				
		FILL	120.3					
		Sandy silt, trace grave and clay, rootlets and organics, brown, moist, no odor (comapct)			25		SS1	
		Frozen to 0.4 m depth	119.8					
		TILL		1	66		SS2	
		Gravelly silty sand, trace clay, numerous cobbles and boulders, brown, moist, no odor (very dense)			97		SS3	
				2	69		SS4	21.0
				3	60		SS5	
		Refusal to Augers at 3.60 m Depth	116.9					

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Combustible Vapour Reading (ppm): 250 500 750

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

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00258780-B0

WATER LEVEL RECORDS

Date	Water Level (m)	Hole Open To (m)
'March 24, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF BOREHOLE BH LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

Log of Test Pit TP-03

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 9

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		FILL Gravelly sand to silty sand, some cobbles and boulders, clayey silt inclusions, brown, moist, no odor	116.2	0	20 40 60 80 50 100 150 200	250 500 750 20 40 60		
		Refusal to Excavator Bucket at 0.6 m Depth on Inferred Bedrock	115.6					

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-04

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 10

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		FILL Gravelly sand to silty sand, cobbles and boulders, some clayey silt inclusions, brown, moist	117.2	0	20 40 60 80 / 50 100 150 200	250 500 750 / 20 40 60		
			116.7					
		Refusal to Excavator Bucket at 0.5 m Depth on Inferred Bedrock						

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-05

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 11

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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 ~100 mm thick	117.6	0	20 40 60 80 / 50 100 150 200	250 500 750 / 20 40 60		
		FILL Silty sand, some gravel, brown, moist, no odor	117.5					
		Refusal to Excavator Bucket at 0.3 m Depth on Inferred Bedrock	117.3					

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-06

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 12

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
		FILL Gravelly sand to silty sand, cobbles and boulders, rootlets and organics, brown, moist, no odor	118.1	0
		PEAT Numerous bark pieces and rootlers, dark brown, very moist, no odor	117.3	1
▼		**MARL** Green-grey, minor oxidization staining, very moist, no odor	116.7	
		Refusal to Excavator Bucket at 1.9 m Depth on Inferred Bedrock	116.4 116.2	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750

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

SAMPLES

Natural Unit Wt. kN/m³

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	1.7	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-07

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 13

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
		FILL Gravelly sand to sandy silt, some clay, cobbles and boulders, brown, moist	117.6	0
		FILL Silty sand, some gravel, cobbles, boulders and wood pieces, brown, moist	117.0	1
		PEAT Organic, numerous bark pieces and rootlers, dark brown, very moist, no odor	116.3	
		GLACIAL TILL Gravelly silty sand, numerous cobbles and boulders, grey, wet	116.1	2
		Refusal to Excavator Bucket at 2.3 m Depth on Inferred Bedrock	115.3	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength kPa: 50 100 150 200

Combustible Vapour Reading (ppm): 250 500 750

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

SAMPLES

Natural Unit Wt. kN/m³

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-08

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 14

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation 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
		FILL Gravelly sand to silty sand, cobbles, boulderrs and wood pieces, brown, moist	118.8	0	Shear Strength 50 100 150 200 kPa	250 500 750 / 20 40 60		
		PEAT Organic, numerous bark pieces and rootlets, dark brown, very moist, no odor	117.6	1			100 GS1	
		MARL Green-grey to grey, oxidized stains, very moist to wet, no odor	117.1				GS2	
		GLACIAL TILL Gravelly sand, some silt, numerous cobbles and boulders, grey, wet	116.8	2				
		Refusal to Excavator Bucket at 2.5 m Depth on Inferred Bedrock	116.3					

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-09

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 15

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation 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
		FILL Gravelly sand, trace silt, brown, moist, no odor	118.8	0	20 40 60 80 / 50 100 150 200 kPa	250 500 750 / 20 40 60		
			118.5					
		FILL Silty sand, some gravel, contains cobbles and boulders, contains wood pieces, brown, moist		1				
			117.6					
		MARL Green grey, moist	117.3					
		PEAT Numerous bark pieces and rootletrs, dark brown, very moist, no odor					100 GS1	
			116.8	2				
		CLAY CRUST Silty clay, trace sand and gravel, light brown, no odor					GS2	
			116.3					
		MARL Green-grey to dark grey, very moist, no odor		3				
			115.7					
		Refusal to Excavator Bucket at 3.1 m Depth on Inferred Bedrock						

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-10

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 16

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		FILL Silty sand, some gravel and frequent wood pieces, brown, moist	118.7	0	20 40 60 80 50 100 150 200 kPa	250 500 750 20 40 60		
		FILL Silty gravelly sand, numerous cobbles and boulders, brown, moist to wet	117.6	1			GS1	
		Refusal to Excavator Bucket at 2.3 m Depth on Inferred Bedrock	116.4	2				

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-11

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 17

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation 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 ~ 100 mm	119.2	0	20 40 60 80 / 50 100 150 200 kPa	250 500 750 / 20 40 60		
		FILL Silty gravelly sand, contains numerous cobbles and boulders, large concrete slabs throughout, brown, moist to wet	119.1					
▼			118.3	1		×	GS1	
		Refusal to Excavator Bucket at 1.4 m Depth on Inferred Bedrock	117.8					

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	0.9	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-12

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 18

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation m	Depth
		TOPSOIL ~150 mm	119.6	0
		FILL Silty sand, some gravel, cobbles, boulders and wood pieces, brown, moist	119.5	
▼			118.4	1
		PEAT Organic, numerous bark pieces and rootlets, dark brown, very moist, no odor	117.6 117.3	2
		Refusal to Excavator Bucket at 2.3 m Depth on Inferred Bedrock		

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

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

SAMPLES	Natural Unit Wt. kN/m³
100	GS1

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	1.2	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-13

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 19

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
		TOPSOIL ~ 220 mm	119.4	0
		FILL Silty gravelly sand, numerous cobbles and boulders, large concrete slabs throughout, brown, moist to wet, no odor	119.2	
▼			116.8	1
		Refusal to Excavator Bucket at 2.9 m Depth on Inferred Bedrock	116.5	2

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750

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

SAMPLES

Natural Unit Wt. kN/m³

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	2.6	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-14

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 20

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. Checked by: I.T.

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation 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
		FILL Granular fill over silty sand and gravel, wood pieces, brown, moist, no odor	120.1	0	20 40 60 80 50 100 150 200 kPa	250 500 750 20 40 60		
		BOULDERS AND COBBLES FILL Some silty sand inclusions - possible till in lower levels	119.4	1				
			117.8	2				
		Refusal to Excavator Bucket at 2.3 m Depth on Inferred Bedrock						

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-15

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 21

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation m	Depth
		FILL Granular fill (150mm) OVER silty sand with gravel, rootlets and asphalt pieces, cobbles and blulders below 0.8 m depth, brown, moist, no odor	120.2	0
			118.8	1
		PEAT Organic, numerous bark pieces and roots, dark brown, very moist, no odor	118.5	
		GLACIAL TILL Gravelly sand, trace silt and gravel, oxidized stains, numerous cobbles and boulders, brown, wet	118.0	2
		Refusal to Excavator Bucket at 2.2 m Depth on Inferred Bedrock		

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: GS1 at 1 m

Natural Unit Wt. kN/m³

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/5/20

Log of Test Pit TP-16

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 22

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation m	Depth
		FILL Silty sand, some gravel, wood pieces troughout, brown, moist	119.9	0
		SILTY SAND (POSSIBLE TILL) Silty gravelly sand, numerous cobbles and boulders, brown, moist to wet	118.9	1
		Refusal to Excavator Bucket at 1.8 m Depth on Inferred Bedrock	118.1	

Standard Penetration Test N Value: 20 40 60 80
Shear Strength: 50 100 150 200 kPa
Combustible Vapour Reading (ppm): 250 500 750
Natural Moisture Content % Atterberg Limits (% Dry Weight): 20 40 60
SAMPLES
Natural Unit Wt. kN/m³

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

Log of Test Pit TP-17

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 23

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation m	Depth
		FILL 150 mm granular fill OVER silty sand and gravel, rootlers, brown, moist, no odor	120.5	0
		BOULDERS AND COBBLES FILL Gravelly silty sand inclusions , some wood pieces, moist	120.0	
		SILTY GRAVELLY SAND (POSSIBLE TILL) numerous cobbles and boulders, brown, wet	118.9	1
▼			117.4	3
		Refusal to Excavator Bucket at 4.2m Depth on Inferred Bedrock	116.3	4

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

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

SAMPLES

Natural Unit Wt. kN/m³

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	3.1	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

Log of Test Pit TP-18

Project No: OTT-00258780-B0

Project: Geotechnical Investigation - Proposed Residential Development

Location: 6171 Hazeldean Road, Ottawa, Ontario

Figure No. 24

Page. 1 of 1

Date Drilled: 'March 17, 2020

Drill Type: CAT 320D Excavator

Datum: Geodetic Elevation

Logged by: G.C. 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 Elevation m	Depth
		FILL Granular fill OVER Silty sand with some gravel, brown, moist, no odor	120.8	0
		BOULDERS AND COBBLES FILL Gravelly silty sand inclusions, brown, moist	120.3	1
		SILTY GRAVELLY SAND (POSSIBLE TILL) Numerous boulders and cobbles, brown, moist	118.8	2
			117.1	3
		Refusal to Excavator Bucket at 3.7 m Depth on Inferred Bedrock		

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

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

SAMPLES

Natural Unit Wt. kN/m³

NOTES:
1. Borehole/Test Pit data requires Interpretation by exp. before use by others
2. Test pit backfilled with excavated material and nominally compacted using excavator bucket.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00258780-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
'March 17, 2020	Dry	

CORE DRILLING RECORD

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

LOG OF TEST PIT TP LOGS - 258780.GPJ TROW OTTAWA.GDT 7/23/20

EXP Services Inc.
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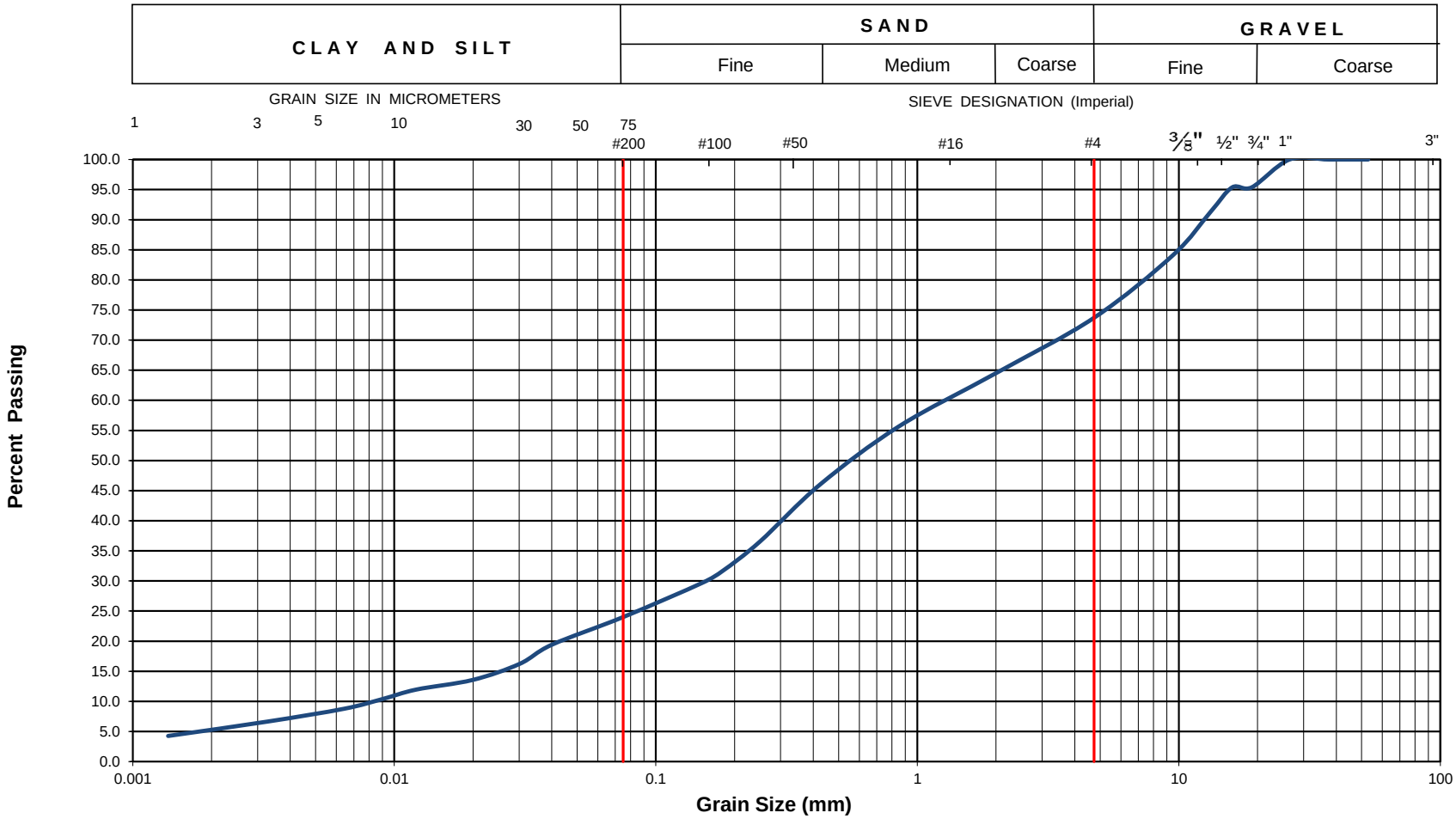
Ottawa, ON K2B 8H6

Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422

Unified Soil Classification Svstem



EXP Project No.:	**OTT-00258780-B0**	**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**						
Client :	**11654128 Canada Inc.**	**Project Location :**	**6171 Hazeldean Rd, Ottawa, ON**						
Date Sampled :	**March 20, 2020**	**Borehole No:**	**BH2**	**Sample No.:**	**SS2**	**Depth (m) :**	**0.8-1.4**		
Sample Description :		**% Silt and Clay**	**24**	**% Sand**	**50**	**% Gravel**	**26**	**Figure :**	**25**
Sample Description :		**Silty Gravelly Sand (SM)**							

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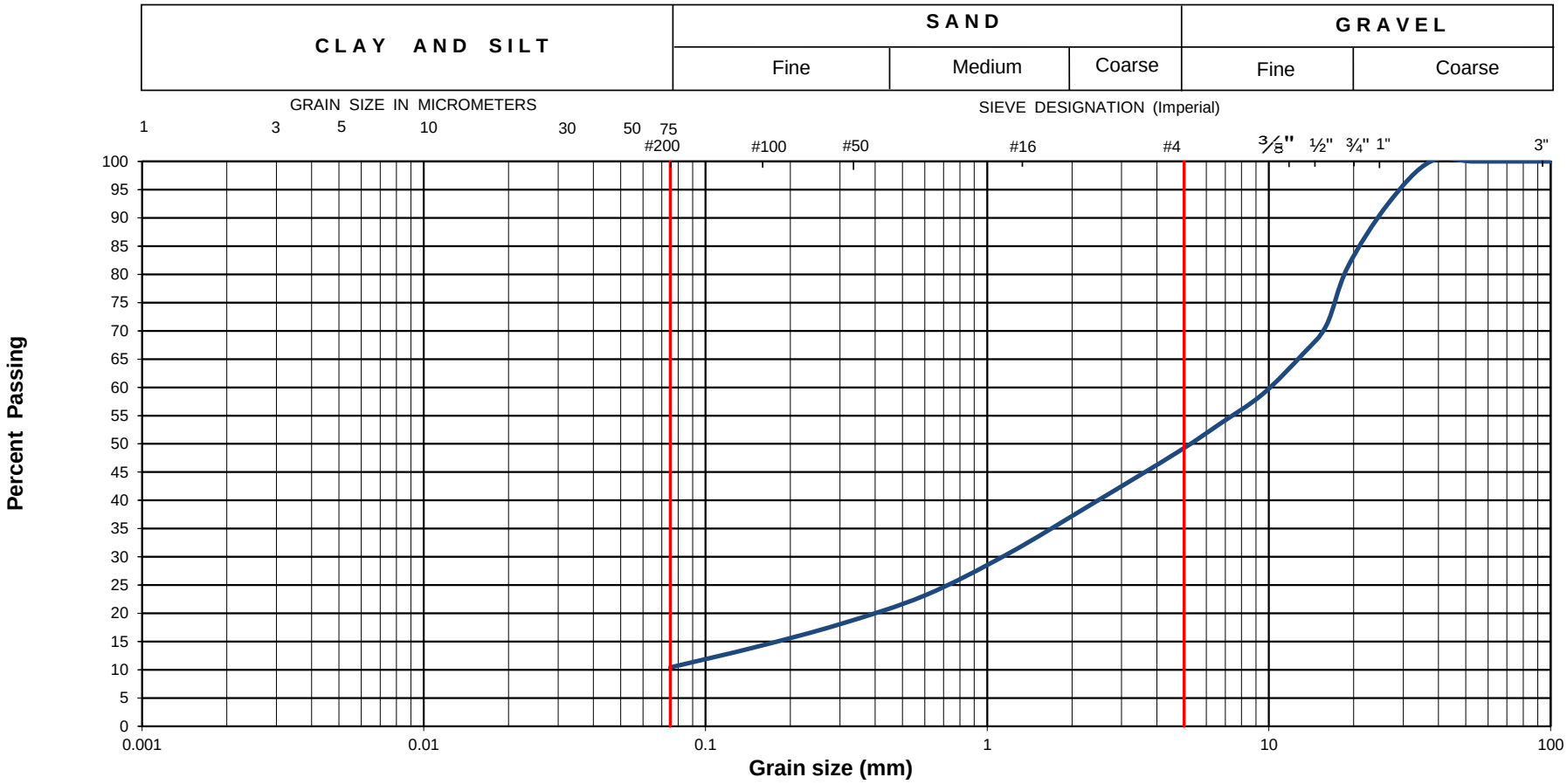
Grain-Size Distribution Curve
Method of Test For Sieve Analysis of Aggregate
ASTM C-136

Unified Soil Classification System



EXP Project No.:	**OTT-00258780-B0**	**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**						
Client :	**11654128 Canada Inc.**	**Project Location :**	**6171 Hazeldean Rd, Ottawa, ON**						
Date Sampled :	**March 24, 2020**	**Borehole No:**	**BH3**	**Sample:**	**SS2**	**Depth (m) :**	**0.8-1.4**		
Sample Composition :		**Gravel (%)**	**51**	**Sand (%)**	**39**	**Silt & Clay (%)**	**10**	**Figure :**	**26**
Sample Description :	**Well Graded Sandy Gravel (GW)**								

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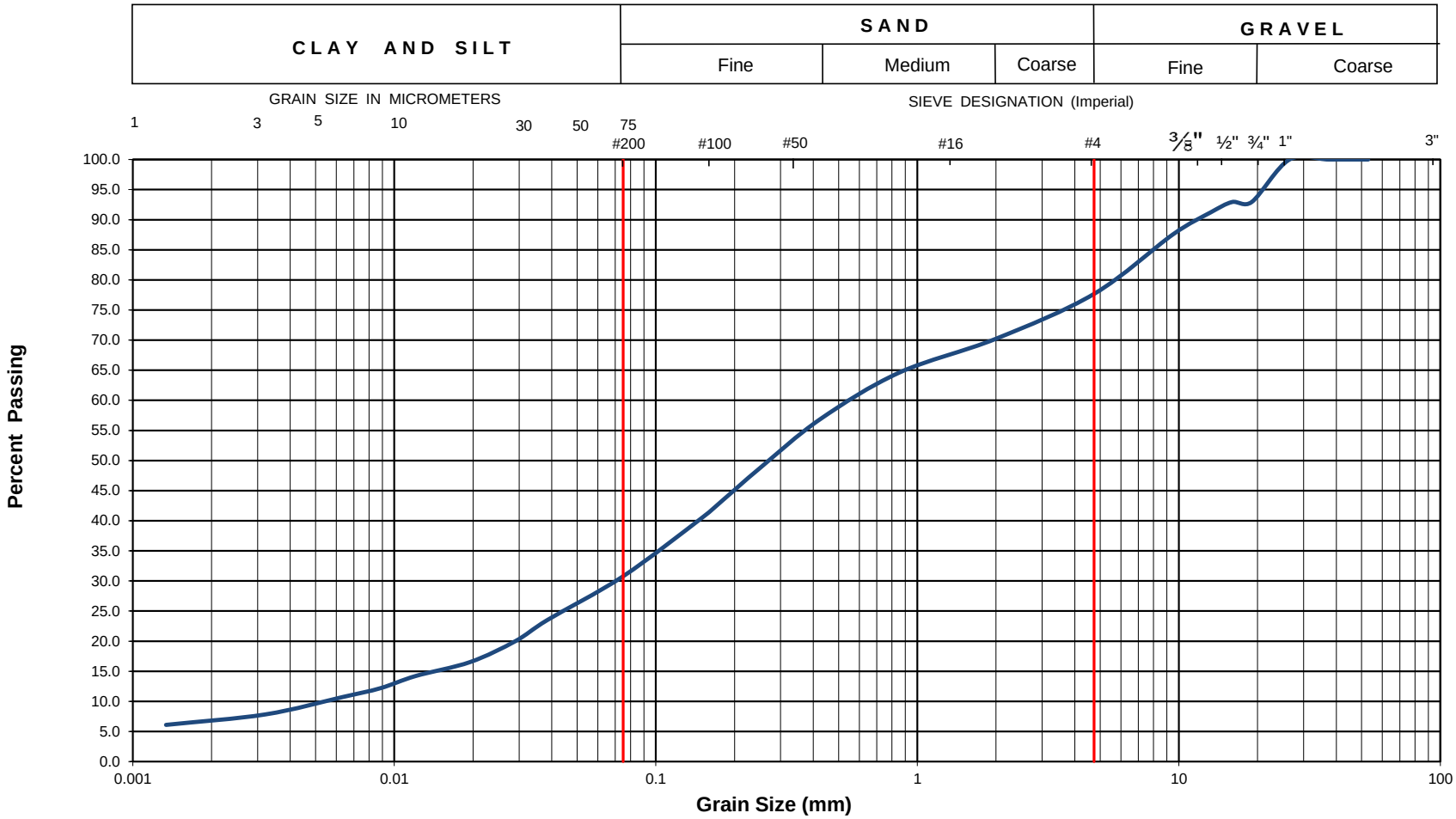
Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422

Unified Soil Classification System



EXP Project No.:	**OTT-00258780-B0**	**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**						
Client :	**11654128 Canada Inc.**	**Project Location :**	**6171 Hazeldean Rd, Ottawa, ON**						
Date Sampled :	**March 24, 2020**	**Borehole No:**	**BH4**	**Sample No.:**	**SS1**	**Depth (m) :**	**0-0.6**		
Sample Description :		**% Silt and Clay**	**31**	**% Sand**	**47**	**% Gravel**	**22**	**Figure :**	**27**
Sample Description :		**Silty Gravelly Sand (SM)**							

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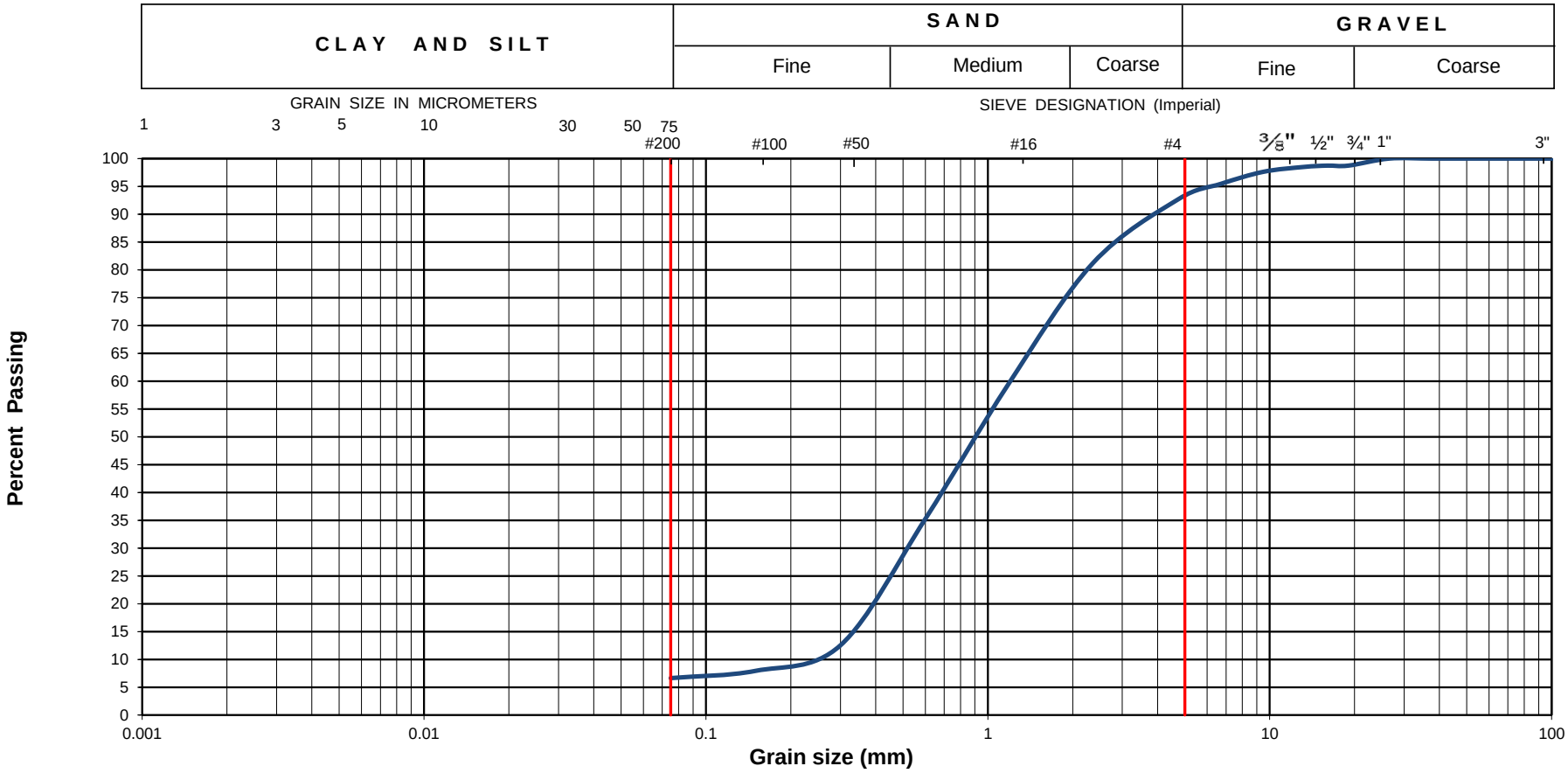
Grain-Size Distribution Curve
Method of Test For Sieve Analysis of Aggregate
ASTM C-136

Unified Soil Classification System



EXP Project No.:	**OTT-00258780-B0**	**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**						
Client :	**11654128 Canada Inc.**	**Project Location :**	**6171 Hazeldean Rd, Ottawa, ON**						
Date Sampled :	**March 17, 2020**	**Borehole No:**	**TP14**	**Sample:**	**AS1**	**Depth (m) :**	**0 - 0.6**		
Sample Composition :		**Gravel (%)**	**7**	**Sand (%)**	**86**	**Silt & Clay (%)**	**7**	**Figure :**	**28**
Sample Description :	**Well Graded Sand (SW)**								

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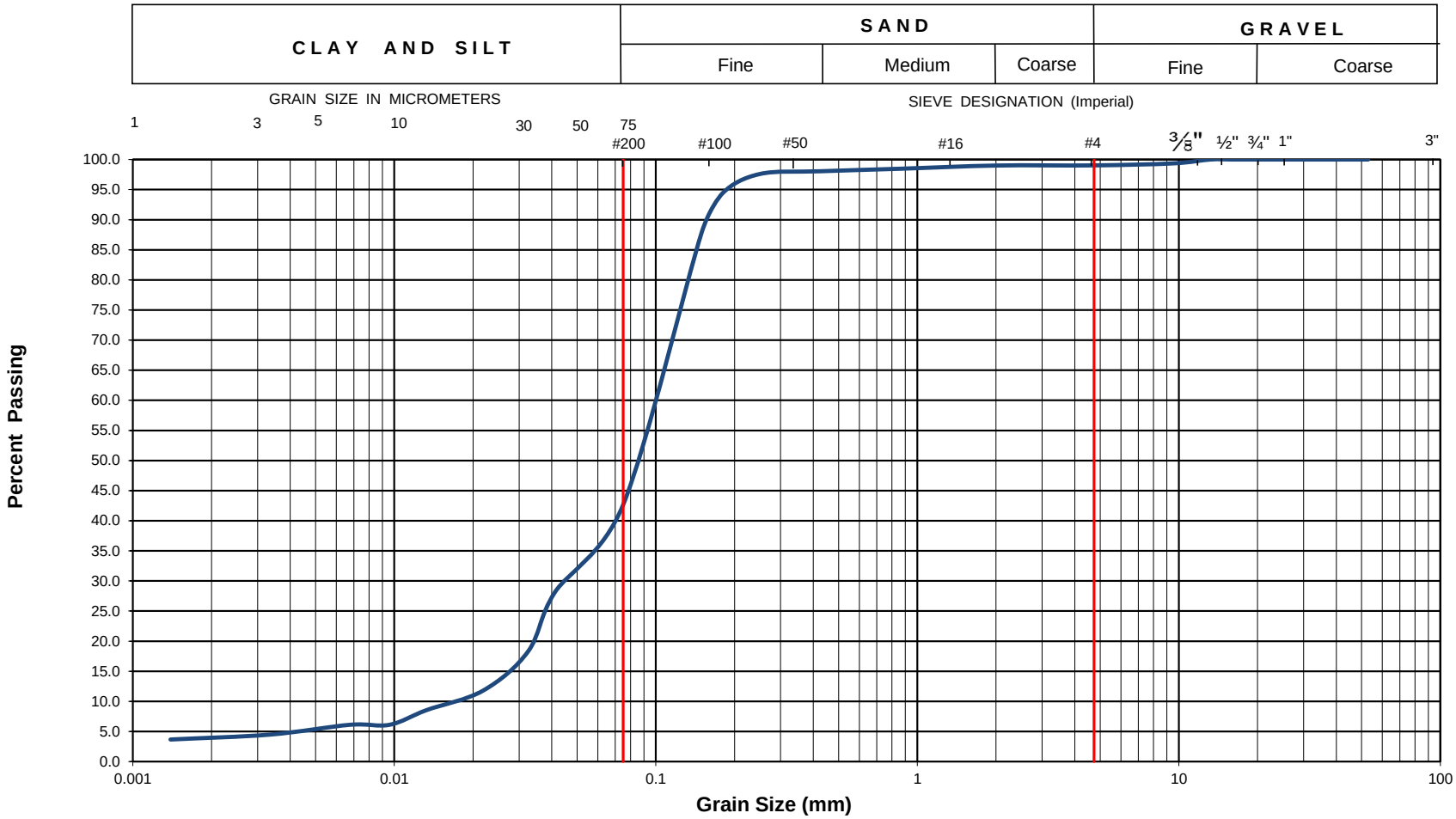
Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422

Unified Soil Classification System



EXP Project No.:	**OTT-00258780-B0**	**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**						
Client :	**11654128 Canada Inc.**	**Project Location :**	**6171 Hazeldean Rd, Ottawa, ON**						
Date Sampled :	**March 24, 2020**	**Borehole No:**	**BH5**	**Sample No.:**	**SS6**	**Depth (m) :**	**3.8-4.4**		
Sample Description :		**% Silt and Clay**	**43**	**% Sand**	**56**	**% Gravel**	**1**	**Figure :**	**29**
Sample Description :		**Silty Sand (SM)**							

EXP Services Inc.
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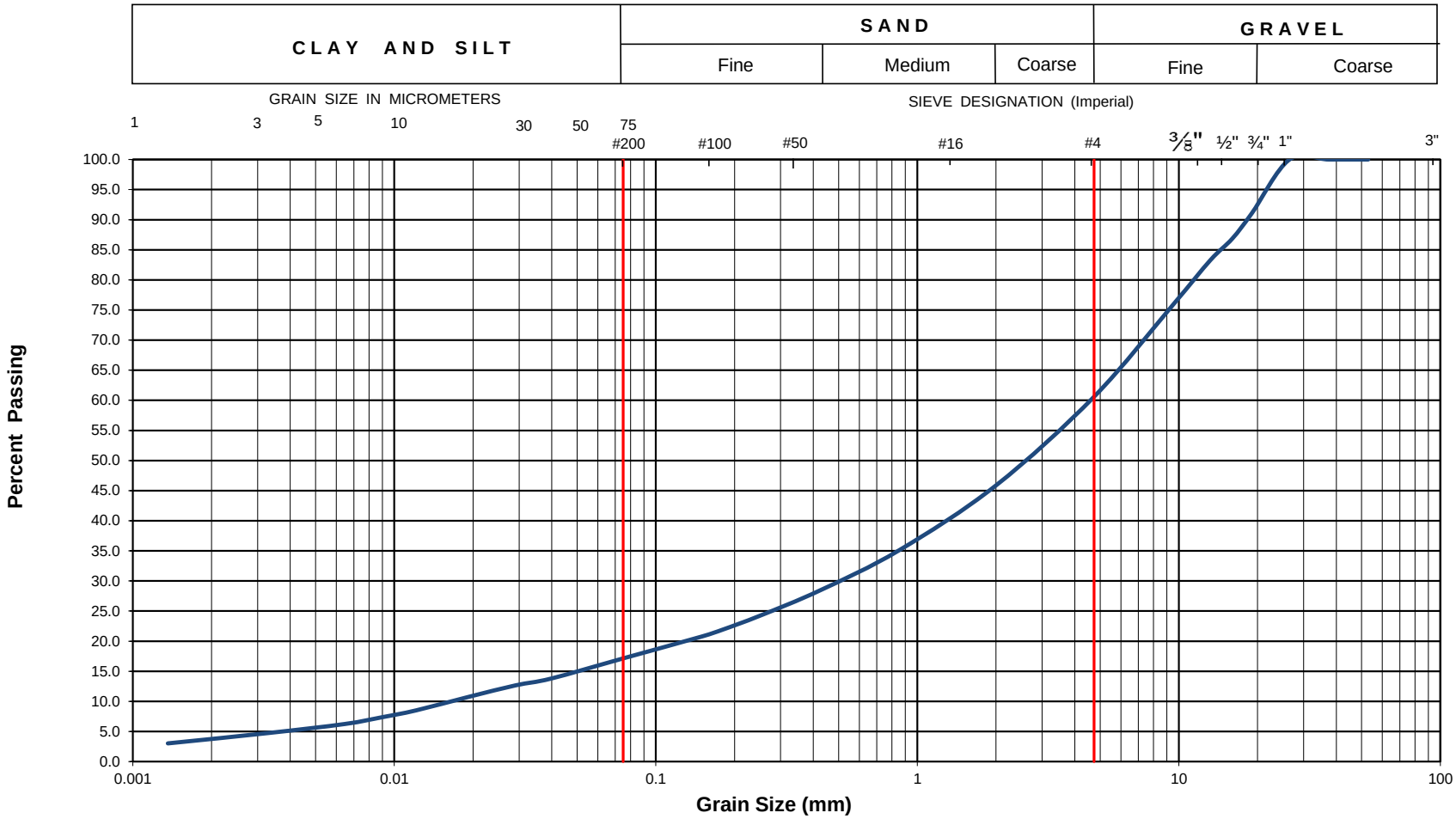
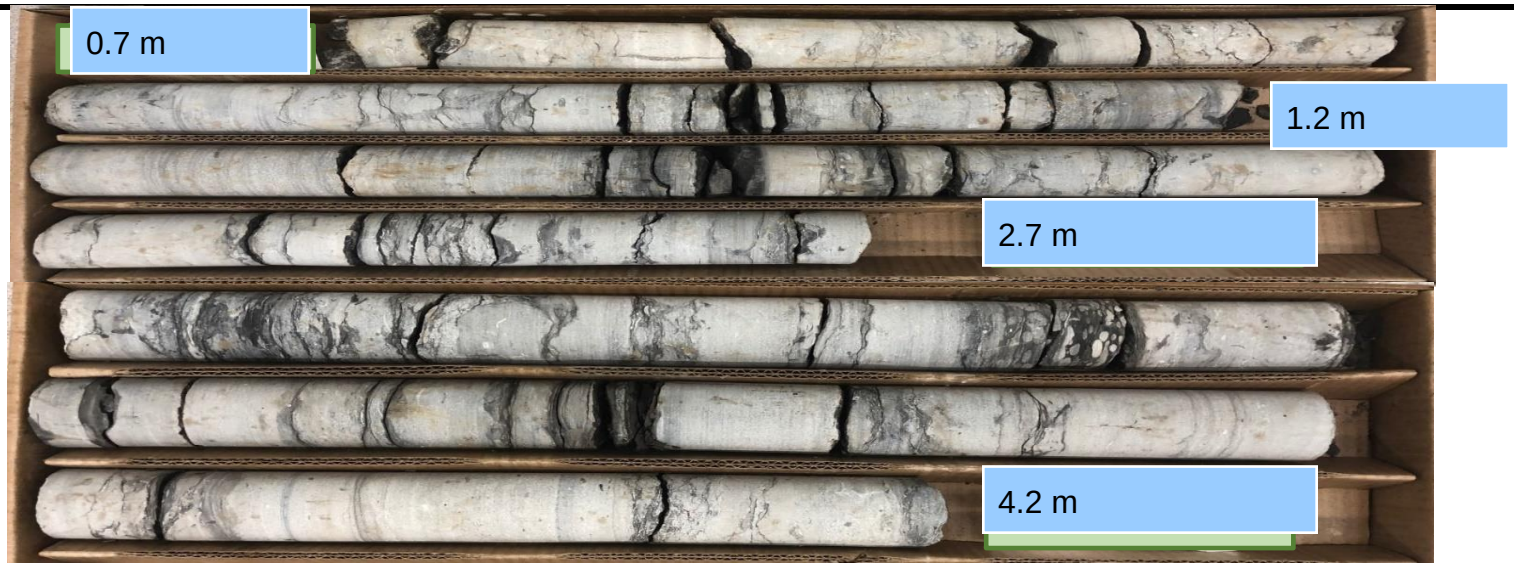
Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422

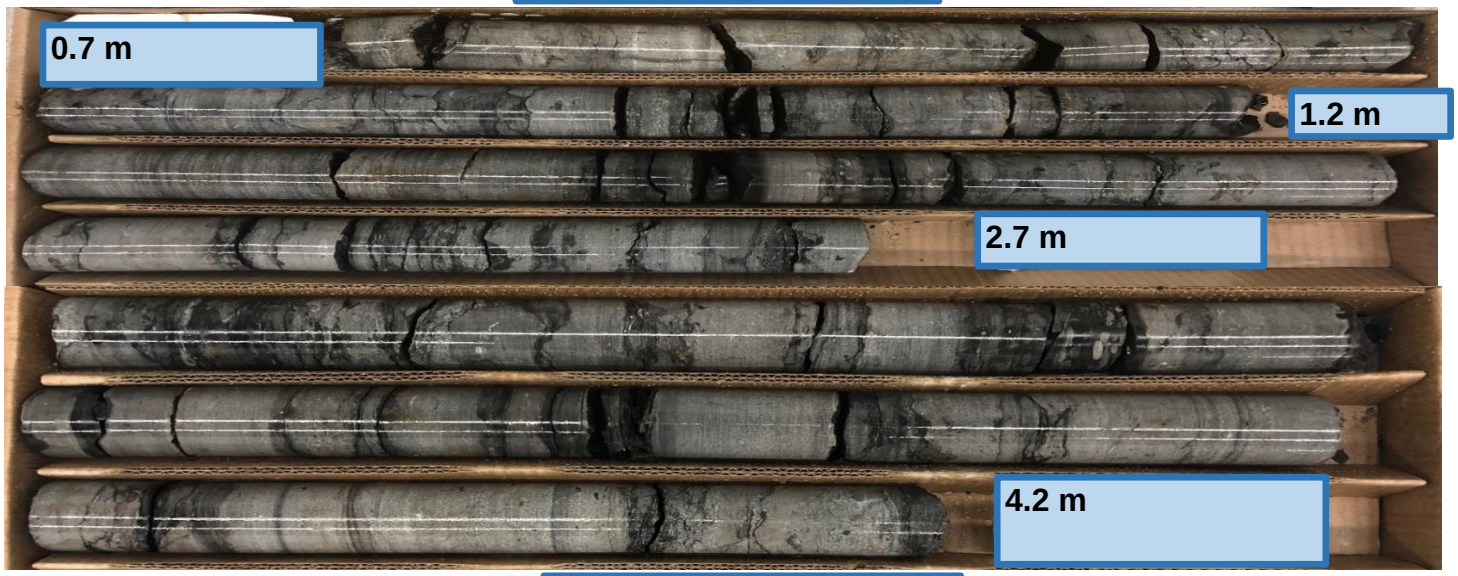
Unified Soil Classification System



EXP Project No.:	**OTT-00258780-B0**	**Project Name :**	**Geotechnical Investigation - Proposed Residential Development**						
Client :	**1165128 Canada Inc.**	**Project Location :**	**6171 Hazeldean Rd, Ottawa, ON**						
Date Sampled :	**March 24, 2020**	**Borehole No:**	**BH6**	**Sample No.:**	**SS5**	**Depth (m) :**	**3.0-3.6**		
Sample Description :		**% Silt and Clay**	**17**	**% Sand**	**44**	**% Gravel**	**39**	**Figure :**	**30**
Sample Description :		**Silty Sand & Gravel (SM)**							

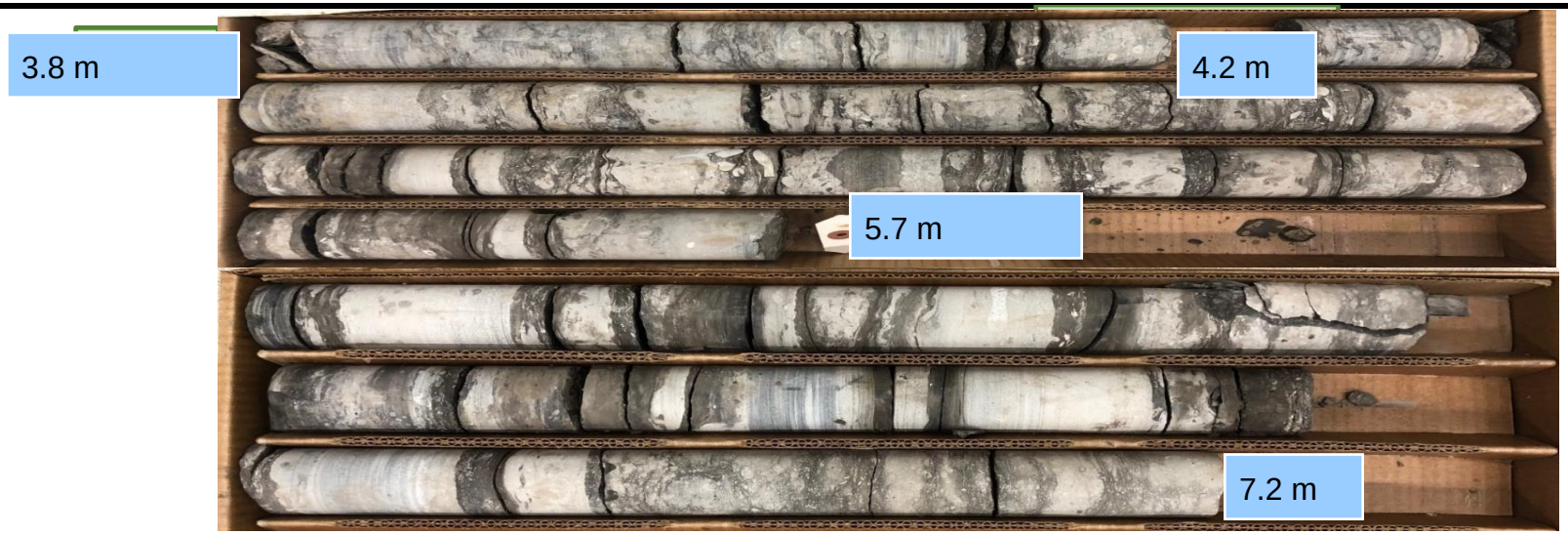


DRY BEDROCK CORES

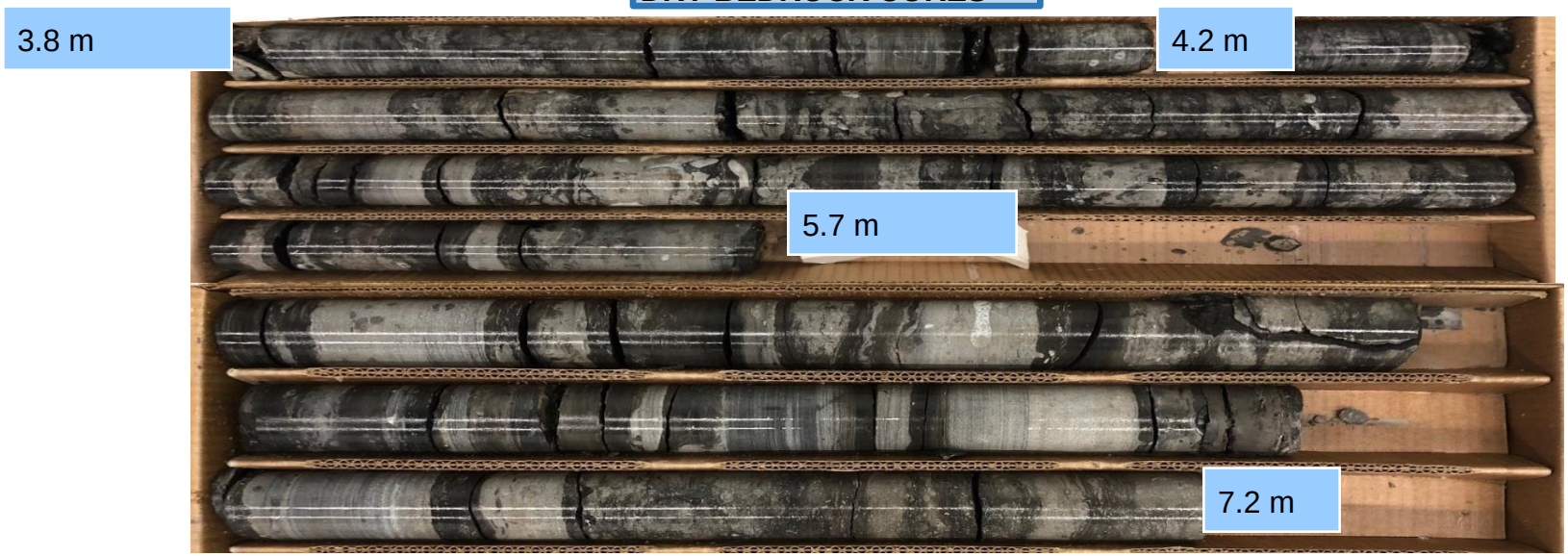


WET BEDROCK CORES

Borehole No. **BH-1**	**Core Runs** Run 1 : 0.7 - 1.2 m Run 2 : 1.2 - 2.7 m Run 3> 2.7 - 4.2 m	Project Name: **Propsoed Residential Development. 6171 Hazeldean Road, Ottawa, ON**	Project No: **OTT-000258780-B0**
		ROCK CORE PHOTOGRAPHS	Figure No: **Fig 31**

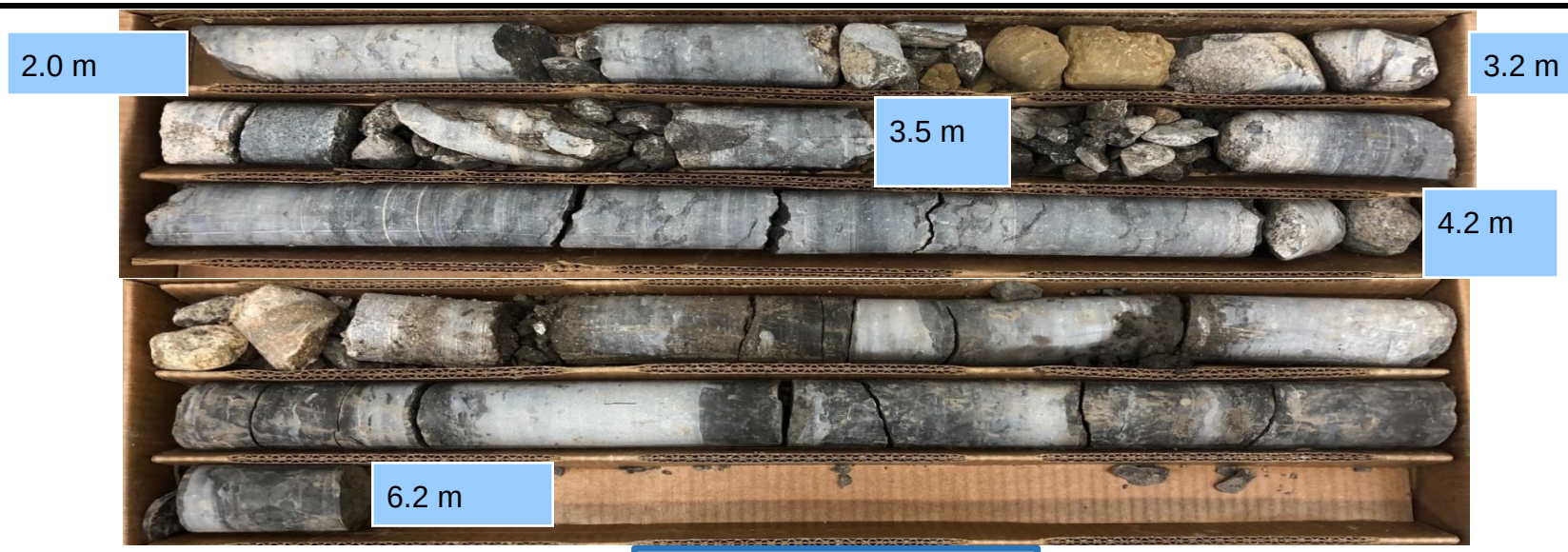


DRY BEDROCK CORES

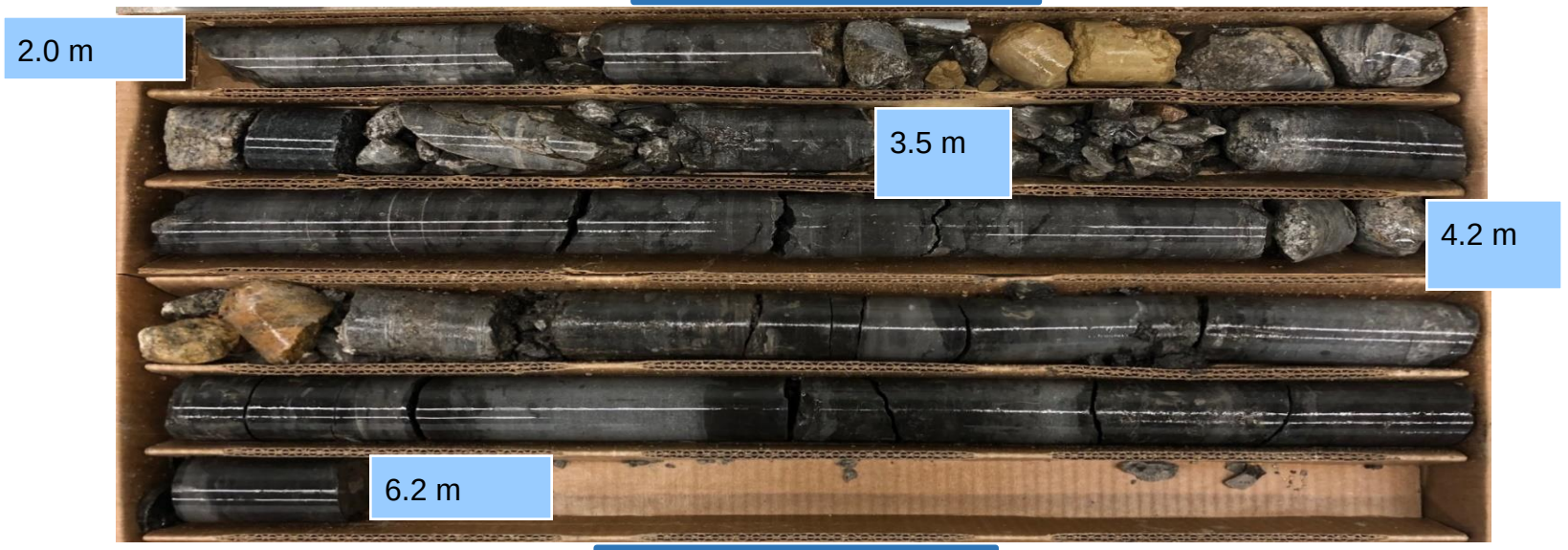


WET BEDROCK CORES

Borehole No. **BH-2**	**Core Runs** Run 1 : 3.8 - 4.2 m Run 2 : 4.2 - 5.7 m Run 3: 5.7 - 7.2 m	Project Name: **Propsoed Residential Development. 6171 Hazeldean Road, Ottawa, ON**	Project No: **OTT-000258780-B0**
		ROCK CORE PHOTOGRAPHS	Figure No: **Fig 32**



DRY BEDROCK CORES



WET BEDROCK CORES

Borehole No. **BH-3**	**Core Runs** Run 1 : 2.0 - 3.2 m Run 2 : 3.2 - 3.5 m Run 3: 3.5 - 4.6 m Run 4: 4.6 - 6.2 m	Project Name: **Propsoed Residential Development. 6171 Hazeldean Road, Ottawa, ON**	Project No: **OTT-000258780-B0**
		ROCK CORE PHOTOGRAPHS	Figure No: **Fig 33**

Appendix E : Analytical Summary Tables

Table 1 - Petroleum Hydrocarbons in Soil
6171 Hazeldean Road, Ottawa, Ontario
OTT-00258780-C0

Sample ID	**Units**	**MECP Table 1 SCS [1] Residential**	**MECP Table 3 SCS [2] Residential**	**TP06-Fill**	**TP06-Native**	**TP08-Fill**	**TP08-Native**	**TP09-Fill**	**TP09-Native**	**TP10-Fill**	**TP10-Native**	**TP14-Fill**	**TP15-Fill**
Sampling Date				**17-Mar-20**	**17-Mar-20**	**17-Mar-20**	**17-Mar-20**	**17-Mar-20**	**17-Mar-20**	**17-Mar-20**	**17-Mar-20**	**17-Mar-20**	**17-Mar-20**
Sample Depth (mbgs)				**0.3 - 0.8**	**1.4 - 1.9**	**1.3 - 1.7**	**1.7 - 2.0**	**1.5 - 2.0**	**2.0 - 2.5**	**0.8 - 1.2**	**1.5 - 2.0**	**0.7 - 2.3**	**0.1 - 0.8**
Laboratory ID				**MHA371**	**MHA372**	**MHA373**	**MHA374**	**MHA375**	**MHA376**	**MHA377**	**1.5 - 2.0**	**MHA379**	**MHA380**
Date of Analysis				**25-Mar-20**	**25-Mar-20**	**25-Mar-20**	**25-Mar-20**	**25-Mar-20**	**25-Mar-20**	**25-Mar-20**	**25-Mar-20**	**25-Mar-20**	**25-Mar-20**
Laboratory Certificate of Analysis				**C073569**	**C073569**	**C073569**	**C073569**	**C073569**	**C073569**	**C073569**	**C073569**	**C073569**	**C073569**
Benzene	ug/g	0.02	0.17	<0.020	<0.020	<0.020	<0.020	<0.020	<0.040	<0.020	<0.020	<0.020	<0.020
Toluene	ug/g	0.2	6	<0.020	<0.020	<0.020	<0.020	<0.020	<0.040	<0.020	<0.020	<0.020	<0.020
Ethylbenzene	ug/g	0.05	15	<0.020	<0.020	<0.020	<0.020	<0.020	<0.040	<0.020	<0.020	<0.020	<0.020
Total Xylenes	ug/g	0.05	25	<0.040	<0.040	<0.040	<0.040	<0.040	<0.080	<0.040	<0.040	<0.040	<0.040
F1 (C6-C10) - BTEX*	ug/g	25	65	<10	<10	<10	<10	<10	<20	<10	<10	<10	<10
F2 (C10-C16)	ug/g	10	150	<10	<10	<10	<10	<10	<20	<10	<10	<10	<10
F3 (C16-C34)	ug/g	240	1300	<50	<50	<50	<50	<50	<100	<50	<50	<50	<50
F4 (C34-C50)**	ug/g	120	5600	<50	<50	<50	<50	<50	<100	<50	<50	<50	**560**

NOTES:

1	Ontario Ministry of Environment, Conservation and Parks (MECP), Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011, Table 1 Full Depth Background Site Condition Standards (SCS) for Residential/Parkland/Institutional property use and coarse textured soils.
2	Ontario Ministry of Environment, Conservation and Parks (MECP), Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011, Table 3 Full Depth Generic Site Condition Standards (SCS) in a Potable Ground Water Condition for Residential/Parkland/Institutional property use and coarse textured soils.
	All results are reported in ppm (ug/g) unless otherwise indicated.
*	F1 fraction does not include BTEX.
**	In instances where the PHC F2 to F4 chromatogram did not reach baseline, the F4 fraction result shown is the highest value obtained via the gas chromatograph/flame ionization detection method or the gravimetric method.
<(RDL)	Non-detectable results are shown as "< (RDL)" where RDL represents the reporting detection limit.
NV	No Value
N/A	Not Applicable
-	Parameter not analyzed
m bgs	Metres below ground surface
	Indicates soil exceedance of MECP Table 1 SCS for Residential/Parkland/Institutional property use
	Indicates soil exceedance of MECP Table 3 SCS for Residential/Parkland/Institutional property use
	Indicates RDL exceedence of MECP Table 1 SCS for Residential/Parkland/Institutional property use

Table 2 - Inorganic Parameters in Soil
6171 Hazeldean Road, Ottawa, Ontario
OTT-00258780-C0

Sample ID	Units	MECP Table 1 SCS [1] Residential	MECP Table 3 SCS [2] Residential	TP06-Fill	TP06-Native	TP08-Fill	TP08-Native	TP09-Fill	TP09-Native	TP10-Fill	TP10-Native	TP11-Fill	TP21-Fill (Field Duplicate of TP11-Fill)	TP14-Fill	TP15-Fill
Sampling Date				17-Mar-20	17-Mar-20	17-Mar-20	17-Mar-20	17-Mar-20	17-Mar-20	17-Mar-20	1.5 - 2.0	17-Mar-20	17-Mar-20	17-Mar-20	17-Mar-20
Sample Depth (mbgs)				0.3 - 0.8	1.4 - 1.9	1.3 - 1.7	1.7 - 2.0	1.5 - 2.0	2.0 - 2.5	0.8 - 1.2	1.5 - 2.0	0.9 - 1.4	0.9 - 1.4	0.7 - 2.3	0.1 - 0.8
Laboratory ID				MHA371	MHA372	MHA373	MHA374	MHA375	MHA376	MHA377	MHA378	MIA870	MIA871	MHA379	MHA380
Date of Analysis				25-Mar-20	25-Mar-20	25-Mar-20	25-Mar-20	25-Mar-20	25-Mar-20	25-Mar-20	25-Mar-20	1-Apr-20	1-Apr-20	25-Mar-20	25-Mar-20
Laboratory Certificate of Analysis				C073569	C073569	C073569	C073569	C073569	C073569	C073569	C073569	C078311	C078311	C073569	C073569
Metals															
Antimony	ug/g	1.3	7.5	0.38	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic	ug/g	18	18	2.0	1.2	<1.0	<1.0	<1.0	<1.0	1.1	<1.0	1.3	1.4	2.7	3.5
Barium	ug/g	220	390	110	48	83	80	59	190	85	53	65	65	66	110
Beryllium	ug/g	2.5	5	0.37	0.21	0.33	0.30	0.24	<0.20	0.41	0.23	0.35	0.35	0.56	0.66
Boron (HWS)	ug/g	NV	1.5	0.18	<0.050	0.12	<0.050	0.085	0.094	0.13	<0.050	0.11	0.08	0.055	0.11
Boron (Total)	ug/g	36	120	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	5.3	5.6
Cadmium	ug/g	1.2	1.2	0.16	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	<0.10	0.11	0.15	<0.10	0.29
Chromium	ug/g	70	160	18	14	16	15	13	1.1	19	16	15	16	18	24
Chromiun VI	ug/g	0.66	8	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18	<0.18
Cobalt	ug/g	21	22	7.4	5.2	5.3	5.2	4.5	0.58	7.5	9.2	5.2	5.4	11	11
Copper	ug/g	92	180	6.4	13	12	11	10	4.3	13	24	10	10	15	13
Lead	ug/g	120	120	47	3.1	5.1	3.8	5.0	<1.0	9.8	4.8	9.0	8.9	7.1	20
Mercury	ug/g	0.27	0.27	<0.050	<0.050	<0.050	<0.050	0.058	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	0.067
Molybdenum	ug/g	2	6.9	<0.50	1.2	<0.50	<0.50	<0.50	0.99	<0.50	<0.50	<0.50	<0.50	<0.50	0.67
Nickel	ug/g	82	130	9.0	8.9	9.5	10	8.0	3.5	13	13	9.3	9.8	15	18
Selenium	ug/g	1.5	2.4	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Silver	ug/g	0.5	25	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium	ug/g	1	1	0.13	0.075	0.11	0.093	0.080	0.15	0.17	0.15	0.10	0.087	0.25	0.27
Uranium	ug/g	2.5	23	0.55	1.1	0.61	0.52	0.62	2.0	0.59	0.49	0.52	0.50	0.65	0.58
Vanadium	ug/g	86	86	38	28	29	27	26	<5.0	34	42	29	29	42	46
Zinc	ug/g	290	340	37	23	27	25	26	9.7	35	28	33	34	69	66
Other Inorganics															
pH	N/A	NV	NV	7.48	7.66	7.34	7.67	7.59	7.12	7.37	7.80	7.46	7.59	7.63	7.37
Conductivity	mS/cm	0.57	0.7	0.34	0.25	0.17	0.12	0.16	0.24	0.20	0.13	0.16	0.16	0.12	0.17
SAR	N/A	2.4	5	0.19	0.23	0.28	0.29	0.27	0.76	0.25	0.31	0.25	0.25	0.31	0.26
Cyanide (Free)	ug/g	0.051	0.051	0.03	<0.01	0.01	<0.01	0.02	0.04	0.02	<0.01	0.01	0.02	<0.01	0.03

NOTES:

1 Ontario Ministry of Environment, Conservation and Parks (MECP), Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011, Table 1 Full Depth Background Site Condition Standards (SCS) for Residential/Parkland/Institutional property use and coarse textured soils.

2 Ontario Ministry of Environment, Conservation and Parks (MECP), Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011, Table 3 Full Depth Generic Site Condition Standards (SCS) in a Potable Ground Water Condition for Residential/Parkland/Institutional property use property use and coarse textured soils.

All results are reported in ppm (ug/g) unless otherwise indicated.

<(RDL) Non-detectable results are shown as "< (RDL)" where RDL represents the reporting detection limit.

NV No Value

N/A Not Applicable

- Parameter not analyzed

m bgs Metres below ground surface

Indicates soil exceedance of MECP Table 1 SCS for Residential/Parkland/Institutional property use

Indicates soil exceedance of MECP Table 3 SCS for Residential/Parkland/Institutional property use

Table 3 - Maximum Concentrations in Soil
6171 Hazeldean Road, Ottawa, Ontario
OTT-00258780-C0

Parameter	Sample Location	Sample Depth (mbgs)	Sampling Date	Maximum Concentration	MECP Table 3
Petroleum Hydrocarbons					
F1 PHC (C6 - C10) - BTEX	TP-09	2.0 - 2.5	17-Mar-20	<20	55
F2 PHC (C10-C16)	TP-09	2.0 - 2.5	17-Mar-20	<20	98
F3 PHC (C16-C34)	TP-09	2.0 - 2.5	17-Mar-20	<100	300
F4 PHC (C34-C50)	TP-15	0.1 - 0.8	17-Mar-20	560	2800
Benzene	TP-09	2.0 - 2.5	17-Mar-20	<0.04	0.21
Ethylbenzene	TP-09	2.0 - 2.5	17-Mar-20	<0.04	2
Toluene	TP-09	2.0 - 2.5	17-Mar-20	<0.04	2.3
Xylenes, total	TP-09	2.0 - 2.5	17-Mar-20	<0.08	3.1
Inorganic Parameters					
Antimony	TP-06	0.3 - 0.8	17-Mar-20	0.38	7.5
Arsenic	TP-15	0.1 - 0.8	17-Mar-20	3.5	18
Barium	TP-09	2.0 - 2.5	17-Mar-20	190	390
Beryllium	TP-15	0.1 - 0.8	17-Mar-20	0.66	4
Boron (HWS)	TP-06	0.3 - 0.8	17-Mar-20	0.18	
Boron	TP-15	0.1 - 0.8	17-Mar-20	5.6	120
Cadmium	TP-15	0.1 - 0.8	17-Mar-20	0.29	1.2
Chromium	TP-15	0.1 - 0.8	17-Mar-20	24	160
Chromium IV	All Locations	0.1 - 2.5	17-Mar-20	<0.18	
Cobalt	TP-14	0.7 - 2.3	17-Mar-20	11	22
	TP-15	0.1 - 0.8	17-Mar-20		
Copper	TP-10	1.5 - 2.0	17-Mar-20	24	140
Lead	TP-06	0.3 - 0.8	17-Mar-20	47	120
Mercury	TP-15	0.1 - 0.8	17-Mar-20	0.067	
Molybdenum	TP-06	1.4 - 1.9	17-Mar-20	1.20	6.9
Nickel	TP-15	0.1 - 0.8	17-Mar-20	18	100
Selenium	All Locations	0.1 - 2.5	17-Mar-20	<0.50	2.4
Silver	All Locations	0.1 - 2.5	17-Mar-20	<0.20	20
Thallium	TP-15	0.1 - 0.8	17-Mar-20	0.27	1
Uranium	TP-09	2.0 - 2.5	17-Mar-20	2.0	23
Vanadium	TP-15	0.1 - 0.8	17-Mar-20	46	86
Zinc	TP-14	0.7 - 2.3	17-Mar-20	69	340

NOTES:

Analysis by Maxxam Analytics

All results are in ppm on dry weight basis

Non-detectable results are shown as "< (RDL)" where RDL represents the reporting detection limit.

Results were compared to Ontario Ministry of Environment, Conservation and Parks (MECP), Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011, Table 3 Full Depth Generic Site Condition Standards (SCS) in a Non- Potable Ground Water Condition for Residential/Parkland/Institutional property use and coarse textured soils.

Table 4 - Relative Percent Differences - Inorganic Parameters in Soil
6171 Hazeldean Road, Ottawa, Ontario
OTT-00258780-C0

Parameter	Units	RDL	TP11-Fill	Dup 1	RPD (%)	Alert Limit (%)
			17-Mar-20	17-Mar-20		
Inorganic Parameters						
Antimony	ug/g	0.20	<0.20	<0.20	nc	60
Arsenic	ug/g	1.0	1.3	1.4	7	60
Barium	ug/g	0.50	65	65	0	60
Beryllium	ug/g	0.20	0.35	0.35	0	60
Boron (HWS)	ug/g	0.05	0.11	0.08	32	60
Boron (Total)	ug/g	5.0	<5.0	<5.0	nc	60
Cadmium	ug/g	0.10	0.11	0.15	31	60
Chromium	ug/g	1.0	15	16	6	60
Chromium IV	ug/g	0.2	<0.18	<0.18	nc	60
Cobalt	ug/g	0.10	5.2	5.4	4	60
Copper	ug/g	0.50	10	10	0	60
Lead	ug/g	1.0	9	8.9	1	60
Mercury	ug/g	0.050	<0.050	<0.050	nc	60
Molybdenum	ug/g	0.50	<0.50	<0.50	nc	60
Nickel	ug/g	0.50	9.3	9.8	5	60
Selenium	ug/g	0.50	<0.50	<0.50	nc	60
Silver	ug/g	0.20	<0.20	<0.20	nc	60
Thallium	ug/g	0.050	0.1	0.087	14	60
Uranium	ug/g	0.050	0.52	0.5	4	60
Vanadium	ug/g	5.0	29	29	0	60
Zinc	ug/g	5.0	33	34	3	60
Cyanide	ug/g	0.01	0.01	0.02	**67**	60

NOTES:

Analysis by Bureau Veritas Laboratories
All results on dry weight basis; <RDL means not detected at reporting detection limit (RDL)
- means "not analysed"
nc means "not calculable" - one (or both) of the results are <5x RDL
Exceedances of alert limits are shown in **bold**

Appendix F : Laboratory Certificates of Analysis

Your Project #: OTT-00258780-C0
Your C.O.C. #: 764708-02-01

Attention: Chris Kimmerly

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

Report Date: 2020/03/25
Report #: R6123615
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C073569
Received: 2020/03/18, 16:20

Sample Matrix: Soil
Samples Received: 10

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hot Water Extractable Boron (1)	10	2020/03/20	2020/03/23	CAM SOP-00408	R153 Ana. Prot. 2011
Free (WAD) Cyanide (1)	10	2020/03/20	2020/03/24	CAM SOP-00457	OMOE E3015 m
Conductivity (1)	1	2020/03/20	2020/03/20	CAM SOP-00414	OMOE E3530 v1 m
Conductivity (1)	9	2020/03/23	2020/03/23	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1, 2)	10	2020/03/20	2020/03/23	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydro. CCME F1 & BTEX in Soil (1, 3)	10	N/A	2020/03/22	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Soil (1, 4)	10	2020/03/20	2020/03/23	CAM SOP-00316	CCME CWS m
F4G (CCME Hydrocarbons Gravimetric) (1)	1	2020/03/25	2020/03/25	CAM SOP-00316	CCME PHC-CWS m
Strong Acid Leachable Metals by ICPMS (1)	10	2020/03/20	2020/03/20	CAM SOP-00447	EPA 6020B m
Moisture (1)	10	N/A	2020/03/20	CAM SOP-00445	Carter 2nd ed 51.2 m
pH CaCl2 EXTRACT (1)	10	2020/03/20	2020/03/20	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR) (1)	1	N/A	2020/03/20	CAM SOP-00102	EPA 6010C
Sodium Adsorption Ratio (SAR) (1)	9	N/A	2020/03/24	CAM SOP-00102	EPA 6010C

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs 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.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs 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 BV Labs, unless otherwise agreed in writing. BV Labs 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 BV Labs, results relate to the supplied samples tested.

Your Project #: OTT-00258780-C0
Your C.O.C. #: 764708-02-01

Attention: Chris Kimmerly

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

Report Date: 2020/03/25
Report #: R6123615
Version: 2 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C073569

Received: 2020/03/18, 16:20

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.

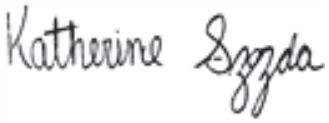
(1) This test was performed by Bureau Veritas Laboratories Mississauga

(2) Soils are reported on a dry weight basis unless otherwise specified.

(3) No lab extraction date is given for F1BTEX & VOC samples that are field preserved with methanol. Extraction date is the date sampled unless otherwise stated.

(4) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories 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.

Encryption Key



Katherine Szozda
Project Manager
25 Mar 2020 15:42:37

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Katherine Szozda, Project Manager
Email: Katherine.Szozda@bvlabs.com
Phone# (613) 274-0573

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

BV Labs Job #: C073569
Report Date: 2020/03/25

exp Services Inc
Client Project #: OTT-00258780-C0
Sampler Initials: GC

O.REG 153 METALS & INORGANICS PKG (SOIL)

BV Labs ID		MHA371	MHA372	MHA373			MHA373		
Sampling Date		2020/03/17	2020/03/17	2020/03/17			2020/03/17		
COC Number		764708-02-01	764708-02-01	764708-02-01			764708-02-01		
	UNITS	**TP06-FILL**	**TP06-NATIVE**	**TP08-FILL**	**RDL**	**QC Batch**	**TP08-FILL Lab-Dup**	**RDL**	**QC Batch**
Calculated Parameters									
Sodium Adsorption Ratio	N/A	0.19	0.23	0.28		6644792			
Inorganics									
Conductivity	mS/cm	0.34	0.25	0.17	0.002	6648741			
Available (CaCl2) pH	pH	7.48	7.66	7.34		6646370			
WAD Cyanide (Free)	ug/g	0.03	<0.01	0.01	0.01	6646601			
Chromium (VI)	ug/g	<0.18	<0.18	<0.18	0.18	6645790			
Metals									
Hot Water Ext. Boron (B)	ug/g	0.18	<0.050	0.12	0.050	6646529	0.12	0.050	6646529
Acid Extractable Antimony (Sb)	ug/g	0.38	<0.20	<0.20	0.20	6646434			
Acid Extractable Arsenic (As)	ug/g	2.0	1.2	<1.0	1.0	6646434			
Acid Extractable Barium (Ba)	ug/g	110	48	83	0.50	6646434			
Acid Extractable Beryllium (Be)	ug/g	0.37	0.21	0.33	0.20	6646434			
Acid Extractable Boron (B)	ug/g	<5.0	<5.0	<5.0	5.0	6646434			
Acid Extractable Cadmium (Cd)	ug/g	0.16	<0.10	<0.10	0.10	6646434			
Acid Extractable Chromium (Cr)	ug/g	18	14	16	1.0	6646434			
Acid Extractable Cobalt (Co)	ug/g	7.4	5.2	5.3	0.10	6646434			
Acid Extractable Copper (Cu)	ug/g	6.4	13	12	0.50	6646434			
Acid Extractable Lead (Pb)	ug/g	47	3.1	5.1	1.0	6646434			
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	1.2	<0.50	0.50	6646434			
Acid Extractable Nickel (Ni)	ug/g	9.0	8.9	9.5	0.50	6646434			
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	<0.50	0.50	6646434			
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	<0.20	0.20	6646434			
Acid Extractable Thallium (Tl)	ug/g	0.13	0.075	0.11	0.050	6646434			
Acid Extractable Uranium (U)	ug/g	0.55	1.1	0.61	0.050	6646434			
Acid Extractable Vanadium (V)	ug/g	38	28	29	5.0	6646434			
Acid Extractable Zinc (Zn)	ug/g	37	23	27	5.0	6646434			
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	<0.050	0.050	6646434			

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

BV Labs Job #: C073569
Report Date: 2020/03/25

exp Services Inc
Client Project #: OTT-00258780-C0
Sampler Initials: GC

O.REG 153 METALS & INORGANICS PKG (SOIL)

BV Labs ID		MHA374			MHA374			MHA375		
Sampling Date		2020/03/17			2020/03/17			2020/03/17		
COC Number		764708-02-01			764708-02-01			764708-02-01		
	UNITS	**TP08-NATIVE**	**RDL**	**QC Batch**	**TP08-NATIVE Lab-Dup**	**RDL**	**QC Batch**	**TP09-FILL**	**RDL**	**QC Batch**
Calculated Parameters										
Sodium Adsorption Ratio	N/A	0.29		6644792				0.27		6644792
Inorganics										
Conductivity	mS/cm	0.12	0.002	6646314	0.12	0.002	6646314	0.16	0.002	6648741
Available (CaCl2) pH	pH	7.67		6646370	7.71		6646370	7.59		6646370
WAD Cyanide (Free)	ug/g	<0.01	0.01	6646601	<0.01	0.01	6646601	0.02	0.01	6646601
Chromium (VI)	ug/g	<0.18	0.18	6645790	<0.18	0.18	6645790	<0.18	0.18	6645790
Metals										
Hot Water Ext. Boron (B)	ug/g	<0.050	0.050	6646529				0.085	0.050	6646529
Acid Extractable Antimony (Sb)	ug/g	<0.20	0.20	6646434				<0.20	0.20	6646434
Acid Extractable Arsenic (As)	ug/g	<1.0	1.0	6646434				<1.0	1.0	6646434
Acid Extractable Barium (Ba)	ug/g	80	0.50	6646434				59	0.50	6646434
Acid Extractable Beryllium (Be)	ug/g	0.30	0.20	6646434				0.24	0.20	6646434
Acid Extractable Boron (B)	ug/g	<5.0	5.0	6646434				<5.0	5.0	6646434
Acid Extractable Cadmium (Cd)	ug/g	<0.10	0.10	6646434				<0.10	0.10	6646434
Acid Extractable Chromium (Cr)	ug/g	15	1.0	6646434				13	1.0	6646434
Acid Extractable Cobalt (Co)	ug/g	5.2	0.10	6646434				4.5	0.10	6646434
Acid Extractable Copper (Cu)	ug/g	11	0.50	6646434				10	0.50	6646434
Acid Extractable Lead (Pb)	ug/g	3.8	1.0	6646434				5.0	1.0	6646434
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	0.50	6646434				<0.50	0.50	6646434
Acid Extractable Nickel (Ni)	ug/g	10	0.50	6646434				8.0	0.50	6646434
Acid Extractable Selenium (Se)	ug/g	<0.50	0.50	6646434				<0.50	0.50	6646434
Acid Extractable Silver (Ag)	ug/g	<0.20	0.20	6646434				<0.20	0.20	6646434
Acid Extractable Thallium (Tl)	ug/g	0.093	0.050	6646434				0.080	0.050	6646434
Acid Extractable Uranium (U)	ug/g	0.52	0.050	6646434				0.62	0.050	6646434
Acid Extractable Vanadium (V)	ug/g	27	5.0	6646434				26	5.0	6646434
Acid Extractable Zinc (Zn)	ug/g	25	5.0	6646434				26	5.0	6646434
Acid Extractable Mercury (Hg)	ug/g	<0.050	0.050	6646434				0.058	0.050	6646434

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

O.REG 153 METALS & INORGANICS PKG (SOIL)

BV Labs ID		MHA376	MHA377	MHA378	MHA379		
Sampling Date		2020/03/17	2020/03/17	2020/03/17	2020/03/17		
COC Number		764708-02-01	764708-02-01	764708-02-01	764708-02-01		
	UNITS	**TP09-NATIVE**	**TP10-FILL**	**TP10-NATIVE**	**TP14-FILL**	**RDL**	**QC Batch**
Calculated Parameters							
Sodium Adsorption Ratio	N/A	0.76	0.25	0.31	0.31		6644792
Inorganics							
Conductivity	mS/cm	0.24	0.20	0.13	0.12	0.002	6648741
Available (CaCl2) pH	pH	7.12	7.37	7.80	7.63		6646370
WAD Cyanide (Free)	ug/g	0.04	0.02	<0.01	<0.01	0.01	6646601
Chromium (VI)	ug/g	<0.18	<0.18	<0.18	<0.18	0.18	6645790
Metals							
Hot Water Ext. Boron (B)	ug/g	0.094	0.13	<0.050	0.055	0.050	6646529
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	<0.20	<0.20	0.20	6646434
Acid Extractable Arsenic (As)	ug/g	<1.0	1.1	<1.0	2.7	1.0	6646434
Acid Extractable Barium (Ba)	ug/g	190	85	53	66	0.50	6646434
Acid Extractable Beryllium (Be)	ug/g	<0.20	0.41	0.23	0.56	0.20	6646434
Acid Extractable Boron (B)	ug/g	<5.0	<5.0	<5.0	5.3	5.0	6646434
Acid Extractable Cadmium (Cd)	ug/g	<0.10	<0.10	<0.10	<0.10	0.10	6646434
Acid Extractable Chromium (Cr)	ug/g	1.1	19	16	18	1.0	6646434
Acid Extractable Cobalt (Co)	ug/g	0.58	7.5	9.2	11	0.10	6646434
Acid Extractable Copper (Cu)	ug/g	4.3	13	24	15	0.50	6646434
Acid Extractable Lead (Pb)	ug/g	<1.0	9.8	4.8	7.1	1.0	6646434
Acid Extractable Molybdenum (Mo)	ug/g	0.99	<0.50	<0.50	<0.50	0.50	6646434
Acid Extractable Nickel (Ni)	ug/g	3.5	13	13	15	0.50	6646434
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	<0.50	<0.50	0.50	6646434
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	<0.20	<0.20	0.20	6646434
Acid Extractable Thallium (Tl)	ug/g	0.15	0.17	0.15	0.25	0.050	6646434
Acid Extractable Uranium (U)	ug/g	2.0	0.59	0.49	0.65	0.050	6646434
Acid Extractable Vanadium (V)	ug/g	<5.0	34	42	42	5.0	6646434
Acid Extractable Zinc (Zn)	ug/g	9.7	35	28	69	5.0	6646434
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	<0.050	<0.050	0.050	6646434

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 METALS & INORGANICS PKG (SOIL)

BV Labs ID		MHA379			MHA380		
Sampling Date		2020/03/17			2020/03/17		
COC Number		764708-02-01			764708-02-01		
	UNITS	**TP14-FILL Lab-Dup**	**RDL**	**QC Batch**	**TP15-FILL**	**RDL**	**QC Batch**
Calculated Parameters							
Sodium Adsorption Ratio	N/A				0.26		6644792
Inorganics							
Conductivity	mS/cm				0.17	0.002	6648741
Available (CaCl2) pH	pH				7.37		6646370
WAD Cyanide (Free)	ug/g				0.03	0.01	6646601
Chromium (VI)	ug/g				<0.18	0.18	6645790
Metals							
Hot Water Ext. Boron (B)	ug/g				0.11	0.050	6646529
Acid Extractable Antimony (Sb)	ug/g	<0.20	0.20	6646434	<0.20	0.20	6646434
Acid Extractable Arsenic (As)	ug/g	2.9	1.0	6646434	3.5	1.0	6646434
Acid Extractable Barium (Ba)	ug/g	62	0.50	6646434	110	0.50	6646434
Acid Extractable Beryllium (Be)	ug/g	0.54	0.20	6646434	0.66	0.20	6646434
Acid Extractable Boron (B)	ug/g	5.2	5.0	6646434	5.6	5.0	6646434
Acid Extractable Cadmium (Cd)	ug/g	0.13	0.10	6646434	0.29	0.10	6646434
Acid Extractable Chromium (Cr)	ug/g	18	1.0	6646434	24	1.0	6646434
Acid Extractable Cobalt (Co)	ug/g	11	0.10	6646434	11	0.10	6646434
Acid Extractable Copper (Cu)	ug/g	14	0.50	6646434	13	0.50	6646434
Acid Extractable Lead (Pb)	ug/g	6.9	1.0	6646434	20	1.0	6646434
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	0.50	6646434	0.67	0.50	6646434
Acid Extractable Nickel (Ni)	ug/g	15	0.50	6646434	18	0.50	6646434
Acid Extractable Selenium (Se)	ug/g	<0.50	0.50	6646434	<0.50	0.50	6646434
Acid Extractable Silver (Ag)	ug/g	<0.20	0.20	6646434	<0.20	0.20	6646434
Acid Extractable Thallium (Tl)	ug/g	0.26	0.050	6646434	0.27	0.050	6646434
Acid Extractable Uranium (U)	ug/g	0.64	0.050	6646434	0.58	0.050	6646434
Acid Extractable Vanadium (V)	ug/g	43	5.0	6646434	46	5.0	6646434
Acid Extractable Zinc (Zn)	ug/g	67	5.0	6646434	66	5.0	6646434
Acid Extractable Mercury (Hg)	ug/g	<0.050	0.050	6646434	0.067	0.050	6646434

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

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

BV Labs ID		MHA371	MHA372	MHA373	MHA374	MHA375		
Sampling Date		2020/03/17	2020/03/17	2020/03/17	2020/03/17	2020/03/17		
COC Number		764708-02-01	764708-02-01	764708-02-01	764708-02-01	764708-02-01		
	UNITS	**TP06-FILL**	**TP06-NATIVE**	**TP08-FILL**	**TP08-NATIVE**	**TP09-FILL**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	17	11	16	17	16	1.0	6645991
BTEX & F1 Hydrocarbons								
Benzene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6647927
Toluene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6647927
Ethylbenzene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6647927
o-Xylene	ug/g	<0.020	<0.020	<0.020	<0.020	<0.020	0.020	6647927
p+m-Xylene	ug/g	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	6647927
Total Xylenes	ug/g	<0.040	<0.040	<0.040	<0.040	<0.040	0.040	6647927
F1 (C6-C10)	ug/g	<10	<10	<10	<10	<10	10	6647927
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	<10	<10	10	6647927
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	<10	<10	<10	10	6646100
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	<50	<50	<50	50	6646100
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	<50	<50	<50	50	6646100
Reached Baseline at C50	ug/g	Yes	Yes	Yes	Yes	Yes		6646100
Surrogate Recovery (%)								
1,4-Difluorobenzene	%	101	100	98	102	100		6647927
4-Bromofluorobenzene	%	100	98	98	97	98		6647927
D10-Ethylbenzene	%	104	99	104	97	109		6647927
D4-1,2-Dichloroethane	%	103	103	102	103	101		6647927
o-Terphenyl	%	73	71	79	69	69		6646100

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

O.REG 153 PHCS, BTEX/F1-F4 (SOIL)

BV Labs ID		MHA376		MHA377	MHA378	MHA379	MHA380		
Sampling Date		2020/03/17		2020/03/17	2020/03/17	2020/03/17	2020/03/17		
COC Number		764708-02-01		764708-02-01	764708-02-01	764708-02-01	764708-02-01		
	UNITS	**TP09-NATIVE**	**RDL**	**TP10-FILL**	**TP10-NATIVE**	**TP14-FILL**	**TP15-FILL**	**RDL**	**QC Batch**
Inorganics									
Moisture	%	57	1.0	16	11	12	13	1.0	6645991
BTEX & F1 Hydrocarbons									
Benzene	ug/g	<0.040	0.040	<0.020	<0.020	<0.020	<0.020	0.020	6647927
Toluene	ug/g	<0.040	0.040	<0.020	<0.020	<0.020	<0.020	0.020	6647927
Ethylbenzene	ug/g	<0.040	0.040	<0.020	<0.020	<0.020	<0.020	0.020	6647927
o-Xylene	ug/g	<0.040	0.040	<0.020	<0.020	<0.020	<0.020	0.020	6647927
p+m-Xylene	ug/g	<0.080	0.080	<0.040	<0.040	<0.040	<0.040	0.040	6647927
Total Xylenes	ug/g	<0.080	0.080	<0.040	<0.040	<0.040	<0.040	0.040	6647927
F1 (C6-C10)	ug/g	<20	20	<10	<10	<10	<10	10	6647927
F1 (C6-C10) - BTEX	ug/g	<20	20	<10	<10	<10	<10	10	6647927
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	<20	20	<10	<10	<10	<10	10	6646100
F3 (C16-C34 Hydrocarbons)	ug/g	<100	100	<50	<50	<50	<50	50	6646100
F4 (C34-C50 Hydrocarbons)	ug/g	<100	100	<50	<50	<50	86	50	6646100
Reached Baseline at C50	ug/g	Yes		Yes	Yes	Yes	No		6646100
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	100		100	98	102	99		6647927
4-Bromofluorobenzene	%	99		97	99	100	98		6647927
D10-Ethylbenzene	%	106		109	99	106	110		6647927
D4-1,2-Dichloroethane	%	104		104	104	104	104		6647927
o-Terphenyl	%	76		80	79	86	78		6646100

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

PETROLEUM HYDROCARBONS (CCME)

BV Labs ID		MHA380		
Sampling Date		2020/03/17		
COC Number		764708-02-01		
	UNITS	**TP15-FILL**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons				
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	560	100	6652658

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

TEST SUMMARY

BV Labs ID: MHA371
Sample ID: TP06-FILL
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6646529	2020/03/20	2020/03/23	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	6646601	2020/03/20	2020/03/24	Louise Harding
Conductivity	AT	6648741	2020/03/23	2020/03/23	Mandeep Kaur
Hexavalent Chromium in Soil by IC	IC/SPEC	6645790	2020/03/20	2020/03/23	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6647927	N/A	2020/03/22	Abdikarim Ali
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6646100	2020/03/20	2020/03/23	Ksenia Trofimova
Strong Acid Leachable Metals by ICPMS	ICP/MS	6646434	2020/03/20	2020/03/20	Viviana Canzonieri
Moisture	BAL	6645991	N/A	2020/03/20	Kruti Jitesh Patel
pH CaCl2 EXTRACT	AT	6646370	2020/03/20	2020/03/20	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	6644792	N/A	2020/03/24	Automated Statchk

BV Labs ID: MHA372
Sample ID: TP06-NATIVE
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6646529	2020/03/20	2020/03/23	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	6646601	2020/03/20	2020/03/24	Louise Harding
Conductivity	AT	6648741	2020/03/23	2020/03/23	Mandeep Kaur
Hexavalent Chromium in Soil by IC	IC/SPEC	6645790	2020/03/20	2020/03/23	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6647927	N/A	2020/03/22	Abdikarim Ali
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6646100	2020/03/20	2020/03/23	Ksenia Trofimova
Strong Acid Leachable Metals by ICPMS	ICP/MS	6646434	2020/03/20	2020/03/20	Viviana Canzonieri
Moisture	BAL	6645991	N/A	2020/03/20	Kruti Jitesh Patel
pH CaCl2 EXTRACT	AT	6646370	2020/03/20	2020/03/20	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	6644792	N/A	2020/03/24	Automated Statchk

BV Labs ID: MHA373
Sample ID: TP08-FILL
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6646529	2020/03/20	2020/03/23	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	6646601	2020/03/20	2020/03/24	Louise Harding
Conductivity	AT	6648741	2020/03/23	2020/03/23	Mandeep Kaur
Hexavalent Chromium in Soil by IC	IC/SPEC	6645790	2020/03/20	2020/03/23	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6647927	N/A	2020/03/22	Abdikarim Ali
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6646100	2020/03/20	2020/03/23	Ksenia Trofimova
Strong Acid Leachable Metals by ICPMS	ICP/MS	6646434	2020/03/20	2020/03/20	Viviana Canzonieri
Moisture	BAL	6645991	N/A	2020/03/20	Kruti Jitesh Patel
pH CaCl2 EXTRACT	AT	6646370	2020/03/20	2020/03/20	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	6644792	N/A	2020/03/24	Automated Statchk

TEST SUMMARY

BV Labs ID: MHA373 Dup
Sample ID: TP08-FILL
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6646529	2020/03/20	2020/03/23	Suban Kanapathippllai

BV Labs ID: MHA374
Sample ID: TP08-NATIVE
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6646529	2020/03/20	2020/03/23	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	6646601	2020/03/20	2020/03/24	Louise Harding
Conductivity	AT	6646314	2020/03/20	2020/03/20	Kazzandra Adeva
Hexavalent Chromium in Soil by IC	IC/SPEC	6645790	2020/03/20	2020/03/23	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6647927	N/A	2020/03/22	Abdikarim Ali
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6646100	2020/03/20	2020/03/23	Ksenia Trofimova
Strong Acid Leachable Metals by ICPMS	ICP/MS	6646434	2020/03/20	2020/03/20	Viviana Canzonieri
Moisture	BAL	6645991	N/A	2020/03/20	Kruti Jitesh Patel
pH CaCl2 EXTRACT	AT	6646370	2020/03/20	2020/03/20	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	6644792	N/A	2020/03/20	Automated Statchk

BV Labs ID: MHA374 Dup
Sample ID: TP08-NATIVE
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Free (WAD) Cyanide	TECH	6646601	2020/03/20	2020/03/24	Louise Harding
Conductivity	AT	6646314	2020/03/20	2020/03/20	Kazzandra Adeva
Hexavalent Chromium in Soil by IC	IC/SPEC	6645790	2020/03/20	2020/03/23	Violeta Porcila
pH CaCl2 EXTRACT	AT	6646370	2020/03/20	2020/03/20	Surinder Rai

BV Labs ID: MHA375
Sample ID: TP09-FILL
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6646529	2020/03/20	2020/03/23	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	6646601	2020/03/20	2020/03/24	Louise Harding
Conductivity	AT	6648741	2020/03/23	2020/03/23	Mandeep Kaur
Hexavalent Chromium in Soil by IC	IC/SPEC	6645790	2020/03/20	2020/03/23	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6647927	N/A	2020/03/22	Abdikarim Ali
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6646100	2020/03/20	2020/03/23	Ksenia Trofimova
Strong Acid Leachable Metals by ICPMS	ICP/MS	6646434	2020/03/20	2020/03/20	Viviana Canzonieri
Moisture	BAL	6645991	N/A	2020/03/20	Kruti Jitesh Patel
pH CaCl2 EXTRACT	AT	6646370	2020/03/20	2020/03/20	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	6644792	N/A	2020/03/24	Automated Statchk

TEST SUMMARY

BV Labs ID: MHA376
Sample ID: TP09-NATIVE
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6646529	2020/03/20	2020/03/23	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	6646601	2020/03/20	2020/03/24	Louise Harding
Conductivity	AT	6648741	2020/03/23	2020/03/23	Mandeep Kaur
Hexavalent Chromium in Soil by IC	IC/SPEC	6645790	2020/03/20	2020/03/23	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6647927	N/A	2020/03/22	Abdikarim Ali
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6646100	2020/03/20	2020/03/23	Ksenia Trofimova
Strong Acid Leachable Metals by ICPMS	ICP/MS	6646434	2020/03/20	2020/03/20	Viviana Canzonieri
Moisture	BAL	6645991	N/A	2020/03/20	Kruti Jitesh Patel
pH CaCl2 EXTRACT	AT	6646370	2020/03/20	2020/03/20	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	6644792	N/A	2020/03/24	Automated Statchk

BV Labs ID: MHA377
Sample ID: TP10-FILL
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6646529	2020/03/20	2020/03/23	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	6646601	2020/03/20	2020/03/24	Louise Harding
Conductivity	AT	6648741	2020/03/23	2020/03/23	Mandeep Kaur
Hexavalent Chromium in Soil by IC	IC/SPEC	6645790	2020/03/20	2020/03/23	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6647927	N/A	2020/03/22	Abdikarim Ali
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6646100	2020/03/20	2020/03/23	Ksenia Trofimova
Strong Acid Leachable Metals by ICPMS	ICP/MS	6646434	2020/03/20	2020/03/20	Viviana Canzonieri
Moisture	BAL	6645991	N/A	2020/03/20	Kruti Jitesh Patel
pH CaCl2 EXTRACT	AT	6646370	2020/03/20	2020/03/20	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	6644792	N/A	2020/03/24	Automated Statchk

BV Labs ID: MHA378
Sample ID: TP10-NATIVE
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6646529	2020/03/20	2020/03/23	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	6646601	2020/03/20	2020/03/24	Louise Harding
Conductivity	AT	6648741	2020/03/23	2020/03/23	Mandeep Kaur
Hexavalent Chromium in Soil by IC	IC/SPEC	6645790	2020/03/20	2020/03/23	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6647927	N/A	2020/03/22	Abdikarim Ali
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6646100	2020/03/20	2020/03/23	Ksenia Trofimova
Strong Acid Leachable Metals by ICPMS	ICP/MS	6646434	2020/03/20	2020/03/20	Viviana Canzonieri
Moisture	BAL	6645991	N/A	2020/03/20	Kruti Jitesh Patel
pH CaCl2 EXTRACT	AT	6646370	2020/03/20	2020/03/20	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	6644792	N/A	2020/03/24	Automated Statchk

TEST SUMMARY

BV Labs ID: MHA379
Sample ID: TP14-FILL
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6646529	2020/03/20	2020/03/23	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	6646601	2020/03/20	2020/03/24	Louise Harding
Conductivity	AT	6648741	2020/03/23	2020/03/23	Mandeep Kaur
Hexavalent Chromium in Soil by IC	IC/SPEC	6645790	2020/03/20	2020/03/23	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6647927	N/A	2020/03/22	Abdikarim Ali
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6646100	2020/03/20	2020/03/23	Ksenia Trofimova
Strong Acid Leachable Metals by ICPMS	ICP/MS	6646434	2020/03/20	2020/03/20	Viviana Canzonieri
Moisture	BAL	6645991	N/A	2020/03/20	Kruti Jitesh Patel
pH CaCl2 EXTRACT	AT	6646370	2020/03/20	2020/03/20	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	6644792	N/A	2020/03/24	Automated Statchk

BV Labs ID: MHA379 Dup
Sample ID: TP14-FILL
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Strong Acid Leachable Metals by ICPMS	ICP/MS	6646434	2020/03/20	2020/03/20	Viviana Canzonieri

BV Labs ID: MHA380
Sample ID: TP15-FILL
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/18

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6646529	2020/03/20	2020/03/23	Suban Kanapathippllai
Free (WAD) Cyanide	TECH	6646601	2020/03/20	2020/03/24	Louise Harding
Conductivity	AT	6648741	2020/03/23	2020/03/23	Mandeep Kaur
Hexavalent Chromium in Soil by IC	IC/SPEC	6645790	2020/03/20	2020/03/23	Violeta Porcila
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6647927	N/A	2020/03/22	Abdikarim Ali
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6646100	2020/03/20	2020/03/23	Ksenia Trofimova
F4G (CCME Hydrocarbons Gravimetric)	BAL	6652658	2020/03/25	2020/03/25	Rashmi Dubey
Strong Acid Leachable Metals by ICPMS	ICP/MS	6646434	2020/03/20	2020/03/20	Viviana Canzonieri
Moisture	BAL	6645991	N/A	2020/03/20	Kruti Jitesh Patel
pH CaCl2 EXTRACT	AT	6646370	2020/03/20	2020/03/20	Surinder Rai
Sodium Adsorption Ratio (SAR)	CALC/MET	6644792	N/A	2020/03/24	Automated Statchk

GENERAL COMMENTS

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

Package 1	6.3°C

Sample MHA371 [TP06-FILL] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample MHA372 [TP06-NATIVE] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample MHA373 [TP08-FILL] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample MHA374 [TP08-NATIVE] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample MHA375 [TP09-FILL] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample MHA376 [TP09-NATIVE] : F1 BTEX analysis : Detection limits were adjusted for high moisture content .

F2 F4 Analysis: Detection limits were adjusted for high moisture content.

Sample MHA377 [TP10-FILL] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample MHA378 [TP10-NATIVE] : F1/BTEX Analysis: Greater than 10g of soil was submitted in the field preserved vial. This significantly exceeds the protocol specification of approximately 5g. Additional methanol was added to the vial to ensure extraction efficiency.
SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample MHA379 [TP14-FILL] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample MHA380 [TP15-FILL] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Results relate only to the items tested.

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6646100	o-Terphenyl	2020/03/23	87	60 - 130	89	60 - 130	73	%		
6647927	1,4-Difluorobenzene	2020/03/22	99	60 - 140	102	60 - 140	100	%		
6647927	4-Bromofluorobenzene	2020/03/22	99	60 - 140	101	60 - 140	100	%		
6647927	D10-Ethylbenzene	2020/03/22	92	60 - 140	104	60 - 140	104	%		
6647927	D4-1,2-Dichloroethane	2020/03/22	104	60 - 140	107	60 - 140	104	%		
6645790	Chromium (VI)	2020/03/23	63 (1)	70 - 130	90	80 - 120	<0.18	ug/g	NC	35
6645991	Moisture	2020/03/20							3.5	20
6646100	F2 (C10-C16 Hydrocarbons)	2020/03/23	86	50 - 130	86	80 - 120	<10	ug/g	NC	30
6646100	F3 (C16-C34 Hydrocarbons)	2020/03/23	86	50 - 130	88	80 - 120	<50	ug/g	NC	30
6646100	F4 (C34-C50 Hydrocarbons)	2020/03/23	87	50 - 130	90	80 - 120	<50	ug/g	NC	30
6646314	Conductivity	2020/03/20			104	90 - 110	<0.002	mS/cm	0.94	10
6646370	Available (CaCl2) pH	2020/03/20			100	97 - 103			0.54	N/A
6646434	Acid Extractable Antimony (Sb)	2020/03/20	91	75 - 125	104	80 - 120	<0.20	ug/g	NC	30
6646434	Acid Extractable Arsenic (As)	2020/03/20	96	75 - 125	104	80 - 120	<1.0	ug/g	5.7	30
6646434	Acid Extractable Barium (Ba)	2020/03/20	NC	75 - 125	99	80 - 120	<0.50	ug/g	6.0	30
6646434	Acid Extractable Beryllium (Be)	2020/03/20	98	75 - 125	99	80 - 120	<0.20	ug/g	5.0	30
6646434	Acid Extractable Boron (B)	2020/03/20	96	75 - 125	97	80 - 120	<5.0	ug/g	3.6	30
6646434	Acid Extractable Cadmium (Cd)	2020/03/20	98	75 - 125	99	80 - 120	<0.10	ug/g	24	30
6646434	Acid Extractable Chromium (Cr)	2020/03/20	100	75 - 125	98	80 - 120	<1.0	ug/g	1.0	30
6646434	Acid Extractable Cobalt (Co)	2020/03/20	95	75 - 125	101	80 - 120	<0.10	ug/g	1.3	30
6646434	Acid Extractable Copper (Cu)	2020/03/20	96	75 - 125	101	80 - 120	<0.50	ug/g	4.8	30
6646434	Acid Extractable Lead (Pb)	2020/03/20	98	75 - 125	98	80 - 120	<1.0	ug/g	1.9	30
6646434	Acid Extractable Mercury (Hg)	2020/03/20	90	75 - 125	96	80 - 120	<0.050	ug/g	NC	30
6646434	Acid Extractable Molybdenum (Mo)	2020/03/20	97	75 - 125	102	80 - 120	<0.50	ug/g	NC	30
6646434	Acid Extractable Nickel (Ni)	2020/03/20	98	75 - 125	102	80 - 120	<0.50	ug/g	2.5	30
6646434	Acid Extractable Selenium (Se)	2020/03/20	99	75 - 125	103	80 - 120	<0.50	ug/g	NC	30
6646434	Acid Extractable Silver (Ag)	2020/03/20	96	75 - 125	102	80 - 120	<0.20	ug/g	NC	30
6646434	Acid Extractable Thallium (Tl)	2020/03/20	97	75 - 125	99	80 - 120	<0.050	ug/g	1.8	30
6646434	Acid Extractable Uranium (U)	2020/03/20	98	75 - 125	97	80 - 120	<0.050	ug/g	2.4	30
6646434	Acid Extractable Vanadium (V)	2020/03/20	NC	75 - 125	101	80 - 120	<5.0	ug/g	2.7	30
6646434	Acid Extractable Zinc (Zn)	2020/03/20	NC	75 - 125	97	80 - 120	<5.0	ug/g	2.0	30
6646529	Hot Water Ext. Boron (B)	2020/03/23	93	75 - 125	91	75 - 125	<0.050	ug/g	0.27	40

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6646601	WAD Cyanide (Free)	2020/03/24	95	75 - 125	99	80 - 120	<0.01	ug/g	NC	35
6647927	Benzene	2020/03/22	74	60 - 140	97	60 - 140	<0.020	ug/g	NC	50
6647927	Ethylbenzene	2020/03/22	82	60 - 140	104	60 - 140	<0.020	ug/g	NC	50
6647927	F1 (C6-C10) - BTEX	2020/03/22					<10	ug/g	NC	30
6647927	F1 (C6-C10)	2020/03/22	72	60 - 140	85	80 - 120	<10	ug/g	NC	30
6647927	o-Xylene	2020/03/22	83	60 - 140	101	60 - 140	<0.020	ug/g	NC	50
6647927	p+m-Xylene	2020/03/22	83	60 - 140	103	60 - 140	<0.040	ug/g	NC	50
6647927	Toluene	2020/03/22	79	60 - 140	100	60 - 140	<0.020	ug/g	NC	50
6647927	Total Xylenes	2020/03/22					<0.040	ug/g	NC	50
6648741	Conductivity	2020/03/23			102	90 - 110	<0.002	mS/cm	1.2	10
6652658	F4G-sg (Grav. Heavy Hydrocarbons)	2020/03/25	98	65 - 135	101	65 - 135	<100	ug/g	0	50

N/A = Not Applicable

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

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

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

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

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

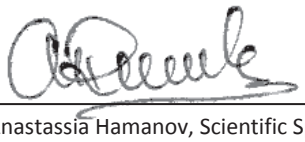
NC (Matrix Spike): The recovery in the matrix spike was not calculated. The relative difference between the concentration in the parent sample and the spike amount was too small to permit a reliable recovery calculation (matrix spike concentration was less than the native sample concentration)

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

(1) The matrix spike recovery was below the lower control limit. This may be due in part to the reducing environment of the sample. The sample was reanalyzed with the same results.

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

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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18-Mar-20 16:20
Katherine Szozda
C073569

Page of

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:			
Company Name:	#17498 exp Services Inc	Company Name:		Quotation #:	B91718	ly:	
Attention:	Accounts Payable	Attention:	Chris Kimmerly	P.O. #:		Bottle Order #:	
Address:	100-2650 Queensview Drive Ottawa ON K2B 8H6	Address:		Project:	OTT-00258780-C0 URE ENV-812		764708
Tel:	(613) 688-1899 Fax: (613) 225-7337	Tel:	Fax:	Project Name:		COC #:	Project Manager:
Email:	accounting.ottawa@exp.com; Karen.Burke@exp.com;	Email:	Chris.Kimmerly@exp.com	Site #:		C#764708-02-01	Katherine Szozda
				Sampled By:	GChu		

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

Regulation 153 (2011)
- [ ] Table 1 [x] Res/Park [ ] Medium/Fine
- [ ] Table 2 [ ] Ind/Comm [x] Coarse
- [ ] Table 3 [ ] Agri/Other [x] For RSC
- [x] Table 7

Other Regulations
- [ ] CCME [ ] Sanitary Sewer Bylaw
- [ ] Reg 558 [ ] Storm Sewer Bylaw
- [ ] MISA Municipality
- [ ] PWQO
- [ ] Other

Special Instructions

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

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

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

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	ANALYSIS REQUESTED (PLEASE BE SPECIFIC): O.Reg 153 PHCs, BTEX/F1-F4 (Soil)	O.Reg 153 Metals & Inorganics Pkg (Soil)	# of Bottles	Comments
1		TP06-Fill	2020/03/17	PM	S		✓	✓	4	
2		TP06-Native	"	"	"		✓	✓	4	
3		TP08-Fill	"	"	"		✓	✓	4	
4		TP08-Native	"	"	"		✓	✓	4	
5		TP09-Fill	"	"	"		✓	✓	4	
6		TP09-Native	"	"	"		✓	✓	4	
7		TP10-Fill	"	"	"		✓	✓	4	
8		TP10-Native	"	"	"		✓	✓	4	
9		TP14-Fill	"	"	"		✓	✓	4	
10		TP15-Fill	"	"	"		✓	✓	4	

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Chris Kimmerly	20/03/17	3:00pm	[illegible]	2020/03/18	16:20	
			[illegible]	2020/03/19	08:00	

Laboratory Use Only

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

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' 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.BVLABS.COM/TERMS-AND-CONDITIONS.

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS. G.G.7

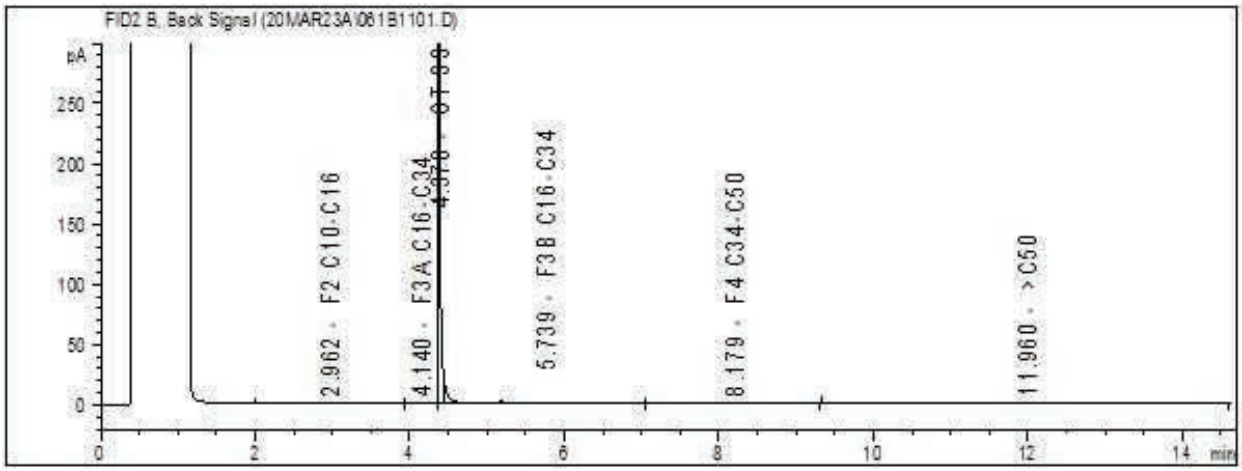
** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

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

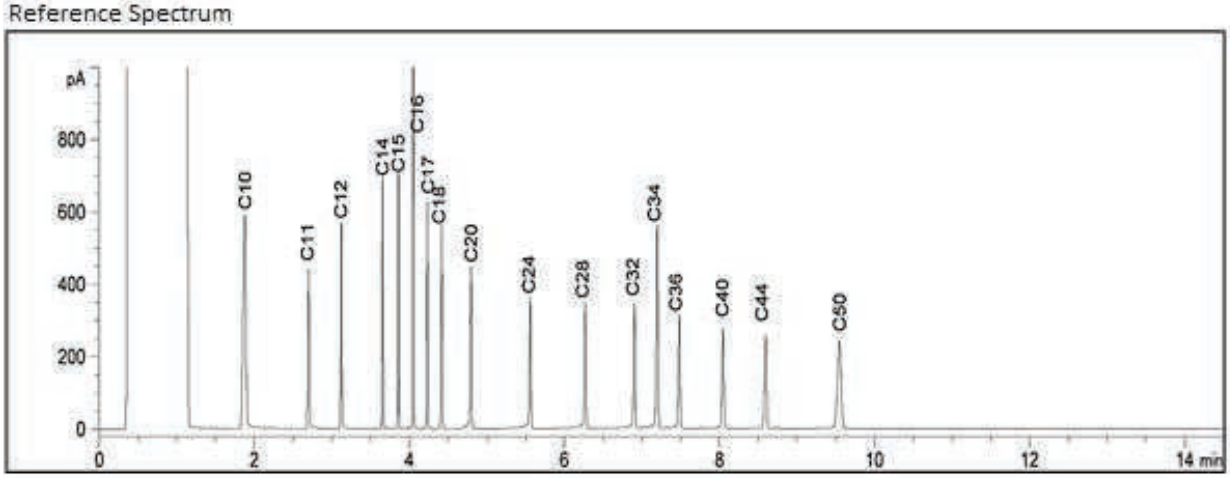
White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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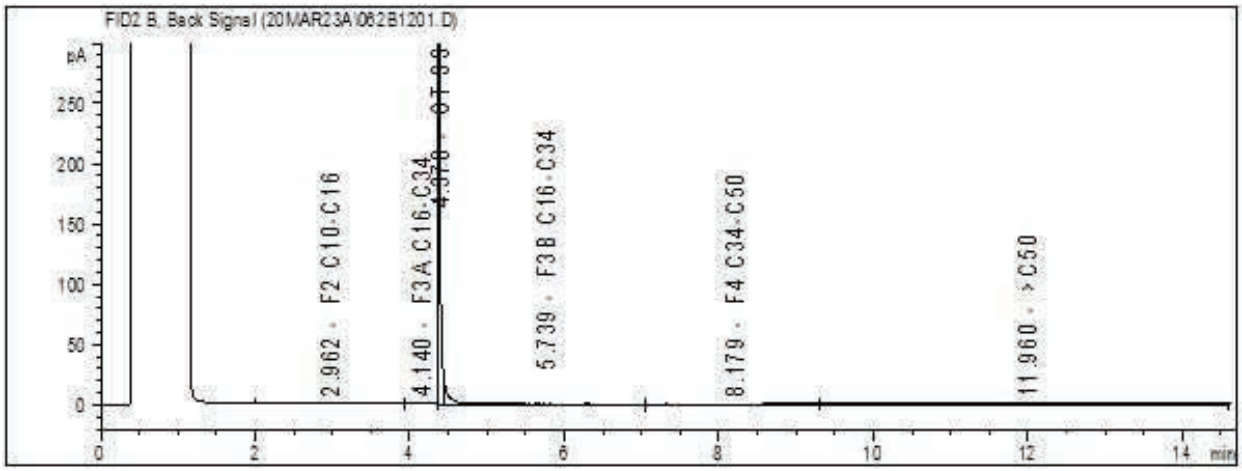
Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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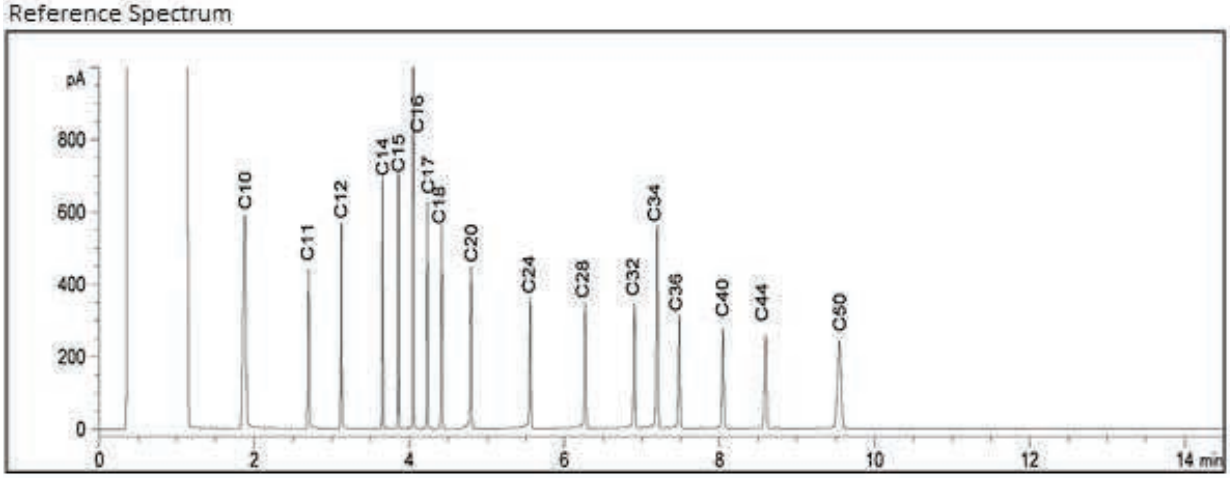

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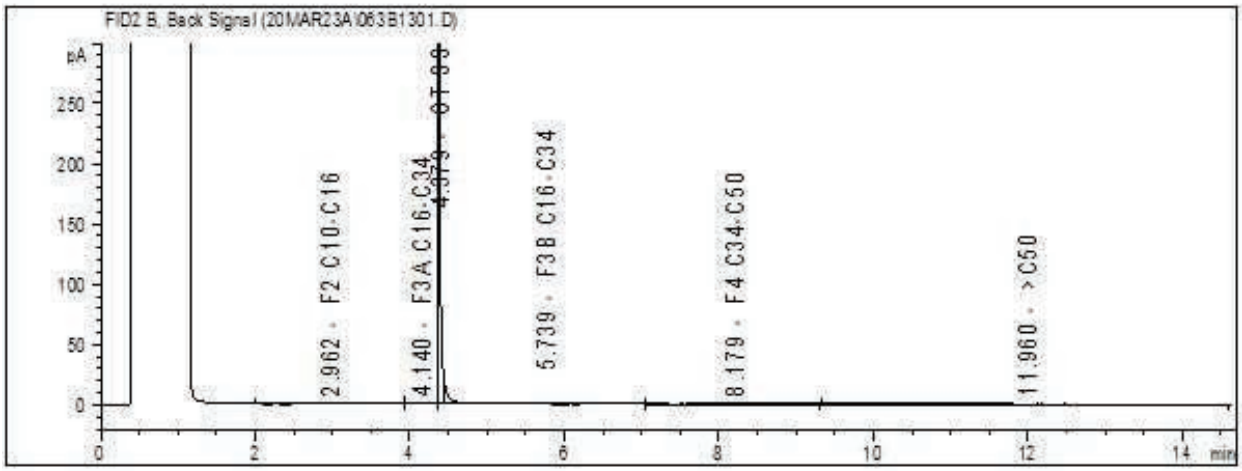

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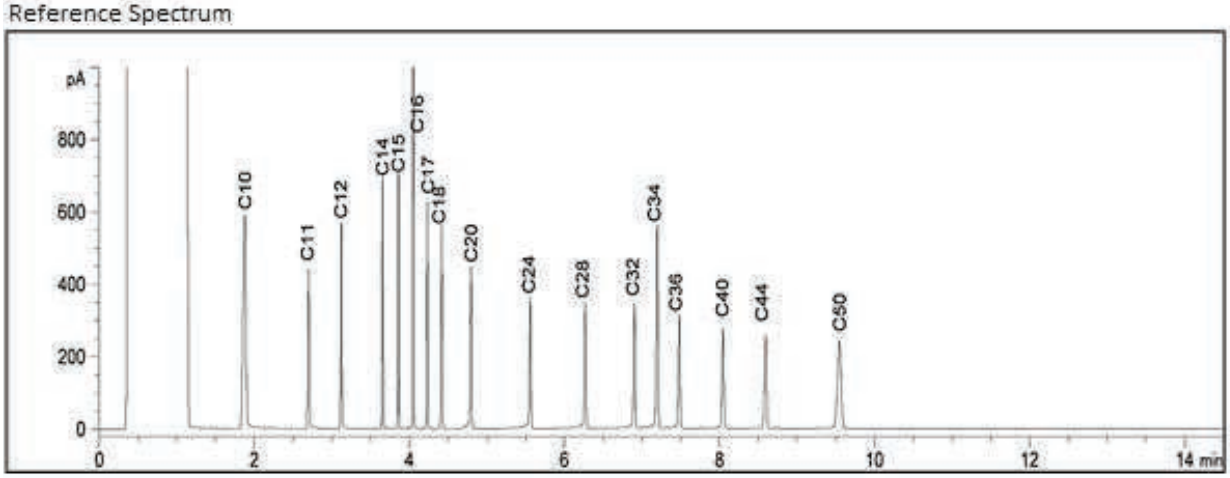

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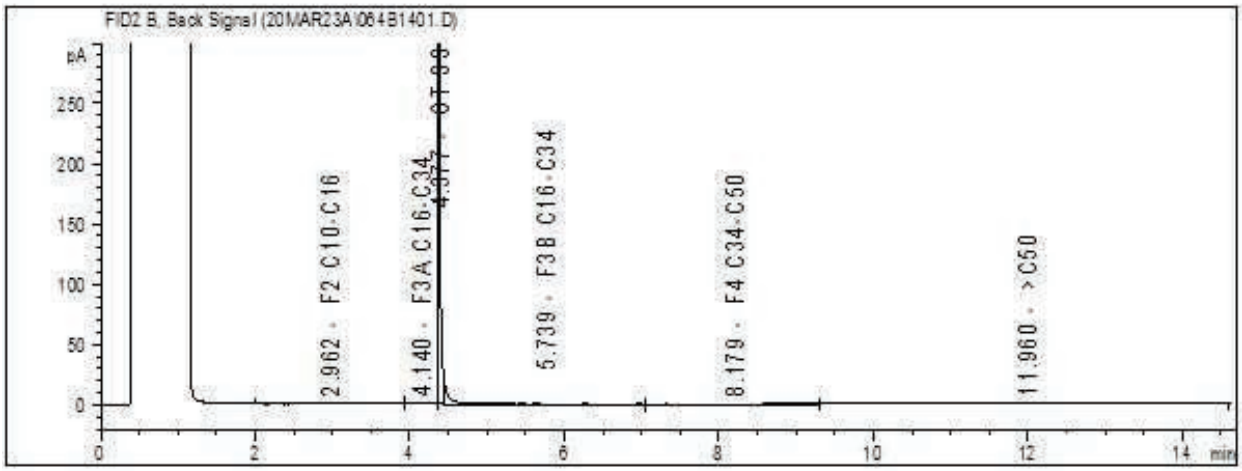

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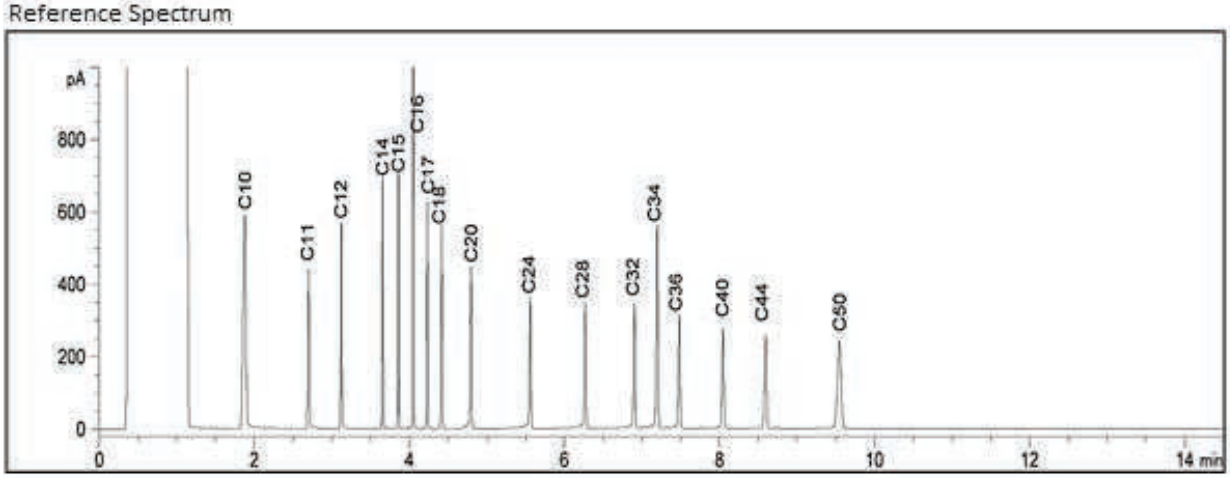

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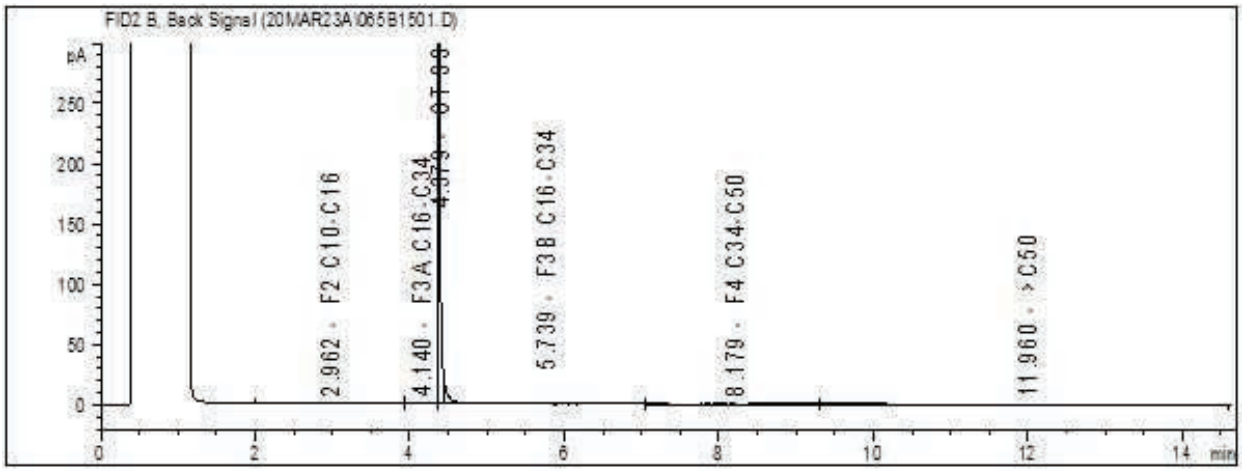

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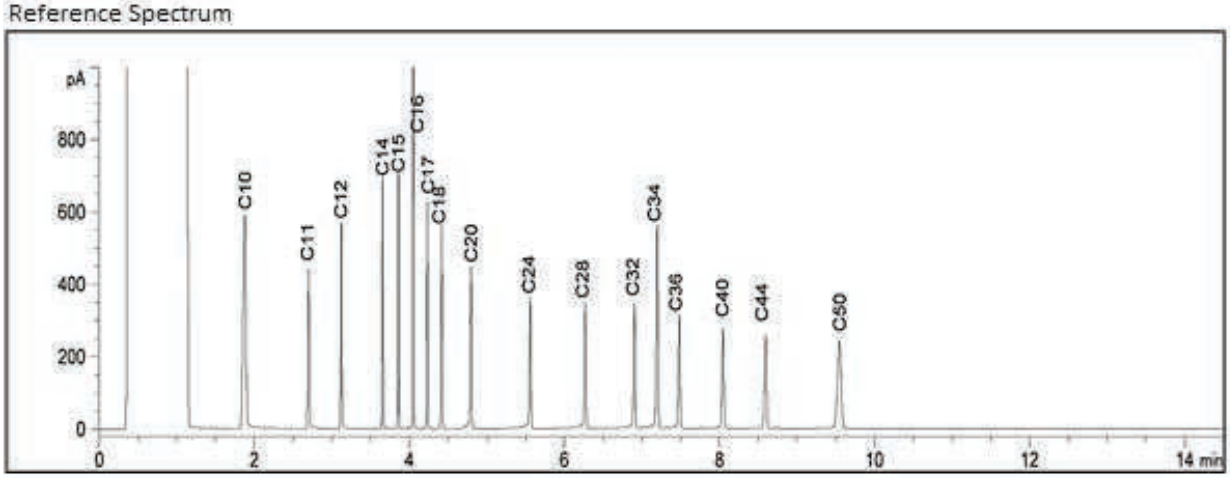

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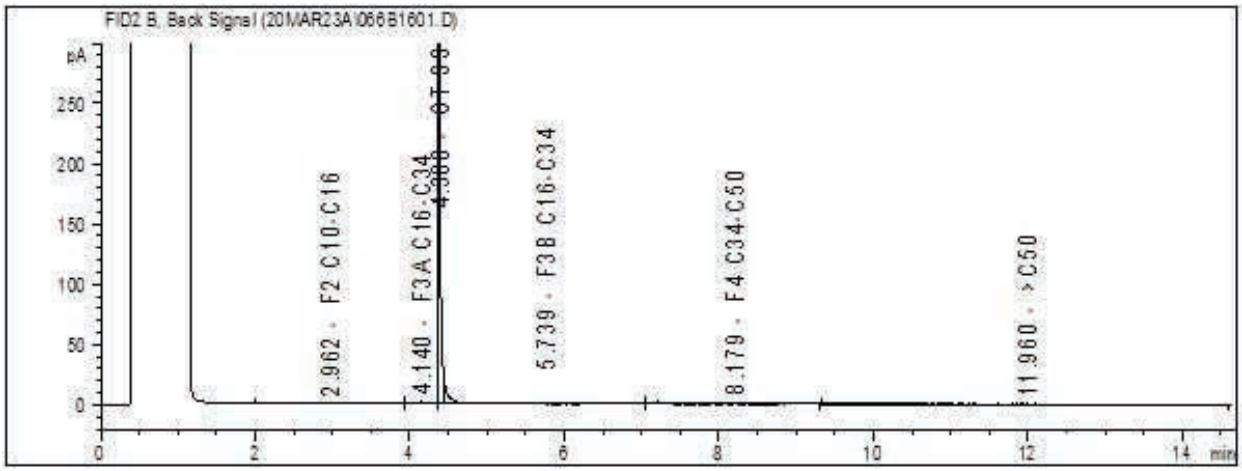

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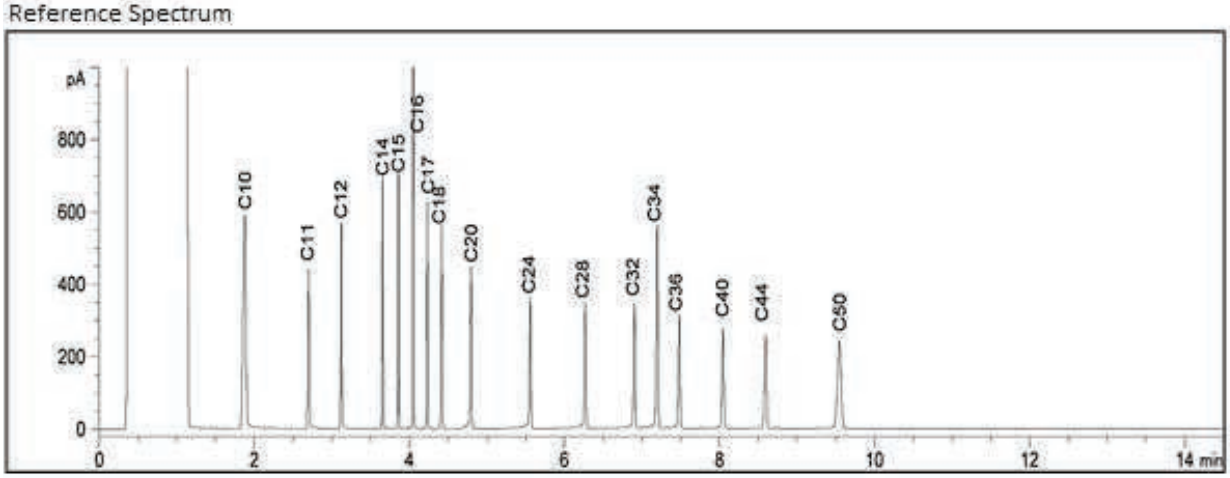

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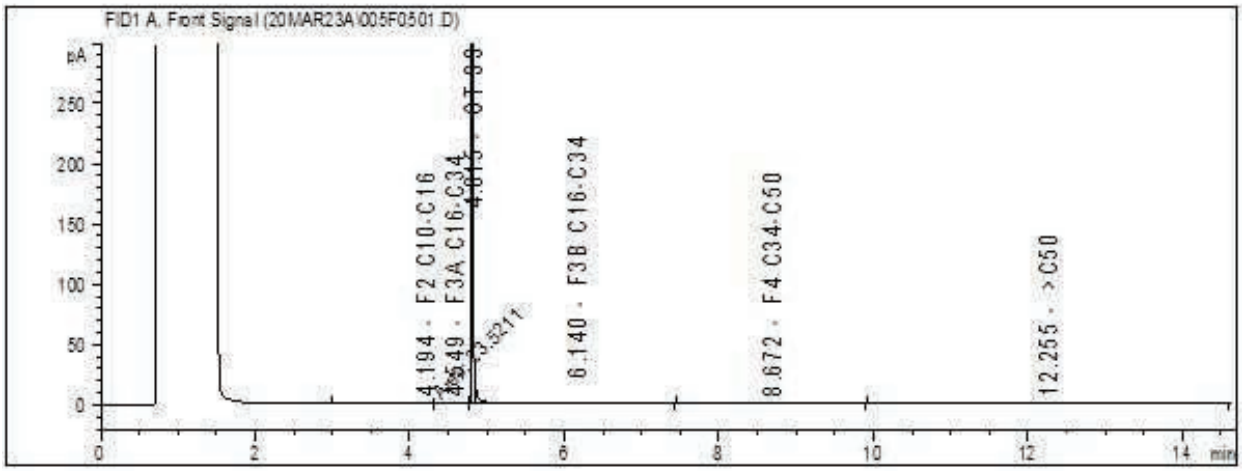

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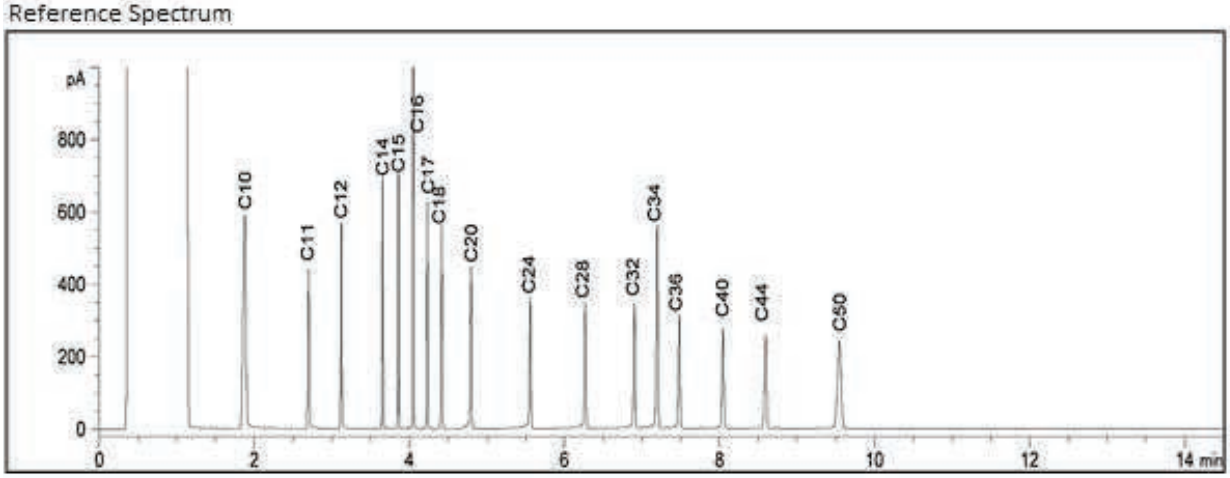

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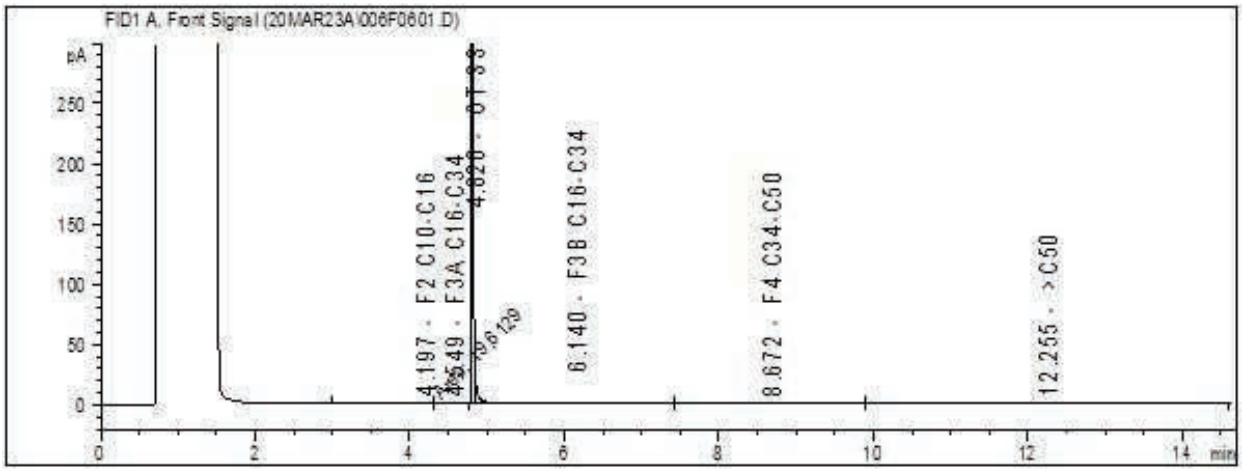

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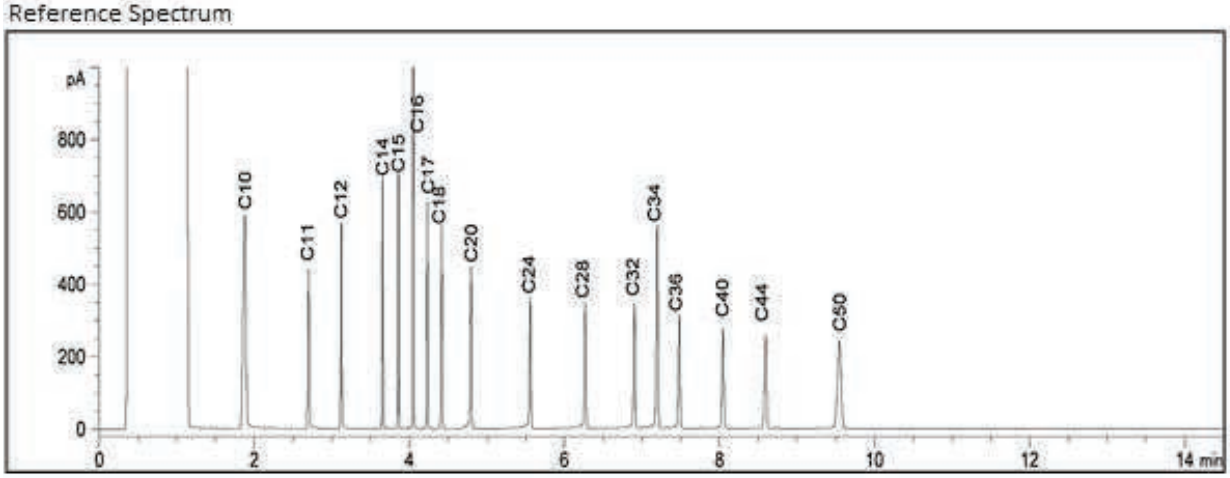

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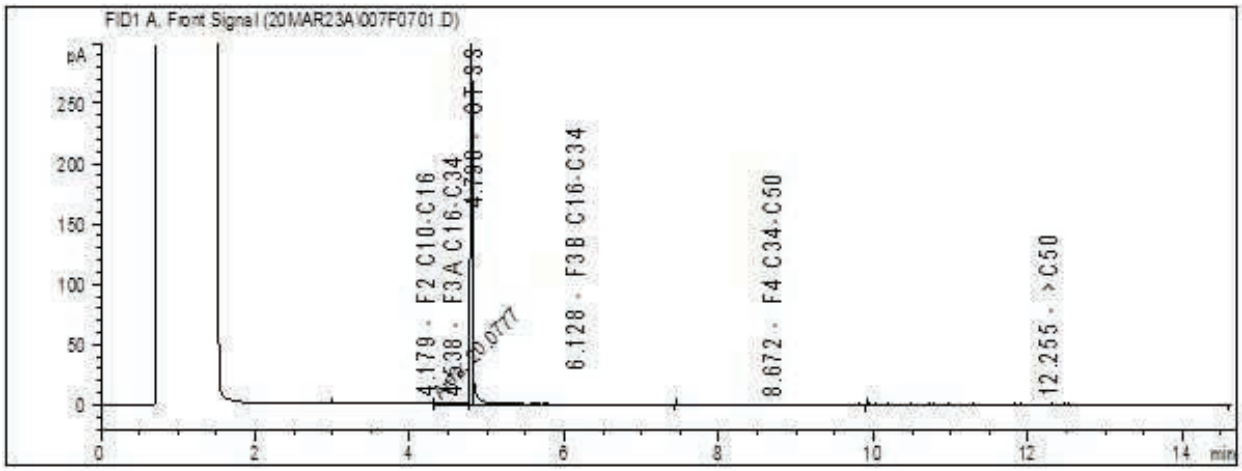

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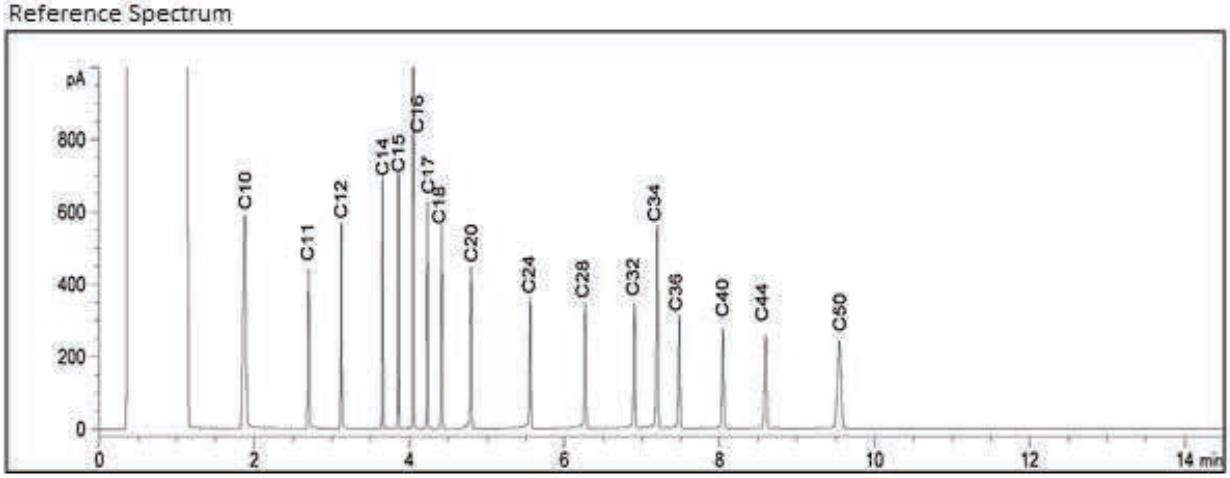

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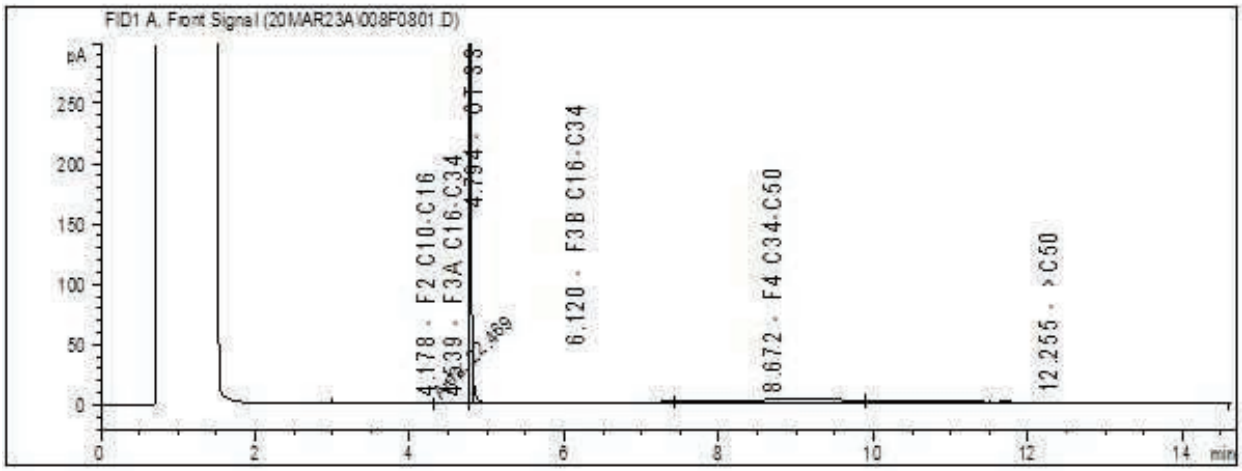

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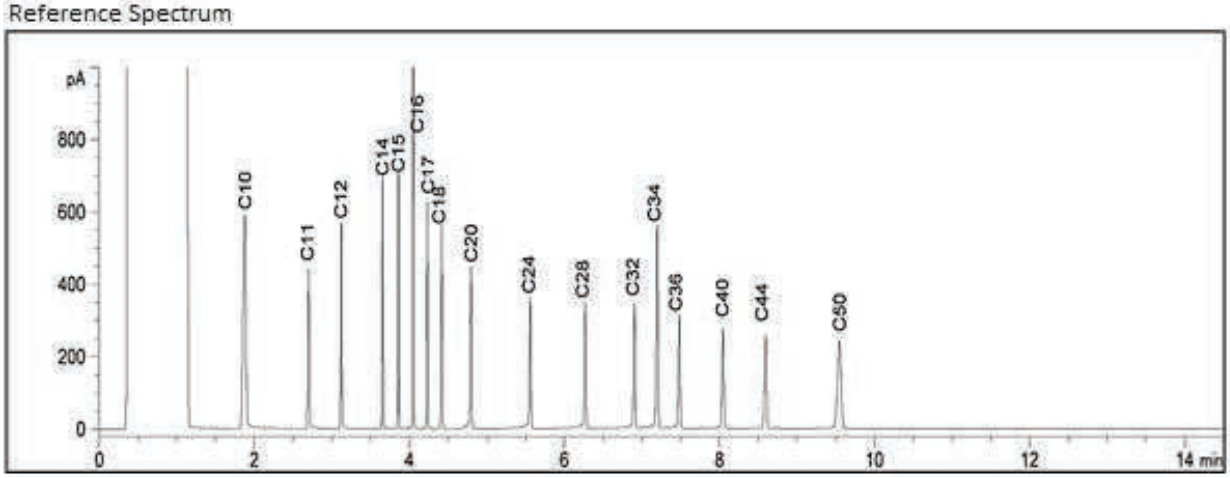

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Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Your Project #: OTT-00258780-C0
Your C.O.C. #: 764708-01-01

Attention: Chris Kimmerly

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

Report Date: 2020/04/01
Report #: R6131711
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C078311
Received: 2020/03/25, 12:45

Sample Matrix: Soil
Samples Received: 2

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Analytical Method
Hot Water Extractable Boron (1)	2	2020/03/27	2020/03/30	CAM SOP-00408	R153 Ana. Prot. 2011
Free (WAD) Cyanide (1)	2	2020/03/26	2020/03/31	CAM SOP-00457	OMOE E3015 m
Conductivity (1)	2	2020/03/30	2020/03/30	CAM SOP-00414	OMOE E3530 v1 m
Hexavalent Chromium in Soil by IC (1, 2)	2	2020/03/26	2020/03/27	CAM SOP-00436	EPA 3060/7199 m
Strong Acid Leachable Metals by ICPMS (1)	2	2020/03/27	2020/03/27	CAM SOP-00447	EPA 6020B m
Moisture (1)	2	N/A	2020/03/26	CAM SOP-00445	Carter 2nd ed 51.2 m
pH CaCl2 EXTRACT (1)	2	2020/03/26	2020/03/26	CAM SOP-00413	EPA 9045 D m
Sodium Adsorption Ratio (SAR) (1)	2	N/A	2020/03/30	CAM SOP-00102	EPA 6010C

Remarks:

Bureau Veritas Laboratories are accredited to ISO/IEC 17025 for specific parameters on scopes of accreditation. Unless otherwise noted, procedures used by BV Labs are based upon recognized Provincial, Federal or US method compendia such as CCME, MELCC, EPA, APHA.

All work recorded herein has been done in accordance with procedures and practices ordinarily exercised by professionals in BV Labs profession using accepted testing methodologies, quality assurance and quality control procedures (except where otherwise agreed by the client and BV Labs 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.

BV Labs liability is limited to the actual cost of the requested analyses, unless otherwise agreed in writing. There is no other warranty expressed or implied. BV Labs 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 BV Labs, unless otherwise agreed in writing. BV Labs 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 BV Labs, 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 Bureau Veritas Laboratories Mississauga
(2) Soils are reported on a dry weight basis unless otherwise specified.

Your Project #: OTT-00258780-C0
Your C.O.C. #: 764708-01-01

Attention: Chris Kimmerly

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

Report Date: 2020/04/01
Report #: R6131711
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: C078311
Received: 2020/03/25, 12:45

Encryption Key

Katherine Szozda
Project Manager
01 Apr 2020 15:27:10

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Katherine Szozda, Project Manager
Email: Katherine.Szozda@bvlabs.com
Phone# (613) 274-0573

==========

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

O.REG 153 METALS & INORGANICS PKG (SOIL)

BV Labs ID		MIA870	MIA871		
Sampling Date		2020/03/17	2020/03/17		
COC Number		764708-01-01	764708-01-01		
	UNITS	**TP-11 FILL**	**TP-21 FILL**	**RDL**	**QC Batch**
Calculated Parameters					
Sodium Adsorption Ratio	N/A	0.25	0.25		6653547
Inorganics					
Conductivity	mS/cm	0.16	0.16	0.002	6659737
Moisture	%	16	17	1.0	6655496
Available (CaCl2) pH	pH	7.46	7.59		6655411
WAD Cyanide (Free)	ug/g	0.01	0.02	0.01	6656316
Chromium (VI)	ug/g	<0.18	<0.18	0.18	6655240
Metals					
Hot Water Ext. Boron (B)	ug/g	0.11	0.080	0.050	6657283
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	0.20	6657277
Acid Extractable Arsenic (As)	ug/g	1.3	1.4	1.0	6657277
Acid Extractable Barium (Ba)	ug/g	65	65	0.50	6657277
Acid Extractable Beryllium (Be)	ug/g	0.35	0.35	0.20	6657277
Acid Extractable Boron (B)	ug/g	<5.0	<5.0	5.0	6657277
Acid Extractable Cadmium (Cd)	ug/g	0.11	0.15	0.10	6657277
Acid Extractable Chromium (Cr)	ug/g	15	16	1.0	6657277
Acid Extractable Cobalt (Co)	ug/g	5.2	5.4	0.10	6657277
Acid Extractable Copper (Cu)	ug/g	10	10	0.50	6657277
Acid Extractable Lead (Pb)	ug/g	9.0	8.9	1.0	6657277
Acid Extractable Molybdenum (Mo)	ug/g	<0.50	<0.50	0.50	6657277
Acid Extractable Nickel (Ni)	ug/g	9.3	9.8	0.50	6657277
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	0.50	6657277
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	0.20	6657277
Acid Extractable Thallium (Tl)	ug/g	0.10	0.087	0.050	6657277
Acid Extractable Uranium (U)	ug/g	0.52	0.50	0.050	6657277
Acid Extractable Vanadium (V)	ug/g	29	29	5.0	6657277
Acid Extractable Zinc (Zn)	ug/g	33	34	5.0	6657277
Acid Extractable Mercury (Hg)	ug/g	<0.050	<0.050	0.050	6657277

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

BV Labs Job #: C078311
Report Date: 2020/04/01

exp Services Inc
Client Project #: OTT-00258780-C0
Sampler Initials: GC

TEST SUMMARY

BV Labs ID: MIA870
Sample ID: TP-11 FILL
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6657283	2020/03/27	2020/03/30	Jolly John
Free (WAD) Cyanide	TECH	6656316	2020/03/26	2020/03/31	Louise Harding
Conductivity	AT	6659737	2020/03/30	2020/03/30	Mandeep Kaur
Hexavalent Chromium in Soil by IC	IC/SPEC	6655240	2020/03/26	2020/03/27	Violeta Porcila
Strong Acid Leachable Metals by ICPMS	ICP/MS	6657277	2020/03/27	2020/03/27	Daniel Teclu
Moisture	BAL	6655496	N/A	2020/03/26	Prgya Panchal
pH CaCl2 EXTRACT	AT	6655411	2020/03/26	2020/03/26	Kazzandra Adeva
Sodium Adsorption Ratio (SAR)	CALC/MET	6653547	N/A	2020/03/30	Automated Statchk

BV Labs ID: MIA871
Sample ID: TP-21 FILL
Matrix: Soil

Collected: 2020/03/17
Shipped:
Received: 2020/03/25

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6657283	2020/03/27	2020/03/30	Jolly John
Free (WAD) Cyanide	TECH	6656316	2020/03/26	2020/03/31	Louise Harding
Conductivity	AT	6659737	2020/03/30	2020/03/30	Mandeep Kaur
Hexavalent Chromium in Soil by IC	IC/SPEC	6655240	2020/03/26	2020/03/27	Violeta Porcila
Strong Acid Leachable Metals by ICPMS	ICP/MS	6657277	2020/03/27	2020/03/27	Daniel Teclu
Moisture	BAL	6655496	N/A	2020/03/26	Prgya Panchal
pH CaCl2 EXTRACT	AT	6655411	2020/03/26	2020/03/26	Kazzandra Adeva
Sodium Adsorption Ratio (SAR)	CALC/MET	6653547	N/A	2020/03/30	Automated Statchk

GENERAL COMMENTS

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

Package 1	3.7°C

Sample MIA870 [TP-11 FILL] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Sample MIA871 [TP-21 FILL] : SAR Analysis: Sodium was not detected. To report SAR the sodium detection limit was used in the calculation. This value represents a maximum ratio.

Results relate only to the items tested.

BV Labs Job #: C078311
Report Date: 2020/04/01

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-00258780-C0
Sampler Initials: GC

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6655240	Chromium (VI)	2020/03/27	80	70 - 130	90	80 - 120	<0.18	ug/g	NC	35
6655411	Available (CaCl2) pH	2020/03/26			99	97 - 103			0.088	N/A
6655496	Moisture	2020/03/26							17	20
6656316	WAD Cyanide (Free)	2020/03/31	81	75 - 125	95	80 - 120	<0.01	ug/g	NC	35
6657277	Acid Extractable Antimony (Sb)	2020/03/27	87	75 - 125	95	80 - 120	<0.20	ug/g	NC	30
6657277	Acid Extractable Arsenic (As)	2020/03/27	97	75 - 125	101	80 - 120	<1.0	ug/g	19	30
6657277	Acid Extractable Barium (Ba)	2020/03/27	NC	75 - 125	93	80 - 120	<0.50	ug/g	4.5	30
6657277	Acid Extractable Beryllium (Be)	2020/03/27	99	75 - 125	96	80 - 120	<0.20	ug/g	2.5	30
6657277	Acid Extractable Boron (B)	2020/03/27	98	75 - 125	95	80 - 120	<5.0	ug/g	4.3	30
6657277	Acid Extractable Cadmium (Cd)	2020/03/27	96	75 - 125	94	80 - 120	<0.10	ug/g	7.5	30
6657277	Acid Extractable Chromium (Cr)	2020/03/27	95	75 - 125	94	80 - 120	<1.0	ug/g	0.70	30
6657277	Acid Extractable Cobalt (Co)	2020/03/27	92	75 - 125	98	80 - 120	<0.10	ug/g	0.56	30
6657277	Acid Extractable Copper (Cu)	2020/03/27	93	75 - 125	95	80 - 120	<0.50	ug/g	1.4	30
6657277	Acid Extractable Lead (Pb)	2020/03/27	95	75 - 125	96	80 - 120	<1.0	ug/g	5.0	30
6657277	Acid Extractable Mercury (Hg)	2020/03/27	87	75 - 125	87	80 - 120	<0.050	ug/g	NC	30
6657277	Acid Extractable Molybdenum (Mo)	2020/03/27	99	75 - 125	94	80 - 120	<0.50	ug/g	NC	30
6657277	Acid Extractable Nickel (Ni)	2020/03/27	92	75 - 125	95	80 - 120	<0.50	ug/g	9.1	30
6657277	Acid Extractable Selenium (Se)	2020/03/27	103	75 - 125	99	80 - 120	<0.50	ug/g	NC	30
6657277	Acid Extractable Silver (Ag)	2020/03/27	95	75 - 125	97	80 - 120	<0.20	ug/g	NC	30
6657277	Acid Extractable Thallium (Tl)	2020/03/27	98	75 - 125	97	80 - 120	<0.050	ug/g	11	30
6657277	Acid Extractable Uranium (U)	2020/03/27	99	75 - 125	95	80 - 120	<0.050	ug/g	3.7	30
6657277	Acid Extractable Vanadium (V)	2020/03/27	NC	75 - 125	96	80 - 120	<5.0	ug/g	0.60	30
6657277	Acid Extractable Zinc (Zn)	2020/03/27	NC	75 - 125	98	80 - 120	<5.0	ug/g	3.6	30
6657283	Hot Water Ext. Boron (B)	2020/03/30	86	75 - 125	103	75 - 125	<0.050	ug/g	6.1	40

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6659737	Conductivity	2020/03/30			101	90 - 110	<0.002	mS/cm	7.0	10

N/A = Not Applicable

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.

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).

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

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

BV Labs has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per ISO/IEC 17025, signing the reports.
For Service Group specific validation please refer to the Validation Signature Page.

Bureau Veritas Laboratories 100 – 36 Antares Dr. Nepean, ON, K2E 7W5 Phone: 613-274-0573 Website: www.bvlabs.com

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free:800-563-6266 Fax:(905) 817-5777 www.bvlabs.com

Page of

CHAIN OF CUSTODY RECORD

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#17498 exp Services Inc	Company Name:		Quotation #:	B91718	BV Labs Job #:	Bottle Order #:
Attention:	Accounts Payable	Attention:	Chris Kimmerly	P.O. #:			764708
Address:	100-2650 Queensview Drive Ottawa ON K2B 8H6	Address:		Project:	OTT-00258780-C0	COC #:	Project Manager:
Tel:	(613) 688-1899 Fax: (613) 225-7337	Tel:	Fax:	Project Name:		C#764708-01-01	Katherine Szozda
Email:	accounting.ottawa@exp.com; Karen.Burke@exp.com;	Email:	Chris.Kimmerly@exp.com	Site #:			
				Sampled By:	S Chin		

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

Regulation 153 (2011)
- ☐ Table 1 ☐ Res/Park ☐ Medium/Fine
- ☐ Table 2 ☐ Ind/Comm ☐ Coarse
- ☐ Table 3 ☐ Agri/Other ☐ For RSC
- ☐ Table ___

Other Regulations
- ☐ CCME ☐ Sanitary Sewer Bylaw
- ☐ Reg 558. ☐ Storm Sewer Bylaw
- ☐ MISA Municipality _____
- ☐ PWQO
- ☐ Other _____

Special Instructions

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 PHCs, BTEX/F1-F4 (Soil)	O.Reg 153 Metals & Inorganics Pkg (Soil)	ANALYSIS REQUESTED (PLEASE BE SPECIFIC)	# of Bottles	Comments
1	TP-11 Fill		2020/03/17	PM	S			✓	✓		
2	TP-21 Fill		2020/03/17	PM	S			✓	✓		
3											
4											
5											
6											
7											
8	Analysis only for metals + inorganics										
9			CTC								OAT Tue
10											

25-Mar-20 12:45
Katherine Szozda
C078311
KJY OTT-001

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

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

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

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted	Laboratory Use Only				
Chris Kimmerly	2020/03/25	AM	[illegible]	2020/03/25	12:45		Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
								4 1 4 3	Present		
									Intact	✓	

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' 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.BVLABS.COM/TERMS-AND-CONDITIONS.

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

** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

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

White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

Bureau Veritas Laboratories
6740 Campobello Road, Mississauga, Ontario Canada L5N 2L8 Tel:(905) 817-5700 Toll-free 800-563-6266 Fax:(905) 817-5777 www.bvlabs.com

CHAIN OF CUSTODY RECORD

Page of

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:		Laboratory Use Only:	
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Address:	100-2650 Queensview Drive	Address:		Project:	OTT-00258780-C0	COC #: C#764708-01-01	Project Manager: Katherine Szozda
	Ottawa ON K2B 8H6			Project Name:			
Tel:	(613) 688-1899 Fax: (613) 225-7337	Tel:	Fax:	Site #:			
Email:	accounting.ottawa@exp.com; Karen.Burke@exp.com;	Email:	Chris.Kimmerly@exp.com	Sampled By:	S Chin		

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2	TP-21 Fill		2020/03/17	PM	S			✓	✓ (struck out)		
3											
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7											
8	Analysis only for metals + inorganics										
9			CTIC								ON ICE
10											

25-Mar-20 12:45
Katherine Szozda
C078311
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Chris Kimmerly	2020/03/25	AM	[signature]	20/03/25	12:45	
			[signature]	20/03/26	09:00	

Laboratory Use Only				
Time Sensitive	Temperature (°C) on Recei: 4 1 4 3	Custody Seal	Yes	No
		Present		
		Intact	✓	

1/2/3

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