Phase Two Environmental Site Assessment
925 Ralph Hennessy Avenue, Ottawa, Ontario

Client:
Centre des écoles catholiques du Centre-Est
4000 Rue Labelle
Ottawa, Ontario K1J 1A1

Project Number:
OTT-00245869-A0

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Legal Notification

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Executive Summary

EXP Services Inc. (EXP) was retained by Centre des écoles catholiques du Centre-Est (CECCE) to complete a Phase Two Environmental Site Assessment (ESA) of the proposed new Riverside South catholic elementary school in Riverside South located at 925 Ralph Hennessy Avenue in Ottawa, Ontario hereinafter referred to as the 'Phase One Property'. The objective of the Phase Two ESA was to address areas of potential environmental concern (APEC) identified in a Phase One ESA conducted at the Phase One Property by EXP. It is understood that this report is required as part of the permitting process with the City of Ottawa. We understand that a Record of Site Condition (RSC) is not required.

The findings of a Phase One ESA were presented in a report entitled *Phase One Environmental Site* Assessment, 925 Ralph Hennessy Avenue, Ottawa*, Ontario* dated September 18, 2018. The Phase One ESA identified the following APECs:

Table EX.1: Areas of Potential Environmental Concern

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
APEC 1	Central part	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-site	Petroleum hydrocarbons (PHC), benzene, toluene, ethylbenzene, xylenes	Soil and groundwater
APEC 2	All of Site	#30 – Importation of Fill Material of Unknown Quality	On-site	PHCs, BTEX and metals	Soil

Based on the Phase One ESA findings, EXP recommended conducting a Phase Two ESA at the Phase One Property. The Phase Two ESA consisted of advancing boreholes and completing them as groundwater monitoring wells. Soil and groundwater samples were collected and submitted for laboratory analysis of one or more of the following parameters: metals, BTEX and/or PHC.

For assessment purposes, EXP selected the Site Condition Standards (SCS), provided in Table 2 of *Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act*, Ministry of the Environment (MOE), 2011 for residential/institutional land use at a site with fine textured soil in accordance with Ontario Regulation 153/04 (as amended).

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

- In April 2018, 13 boreholes (BH 1 to BH 13) were advanced at the Phase One Property and one borehole was instrumented with a monitoring well (BH/MW6) and piezometers were installed in BH1, BH2 and BH5. In July 6, 2018, seven (7) additional boreholes (BH 14 to BH 20) were drilled to further characterize the Phase One Property.
- A layer of silty sand and silty clay, trace gravel in most of the boreholes. The fill had a maximum depth of 1.8 m in BH 12 but was generally 0.7 m thick. Below the fill was a layer of silty sand and silty clay that extended to a maximum depth of 3 m (BH 5). followed by a layer of clay that extended to a depth of 6.7 m (BH 3). Below the clay was glacial till, silty sand to sandy silty, some clay, gravel, cobbles and that extended to the maximum depth drilled of 12 m (BH 2). No petroleum odours were identified in the native soil.
- The depth to limestone bedrock ranged from 8.8 m to 12.0 m below ground surface. Groundwater was encountered at a depth of 0.90 m bgs in BH/MW6 to 2.50 m bgs in BH1. No petroleum sheens were observed in the monitoring wells during either sampling event. Based on the groundwater level measurements, the groundwater flow in the area of the boreholes is to the west.
- All of the soil and groundwater samples had concentrations of VOC, metals, PHC, and/or BTEX that were less than the 2011 MECP Table 3 site condition standards.

Based on the Phase Two ESA findings, no further work is recommended at this time. If the wells are no longer needed, they should be decommissioned in accordance with Ontario Regulation 903.

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1 Introduction

EXP Services Inc. (EXP) was retained by Centre des écoles catholiques du Centre-Est (CECCE) to complete a Phase Two Environmental Site Assessment (ESA) of the proposed new Riverside South catholic elementary school located at 925 Ralph Hennessy Avenue in Ottawa, Ontario, hereinafter referred to as the 'Phase One Property'. The objective of the Phase Two ESA was to address areas of potential environmental concern (APEC) identified in a Phase One ESA conducted at the Phase One Property by EXP. It is understood that this report is required as part of the permitting process with the City of Ottawa. We understand that a Record of Site Condition (RSC) is not required.

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 One Property is currently vacant and has an area of 2.0 hectares. It is located at the southeast corner of Ralph Hennessey Avenue and Mount Nebo Way as shown on Figure 1 in Appendix B. At the time of the investigation, the Phase One Property was owned by the CECCE.

Owner Contact: Ms. Annick Prud'homme, Project Manager
4000 Labelle Street
Ottawa, Ontario K1J 1A1

At the time of the investigation, the Phase One Property was observed to be vacant undeveloped land and some of the surrounding area was developed with residential houses. The Phase One Property has an area of approximately 2.0 hectares and is vacant land. The Phase One Property is in a minor institutional zoned area. The Phase One Property is legally described as Part of Lot 22, Block 322, Concession 1 (Rideau Front), Geographic Township of Gloucester, City of Ottawa and the City of Ottawa. The PIN is part of 043302163. Previously, the Phase One Property was developed with a small building and four radio towers for a radio station from 1968 to 2009. The Phase One Property has been vacant since that time (Figure 2 in Appendix B). The property is currently not serviced for water and sewer by the City of Ottawa, however the neighbouring residential properties to the north are municipally serviced.

The local MOECC water well records indicate local soil is clay. The depth to bedrock in the area is approximately 8.8 to 12 m below grade. The MOECC water well record indicated the water well on the Phase One Property was drilled for Radio C.J.R.C. in 1968, indicating the radio towers and the associated building was built in 1968 for use as a radio broadcasting transmitter station.

Topographically, the Phase One Property is relatively flat. The local groundwater flow direction is unknown, although based on regional topography, the groundwater flow is anticipated to be to the northwest.

The approximate Universal Transverse Mercator (UTM) coordinates for the Phase One Property centroid is NAD83, Zone 18, 446752.1 m E, 5013287.5 m N. The UTM coordinates were based on an estimate derived using Google Earth™. The accuracy of the centroid is estimated to range from 5 to 50 m.

1.2 Current and Proposed Future Uses

At the time of the Phase Two ESA investigation, the Phase One Property was vacant and previously the Phase One Property was developed with a small building and four radio towers for a radio station from

1968 to 2009. The future land use will be institutional and occupied by an elementary school with parking. A site plan is included in Appendix B.

1.3 Applicable Site Condition Standards

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

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

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

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

For assessment purposes, EXP selected the MOE (2011) Table 3: Full Depth Generic Site Condition Standards (SCS) in a non-potable groundwater condition for a residential/parkland/institutional property use and fine textured soil. The selection of this category was based on the following factors:

- The predominant soil type on the Phase One Property was considered to be fine textured (refer to the results of the Grain Size Analysis as provided in the Certificates of Analysis presented in Appendix E); and,
- There was no intention to carry out a stratified restoration at the Phase One Property.
- More than two-thirds of the Phase One Property has an overburden thickness greater than 2 m.

- The Phase One Property is not located within 30 m of a surface water body or an area of natural significance.
- The soil at the Phase One Property has a pH value between 5 and 9 for surficial soils; and, between 5 and 11 for subsurface soils.
- The property is not within an area of natural significance; does not include, nor is it adjacent to an area of natural significance, nor is it part of such an area; and, it does not include land that is within 30 m of an area of natural significance, nor is it part of such an area.
- The Phase One Property will be serviced by the City of Ottawa's water distribution system and the surrounding properties either are already municipally serviced or will be in the near future.
- The Phase One Property is planned for institutional use.

2 Background Information

2.1 Physical Setting

At the time of the investigation, the Phase One Property was observed to be vacant undeveloped land and some of the surrounding area was developed with residential houses (Figure 1 in Appendix A). The Phase One Property has an area of approximately 2.0 hectares and is vacant land. The Phase One Property is in an institutional zoned area. The Phase One Property is legally described as Part of Lot 22, Block 322, Concession 1 (Rideau Front), Geographic Township of Gloucester, City of Ottawa and the City of Ottawa PIN is part of 043302163. Previously, the Phase One Property was developed with a small building and four radio towers for a radio station from 1968 to 2009. The Phase One Property has been vacant since that time (Figure 2 in Appendix B). The property is currently not serviced for water and sewer by the City of Ottawa, however the neighbouring residential properties to the north are municipally serviced.

The local MOECC water well records indicate local soil is clay. The depth to bedrock in the area is approximately 8.8 to 12 m below grade. The MOECC water record indicated the water well on the Phase One Property was drilled for Radio C.J.R.C. in 1968, indicating the radio towers and the associated building was built in 1968 for use as a radio broadcasting transmitter station.

Topographically, the Phase One Property is relatively flat. The local groundwater flow direction is unknown, although based on regional topography, the groundwater flow is anticipated to be to the northwest.

2.2 Past Investigations

The findings of a Phase One ESA were presented in a report entitled *Phase One Environmental Site Assessment, 925 Ralph Hennessy Avenue, Ottawa, Ontario,* dated September 18, 2018. The Phase One ESA identified the following APECs:

Table 2.1: Areas of Potential Environmental Concern

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
APEC 1	Central part	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-site	Petroleum hydrocarbons (PHC), benzene, toluene, ethylbenzene, xylenes	Soil and groundwater
APEC 2	All of Site	#30 – Importation of Fill Material of Unknown Quality	On-site	PHCs, BTEX and metals	Soil

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

3 Scope of the Investigation

3.1 Overview of Site Investigation

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

It is understood that the Phase One Property is to be re-developed with an elementary school with associated parking that will be built over most of the Phase One Property. As part of the permitting process, the City of Ottawa requires that a Phase Two ESA be completed in accordance with Ontario Regulation 153/04 (as amended).

3.2 Scope of Work

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

- Request local utility locating companies (e.g., cable, telephone, gas, hydro) to mark any underground utilities present at the Phase One Property;
- Retain a private utility locating company to mark any underground utilities present in the vicinity of the borehole locations and to clear the individual borehole locations;
- Advance a total of twenty (20) boreholes and complete one of them as a groundwater monitoring well and three of them as piezometers;
- Attempt to collect representative soil samples for chemical analysis of volatile organic compounds (VOC), metals, PHC and BTEX;
- Attempt to collect representative groundwater samples for chemical analysis of PHC and BTEX;
- Measure groundwater levels in the monitoring well and piezometers;
- Completion of a survey of the borehole locations relative to a geodetic or other permanent benchmark and in reference with the Universal Transverse Mercator (UTM) coordinate system for vertical and horizontal control; and
- Review the analytical data and prepare a report of the findings.

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

3.3 Media Investigated

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

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

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

3.4 Phase One ESA Conceptual Site Model

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

3.4.1 Current and Past Uses

At the time of the Phase Two ESA investigation, the Phase One Property was vacant and previously the Phase One Property had been developed with a small building and four radio towers for a radio station from 1968 to 2009. The future land use will be institutional and occupied by an elementary school with parking.

3.4.2 Summary of Potentially Contaminating Activities

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

- PCA1 – Former on-site heating oil AST located on the south side of the former Radio C.J.R.C building from 1968 to 2009, (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks).
- PCA2 - The quality of the fill on the Phase One Property (PCA#30 – Importation of Fill Material of Unknown Quality).

No other PCAs took place within the vicinity of the Phase One Property (approximately 250 m radius)

3.4.3 Areas of Potential Environmental Concern

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

- APEC 1 – (central part of Phase One Property) Contaminated soil and groundwater. This APEC is associated with PCA1. The PCOCs include BTEX and PHC.
- APEC 2 – (entire Phase One Property) Contaminated soil. This APEC is associated with PCA2. The PCOCs include BTEX, PHC, and metals.

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

3.4.4 Topography and Geology

Topographically, the Phase One Property is relatively flat. With respect to surficial geology, surficial fill consisting of a mixture of silty sand and silty clay with gravel, roots were encountered to depths of 0.4 m to 0.7 m. Sandy clay to silty clay was observed to a maximum depth of 4.4 m. The clay was underlain by glacial till to the limestone bedrock surface (Paleozoic of the Ottawa Formation) was found between 7.7 m and 11.3 m.

3.4.5 Estimated Groundwater Flow Direction

The local groundwater flow direction is unknown, although based on regional topography, the groundwater flow is anticipated to be to the northwest. The depth to groundwater in 2018 was between 0.9 m and 2.5 m below ground surface.

3.4.6 Underground Utilities

Currently, there are no buried utilities on the Phase One Property.

3.5 Deviations from Sampling and Analysis Plan

The field investigative and sampling program was carried out following the requirements of the Site Sampling and Analysis Plan (SAAP in Appendix A). No significant deviations from the Sampling and Analysis Plan were reported that affected the sampling and data quality objectives for the Phase One Property.

3.6 Impediments

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

4 Investigation Method

4.1 General

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

4.2 Borehole Drilling

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

On April 2, 2018, concurrently with the geotechnical investigation, a total of 13 boreholes (BH 1 to BH 13) were advanced at the Phase One Property by Downing Drilling, a licensed well contractor, under the full-time supervision of EXP staff. In July 6, 2018, seven (7) additional boreholes (BH 14 to BH 20) were drilled to further characterize the Phase One Property. A CME 75 drill rig with split spoon samplers was used to collect the soil samples. A monitoring well was installed in BH/MW 6 to facility groundwater sampling. The locations of the boreholes and monitoring well are presented on Figure 3 in Appendix B.

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

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

4.3 Soil Sampling

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

Soil samples for geologic characterization were collected on a continuous basis in the overburden materials using 5 cm diameter, 61 cm long, split spoon samplers advanced into the subsurface using the drilling rig. The soil cores were removed from the samplers upon retrieval by drilling personnel. Geologic details of the recovered cores were logged by EXP field staff. EXP staff continuously monitored the drilling activities to log the stratigraphy observed from the recovered soil cores, to record the depth of soil sample collection, to record total depths of borings, and to record visual or olfactory observations of potential impacts. Field observations are summarized on the borehole logs provided in Appendix C.

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

4.4 Field Screening Measurements

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

4.5 Soil Sample Submission

Soil samples were selected for laboratory analysis based on combustible vapour measurements and visual and olfactory evidence of impacts, where observed. One worst case soil sample from boreholes BH/MW6 were submitted for laboratory analysis of VOC, metals, PHC, and BTEX. Seventeen soil samples were also submitted for grain size analysis and three soil samples were submitted for pH.

4.6 Groundwater: Monitoring Well Installation

A groundwater monitoring well was installed in BH6 and piezometers were installed in BH1, BH2 and BH5 Downing Drilling using a CME 75 drilling rig. The monitoring wells were installed in general accordance with the Ontario Water Resources Act - R.R.O. 1990, Regulation 903 (as-amended).

The monitoring well consisted of a 1.5 m length of 51 mm diameter Schedule 40 PVC screen and an appropriate length of PVC riser pipe. The piezometers consisted of 19 mm diameter PVC pipes, with 1.5 m of hand made slots. The annular space around the well was backfilled with sand to an average height of 0.3 m above the top of the screen. A bentonite seal was added from the top of the sand pack to approximately 0.3 m below ground surface. The monitoring wells were completed with flush mount protector at the asphalt surface. Details of the monitoring well installations are shown on the Borehole Logs provided in Appendix C.

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

Table 4.1: Monitoring Well Installation Details

Monitoring Well/Piezometer	Ground Elevation (MASL)	Top of Sand Elevation (m)	Top of Screen Elevation (m)	Bottom of Screen Elevation (m)	Bottom of Borehole Elevation (m)	Depth of Borehole (mbgs)
BH1	92.81	88.5	88.2	86.7	86.1	6.7
BH2	92.55	87.7	87.4	86.4	80.6	12.0
BH5	92.97	88.7	88.4	87.0	85.3	7.7
MW18-6	92.32	88.0	87.7	86.2	85.6	6.7

Note: Elevations were collected using a high precision GPS unit and a geodetic datum was established at the Phase One Property (ground surface at BH1) with a known elevation of 92.81 m above sea level).

mbgs – metres below ground surface
TOC - top of plastic well casing

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

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

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

4.7 Groundwater: Field Measurement of Water Quality Parameters

The static water level was measured, the depth of each well was recorded and the well sampled. EXP used an interface probe to measure the possible presence of light non-aqueous phase liquid (LNAPL) in the monitoring well.

4.8 Groundwater: Sampling

Groundwater samples were collected from (BH/MW6) on April 3, 2018. The monitoring activities consisted of measuring the depth to groundwater in each monitoring well and piezometer so that groundwater flow and direction below the Phase One Property could be assessed. The water level measurements were recorded on water level log sheets. The water level meter probe was decontaminated between monitoring well locations with a spray bottle of water and alconox solution, paper towel, then potable water.

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

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

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

4.9 Sediment: Sampling

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

4.10 Analytical Testing

The contracted laboratory selected to perform chemical analysis on all soil and water samples was Maxxam Analytics Inc. Maxxam is an accredited laboratory under the Standards Council of Canada/Canadian Association for Laboratory Accreditation in accordance with ISO/IEC 17025:1999- *General Requirements for the Competence of Testing and Calibration Laboratories*.

4.11 Elevation Survey

An elevation survey was conducted to obtain vertical control of the newly installed monitoring well locations. The top of casing and ground surface elevation of each monitoring well location was surveyed using a high precision GPS unit and a geodetic datum was established at the Phase One Property (ground surface at BH1) with a known elevation of 92.81 m above sea level).

4.12 Residue Management

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

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

4.13 Quality Assurance and Quality Control Measures

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

- Collection and analysis of blind duplicate soil and groundwater samples to ensure analytical precision;
- Using dedicated and/or disposal sampling equipment;
- Using a trip blank for BTEX during sampling;
- Following proper decontamination protocols to minimize cross-contamination;
- Maintaining field notes and completing field forms to document on-Site activities; and,
- Using only laboratory supplied sample containers and following prescribed sample protocols, including proper preservation, meeting sample hold times, proper chain of custody documentation, to ensure integrity of the samples.

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

5 Review and Evaluation

5.1 Geology

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

5.1.1 Topsoil

A layer of topsoil was observed in all of the boreholes. The topsoil had a maximum thickness of 0.3 m in BH 12. No petroleum odours were identified in the topsoil material. Some topsoil was observed underneath some imported fill material as observed in BH 1, BH 2, BH 5, BH 7, BH 8, BH 10, and BH 13.

5.1.2 Fill Material

A layer of silty sand and silty clay, trace gravel in most of the boreholes. The fill had a maximum depth of 1.8 m in BH 12 but was generally 0.7 m thick. No petroleum odours were identified in the fill material.

5.1.3 Native Material

Below the fill was a layer of silty sand and silty clay that extended to a maximum depth of 3 m (BH 5). followed by a layer of clay that extended to a depth of 6.7 m (BH 3). Below the clay was glacial till, silty sand to sandy silty, some clay, gravel, cobbles and that extended to the maximum depth drilled of 12 m (BH 2). No petroleum odours were identified in the native soil.

The grain size analyses showed that more than 50% of the soil had a grain size of silt or finer. This indicates that the native soil is fine grained. The results of the grain size analyses are found in Appendix A.

5.1.4 Bedrock

Limestone bedrock was encountered between 8.8 m and 12 m.

5.2 Aquifers

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

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

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

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

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

Regional groundwater flow in both the contact zone and bedrock have been interpreted to be to the west towards the Rideau River, generally following bedrock topography.

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

5.3 Groundwater: Elevations and Flow Direction

The monitoring well network advanced as part of this Phase Two ESA consists of one monitoring wells (BH/MW6) and three piezometers (BH1, BH2, and BH5) screened within the geologic overburden at the Phase One Property.

Groundwater elevations and water levels were measured at the Phase One Property on April 10 and August 30, 2018. Groundwater was encountered at a depth of 0.90 m bgs in BH/MW6 to 2.50 m bgs in BH1. No petroleum sheens were observed in the monitoring wells during either sampling event.

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

Table 5.1: Groundwater Elevations

Monitoring Well ID	Ground Elevation (MASL)	April 10, 2018		August 30, 2018	
		Water Level (mbg)	Water Level (MASL)	Water Level (mbg)	Water Level (MASL)
BH 1	92.81	2.55	90.56	2.50	90.31
BH 2	92.55	1.79	90.96	1.80	90.75
BH 5	92.97	2.12	91.45	2.10	90.87
MW/BH 6	92.32	0.64	92.28	0.90	91.42

Note: Elevations were referenced using a high precision GPS unit and a geodetic datum was established at the Phase One Property (ground surface at BH1) with a known elevation of 92.81 m above sea level).

mbtoc – metres below top of plastic well casing

mASL – metres above sea level

NA – not applicable

Based on the groundwater level measurements, the groundwater flow in the area of the boreholes is to the west as shown on Figure 3 in Appendix B. EXP notes that groundwater flow direction and level can be influenced by utility trenches and other subsurface structures and may migrate in the bedding stone of nearby subsurface utility trenches.

5.4 Groundwater: Hydraulic Gradients

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

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

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

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

The horizontal hydraulic gradient, based on the groundwater elevations, is estimated to average about 0.020 m/m.

5.5 Single Well Response Tests (SWRTs) Analysis

Single well response tests were conducted on BH6 and BH5 as a part of this Phase Two ESA. The calculated hydraulic conductivity of BH5 was 4 10^{-9} m/s.

5.6 Groundwater: Hydraulic Conductivity

The horizontal hydraulic conductivity in the overburden unit was estimated from the analysis of the soil types observed during the drilling activities and from a review of the grain size analysis. The majority of the native soils consisted of sandy clay overlying silty clay. Using Hazen's empirical formula based on grain size analysis, the hydraulic conductivity of the silty clay was calculated to be less than 1 x 10^{-6} cm/s. Based on estimates provided by *Freeze and Cherry (1979)* the approximate horizontal hydraulic conductivity for silty clay is 10^{-12} m/s to 10^{-9} m/s.

5.7 Soil Texture

Based on the grain size analysis of 17 soil samples, the soil texture at the water table at the Phase One Property was assessed to be fine textured (refer to the two hydrometer analyses in Appendix E) consisting of sandy clay to silty clay. Therefore, the soil texture is fine grained.

5.8 Soil: Field Screening

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

5.9 Soil Quality

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

The MECP Table 3 SCS are applicable if soil pH is in the range of 5 to 11 for subsurface soil (greater than 1.5 m below soil surface). The Certificates of Analysis includes a pH measurement taken from the subsurface. Three soil samples were submitted for pH analysis with results of 7.47, 8.01, and 7.91. The pH values were within the acceptable range for the application of MECP Table 3 SCS.

5.9.1 Petroleum Hydrocarbons

The concentrations of PHC and BTEX measured in the analysed current and previous soil samples were less than the laboratory detection limits and the MECP 2011 Table 3 SCS, as shown in Table 1 in Appendix D.

5.9.2 Volatile Organic Compounds

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

5.9.3 Metals

The concentrations of metals measured in the analysed current and previous soil samples were less than the MECP 2011 Table 3 SCS, as shown in Table 2 in Appendix D.

5.9.4 Chemical Transformation and Soil Contaminant Sources

There were no soil exceedances of the MECP Table 3 SCS.

5.9.5 Evidence of Non-Aqueous Phase Liquid

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

5.10 Groundwater Quality

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

The groundwater analytical results are summarized on Table 4 in Appendix D and the Certificates of Analysis are enclosed in Appendix E.

5.10.1 Petroleum Hydrocarbons

One (1) groundwater sample and a blind duplicate were submitted for the chemical analysis of PHC and BTEX. As shown in Table 5 in Appendix D, the concentrations of PHC and BTEX parameters in both of the groundwater samples were non-detect and below the MECP Table 3 SCS.

5.10.2 Chemical Transformation and Contaminant Sources

There were no groundwater exceedances of the MECP Table 3 SCS.

5.10.3 Evidence of Non-Aqueous Phase Liquid

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

5.11 Sediment Quality

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

5.12 Quality Assurance and Quality Control Results

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

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

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

Duplicate soil sample pair MW/BH 6-SS3 and its duplicate MW/BH 6-S30 were submitted for chemical analysis of BTEX and PHC F1. For QA/QC purposes, the analytical sample results are quantitatively evaluated by calculating the relative percent difference (RPD) between the samples and their duplicates. The concentrations of BTEX and PHC F1 were less than the laboratory reported detection limits for both the primary and duplicate samples and therefore RPD could not be calculated and the data is acceptable from a RPD perspective.

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

The analytical program conducted by laboratory included analytical test group specific QA/QC measures to evaluate the accuracy and precision of the analytical results and the efficiency of analyte recovery during solute extraction procedures. The laboratory QA/QC program consisted of the preparation and analysis of laboratory duplicate samples to assess precision and sample homogeneity, method blanks to assess analytical bias, spiked blanks and QC standards to evaluate analyte recovery, matrix spikes to evaluate matrix interferences and surrogate compound recoveries (VOCs only) to evaluate extraction efficiency. The laboratory QA/QC results are presented in the Quality Assurance Report provided in the Certificate of

Analysis prepared by the laboratory. The QA/QC results are reported as percent recoveries for matrix spikes, spike blanks and QC standards, relative percent difference for laboratory duplicates and analyte concentrations for method blanks.

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

5.13 Phase Two Conceptual Site Model

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

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

5.13.1 Site Identification Information

The Phase One Property was observed to be vacant undeveloped land and some of the surrounding area was developed with residential houses as shown on Figure 2 in Appendix B. The Phase One Property has an area of approximately 2.0 hectares and is vacant land. At the time of the investigation, the Phase One Property was owned by the Centre des écoles catholiques du Centre-Est.

At the time of the investigation, the Phase One Property was observed to be vacant undeveloped land and some of the surrounding area was developed with residential houses. The Phase One Property has an area of approximately 2.0 hectares and is vacant land. The property is in a minor institutional zoned area. The Phase One Property is legally described as Part of Lot 22, Block 322, Concession 1 (Rideau Front), Geographic Township of Gloucester, City of Ottawa and the City of Ottawa PIN is part of 043302163. Previously, the Phase One Property was developed with a small building and four radio towers for a radio station from 1968 to 2009. The Phase One Property has been vacant since that time (Figure 2 in Appendix B). The property is currently not serviced for water and sewer by the City of Ottawa, however the neighbouring residential properties to the north are municipally serviced.

The local MOECC water well records indicate local soil is clay. The depth to bedrock in the area is approximately 8.8 to 12 m below grade. The MOECC water record indicated the water well on the Phase One Property was drilled for Radio C.J.R.C. in 1968, indicating the radio towers and the associated building was built in 1968 for use as a radio broadcasting transmitter station.

Topographically, the Phase One Property is relatively flat. The local groundwater flow direction is unknown, although based on regional topography, the groundwater flow is anticipated to be to the northwest.

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

Civic Address	925 Ralph Hennessy Avenue, Ottawa, ON
Current Land Use	Residential/agricultural/vacant

Proposed Land Use	Institutional
Legal Description	Part of Lot 22, Block 322, Concession 1 (Rideau Front), Geographic Township of Gloucester, City of Ottawa and the City of Ottawa
Property Identification Number	043302163
UTM Coordinates	446752.1 m E, 5013287.5 m N
Phase One Property Area	2.0 ha
Property Owner	Centre Des Ecoles Catholiques Du Centre-Est
Owner Contact	Ms. Annick Prud'homme
Owner Address	4000 Labelle Street, Ottawa, ON

5.13.2 Physical Site Description

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

The Phase One Property is located in a partly developed residential area of Ottawa where potable water is supplied by the City of Ottawa and therefore the MECP Table 3 Site Condition Standards (SCS) are applied to the Phase One Property. The City of Ottawa obtains its water from the Ottawa River, located approximately 14 km northwest of the Phase One Property.

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

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

5.13.3 Geological and Hydrogeological Setting

Based on the Phase Two ESA and the concurrent geotechnical investigation, a layer of silty sand and silty clay, trace gravel in most of the boreholes. The fill had a maximum depth of 1.8 m in BH 12 but was generally 0.7 m thick. Below the fill was a layer of silty sand and silty clay that extended to a maximum depth of 3 m (BH 5). followed by a layer of clay that extended to a depth of 6.7 m (BH 3). Below the clay was glacial till, silty sand to sandy silty, some clay, gravel, cobbles and that extended to the maximum depth drilled of 12 m (BH 2). No petroleum odours were identified in the native soil.

Grey, limestone bedrock was encountered at a depth of 8.8 m to 12.0 m. Groundwater was encountered at a depth of 0.90 m bgs in BH/MW6 to 2.50 m bgs in BH1. No petroleum sheens were observed in the monitoring wells during either sampling event.

The geologic cross-section prepared from the Phase One Property boreholes is presented on Figures 4A and 4B in Appendix B.

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

5.13.4 Underground Utilities

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

5.13.5 Potentially Contaminating Activities

The following PCAs were identified:

- PCA1 – Former on-site heating oil AST located on the south side of the former Radio C.J.R.C building from 1968 to 2009, (PCA#28 – Gasoline and Associated Products Stored in Fixed Tanks).
- PCA2 - The quality of the fill on the Phase One Property (PCA#30 – Importation of Fill Material of Unknown Quality).

No PCAs took place within the vicinity of the Phase One Property (approximately 250 m radius).

5.13.6 Areas of Potential Environmental Concern / Potential Contaminants of Concern

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

Table 5.2: Areas of Potential Environmental Concern

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
APEC 1	Central part	#28: Gasoline and Associated Products Storage in Fixed Tanks	On-site	Petroleum hydrocarbons (PHC), benzene, toluene, ethylbenzene, xylenes	Soil and groundwater
APEC 2	All of Site	#30 – Importation of Fill Material of Unknown Quality	On-site	PHCs, BTEX and metals	Soil

5.13.7 Investigation and Remediation

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

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

5.13.8 Contaminants of Concern (COC)

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

5.13.9 Contaminant Fate and Transport

Soil COCs

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

Groundwater COCs

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

6 Conclusions and Recommendations

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

- In April 2018, 13 boreholes (BH 1 to BH 13) were advanced at the Phase One Property and one borehole was instrumented with a monitoring well (BH/MW6) and piezometers were installed in BH1, BH2 and BH5. In July 6, 2018, seven (7) additional boreholes (BH 14 to BH 20) were drilled to further characterize the Phase One Property.
- A layer of silty sand and silty clay, trace gravel in most of the boreholes. The fill had a maximum depth of 1.8 m in BH 12 but was generally 0.7 m thick. Below the fill was a layer of silty sand and silty clay that extended to a maximum depth of 3 m (BH 5). followed by a layer of clay that extended to a depth of 6.7 m (BH 3). Below the clay was glacial till, silty sand to sandy silty, some clay, gravel, cobbles and that extended to the maximum depth drilled of 12 m (BH 2). No petroleum odours were identified in the native soil.
- The depth to limestone bedrock ranged from 8.8 m to 12.0 m below ground surface. Groundwater was encountered at a depth of 0.90 m bgs in BH/MW6 to 2.50 m bgs in BH1. No petroleum sheens were observed in the monitoring wells during either sampling event. Based on the groundwater level measurements, the groundwater flow in the area of the boreholes is to the west.
- All of the soil and groundwater samples had concentrations of VOC, metals, PHC, and/or BTEX that were less than the 2011 MECP Table 3 site condition standards.

Based on the Phase Two ESA findings, no further work is recommended at this time. If the wells are no longer needed, they should be decommissioned in accordance with Ontario Regulation 903.

7 General Limitations

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

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

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

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

This report was prepared for the exclusive use of Centre des écoles catholiques du Centre-Est and may not be reproduced in whole or in part, without the prior written consent of EXP, or used or relied upon in whole or in part by other parties for any purposes whatsoever. Any use which a third party makes of this report, or any part thereof, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. 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 report.

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

8 References

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

- City of Ottawa. 2011. Characterization of Ottawa's Watersheds: An Environmental Foundation Document with Supporting Information Base. March.
- Environmental Protection Act, R.S.O. 1990, Chapter E.19, as amended, September 2004.
- Ministry of the Environment [MOE] (1996) Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario. Ontario Ministry of the Environment, December 1996.
- MOE (2011) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Ontario Ministry of the Environment, April 15, 2011.
- MOE (2011) Guide for Completing Phase Two Environmental Site Assessments under Ontario Regulation 153/04. Ontario Ministry of the Environment, June 2011.
- MOE (2011) Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Ontario Ministry of the Environment, March 2004, amended as of July 1, 2011.
- Ontario Regulation 153/04, made under the Environmental Protection Act, May 2004, last amended to O.Reg.333/13.
- Ontario Water Resources Act – R.R.O. 1990, Regulation 903, amended to O.Reg. 128/03, August 2003.
- Groundwater, Freeze and Cheery 1979. Prentice Hall.
- Paterson Group; December 11, 2015; *Phase I Environmental Site Assessment Update, Vacant Property, 4619 Spratt Road, Ottawa, Ontario.*
- EXP Services Inc., *Phase One Environmental Site Assessment,* 925 Ralph Hennessy Avenue*, Ottawa, Ontario* dated September 18, 2018.
- Singer, S.N., C.K. Cheng, M.G. Scafe. 2003. Hydrogeology of Southern Ontario. Hydrogeology of Ontario Series – Report 1. Prepared for Ministry of Environment.
- WESA. 2006. Watershed Characterization: Geologic Model and Conceptual Hydrogeological Model, Raisin Region CA and South Nation Conservation, Source Protection Plan Partnership.

Tables

Table 1

Characteristic	Description
Minimum Depth to Bedrock	8.8 m
Minimum Depth to Overburden Groundwater	0.90 m August 30, 2018
Shallow Soil Property	No, greater than 2.0 m
Proximity to water body or ANSI	1.7 km west
Soil pH	7.47 to 8.01
Soil Texture	Fine
Current Property Use	Undeveloped
Future Property Use	Institutional
Proposed Future Building	West part of the site
Areas where soil has been brought to the Phase One Property	None identified

Appendix A – Sampling and Analysis Plan

1 Introduction

This appendix presents the Sampling and Analysis Plan (SAAP) that was developed in support of the Phase Two Environmental Site Assessment (ESA) for the property located at 925 Ralph Hennessy Avenue in Ottawa, Ontario (hereinafter referred to as the 'site'). The SAAP presents the procedures and measures that will be undertaken during field investigative activities to characterize the site conditions and meet the data quality objectives of the Phase Two ESA.

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

2 Field Sampling Program

The field sampling program was developed to provide for the collection of samples of the soil and groundwater for chemical analysis of petroleum hydrocarbons (PHC), benzene, toluene, ethylbenzene and xylenes (collectively known as 'BTEX'), volatile organic compounds (VOC), and/or metals. The soil sampling media is to consist of the overburden materials (depths up to 6 m of overburden beneath site). The soil sampling will be location-specific to assess for the potential presence of VOC, PHC, BTEX, and/or metals based on the identification of potential areas of potential environmental concern identified in a Phase One ESA completed by EXP in 2018. Vapour readings will also be taken in the field to determine samples to be submitted for BTEX and PHC F1-F2 analysis.

Each of the groundwater samples will be submitted for analysis of PHC and BTEX. The monitoring well network is to comprise of one existing well and three peizometers.

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

3 Field Methods

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

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

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

3.1 Borehole Drilling

Boreholes will be advanced at the site to facilitate the collection of soil samples for chemical analysis and geologic characterization; and, for the installation of groundwater monitoring wells. A total of twenty (20) boreholes are proposed to be advanced at the site, up to a maximum overburden depth of approximately 6.1 m below grade, to provide for the collection of samples of the surficial and overburden materials beneath the site. The borehole locations will be selected to delineate the extent and magnitude of PCOC related impacts to the soils and the groundwater.

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

3.2 Soil Sampling

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

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

3.3 Monitoring Well Installation

It is proposed that one boreholes will be instrumented as a groundwater monitoring well installed with slotted screens intercepting either the native overburden material or the shallow bedrock, where the water table aquifer is expected, extending to depths of approximately 3 to 5 m below grade. Three piezometers will also be installed. The piezometers consisted of 19 mm diameter PVC pipes, with 1.5 m of hand made slots. The monitoring wells will be constructed using 51 mm diameter, Schedule 40, PVC riser pipe and number 10 slot size (0.25 mm) well screens. The base of the well screens will be sealed with threaded flush PVC end caps. All well pipe connections will be factory machined threaded flush couplings. The annular space around the well screens will be backfilled with silica sand, to an average height of 0.3 m above the top of the screen. Granular bentonite will be placed in the borehole annulus from the top of the sand pack to approximately 0.3 m below grade. The monitoring wells will be completed with either a flush-mounted protective steel casing or above ground protective casings cemented into place.

3.4 Monitoring Well Development

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

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

3.5 Groundwater Level Measurements

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

3.6 Elevation Survey

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

3.7 Groundwater Sampling

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

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

4 Field Quality Assurance/Quality Control Program

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

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

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

4.1 Decontamination Protocols

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

4.2 Equipment Calibration

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

4.3 Sample Preservation

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

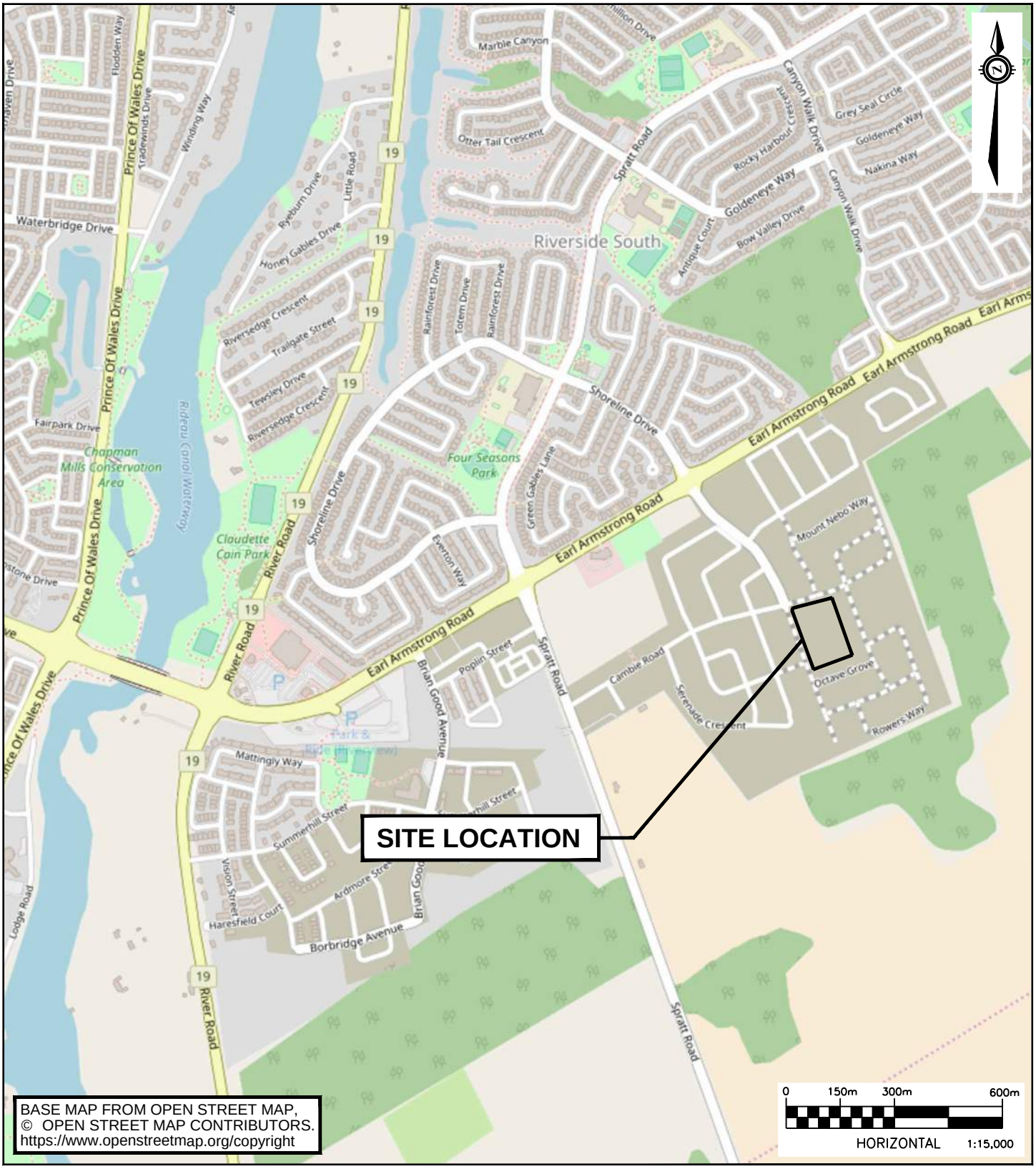
4.4 Sample Documentation

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

4.5 Field Quality Control

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

Appendix B – Figures



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scale 1:15 000	PROJECT: CONSEIL DES ÉCOLES CATHOLIQUES DU CENTRE-EST 925 RALPH HENNESSEY AVE, OTTAWA, ON	project no. OTT-00245869-A0
date SEPTEMBER 2018		design / checked
drawn by J.R.	TITLE: SITE LOCATION PLAN	FIG 1

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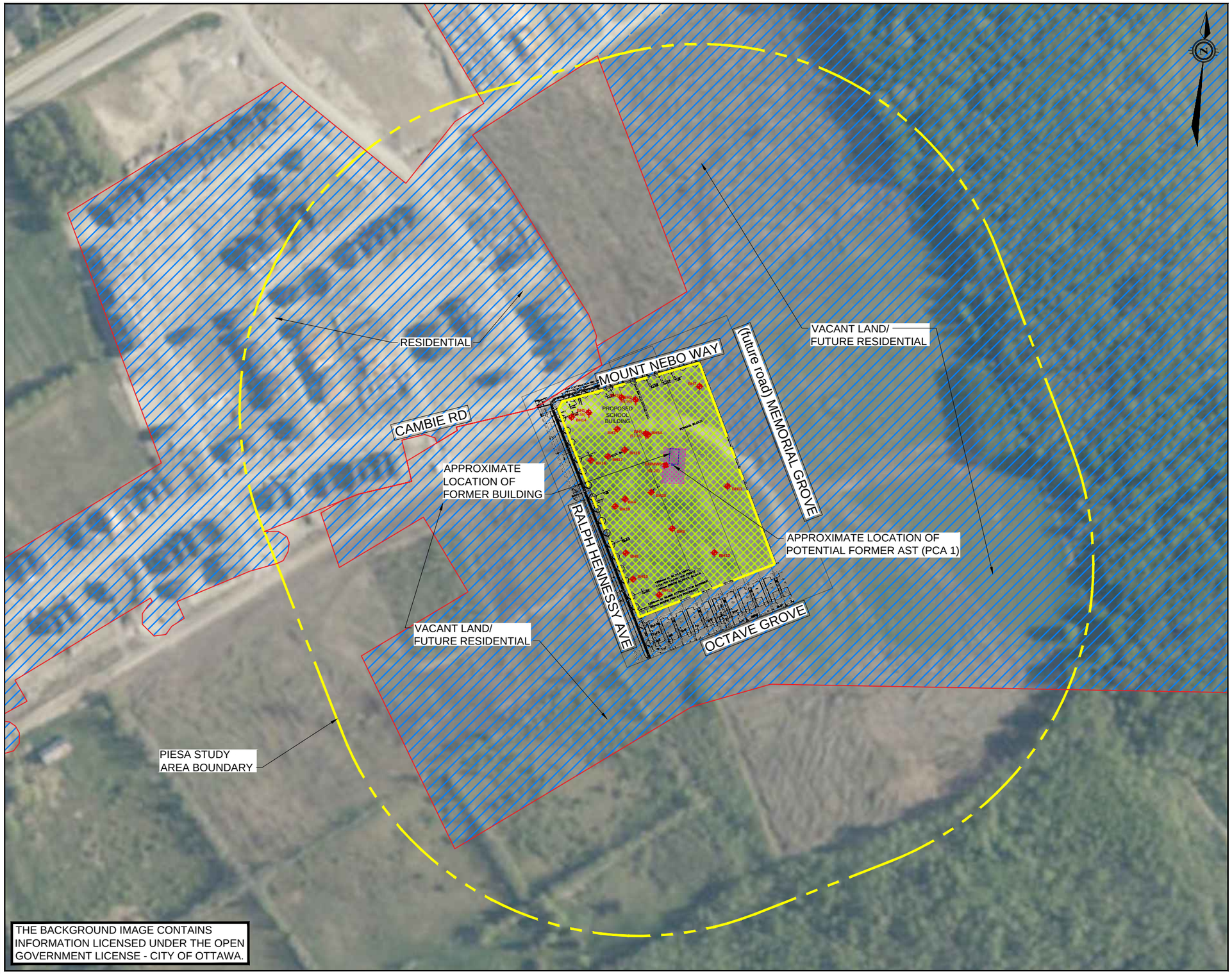

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EXISTING/ PROPOSED RESIDENTIAL

PIESA STUDY AREA BOUNDARY

APEC

APEC 1 - POTENTIAL FORMER AST

APEC 2 - FILL OF UNKNOWN QUALITY

BOREHOLES

BH12 — BOREHOLE LOCATION AND NUMBER

BH/MW6 — BOREHOLE/ MONITORING WELL LOCATION AND NUMBER

BH2 — BOREHOLE W/ INSTALLED PIEZOMETER LOCATION AND NUMBER

(90.96) — GROUNDWATER ELEVATIONS (METERS ABOVE SEA LEVEL)

SCALE 0 30m 60m 120m
HORIZONTAL 1:3000

CLIENT
CONSEIL DES £COLES CATHOLIQUES DU CENTRE-EST

PROJECT
NEW CATHOLIC ELEMENTARY SCHOOL
925 RALPH HENNESSEY AVE,
OTTAWA, ON

TITLE
PIESA STUDY AREA

date: SEPTEMBER 2018	project no.: OTT-00245869-A0
design by: D.C.	drawing no.: FIG 2
prepared by: J.R.	
reviewed by: M.M.	

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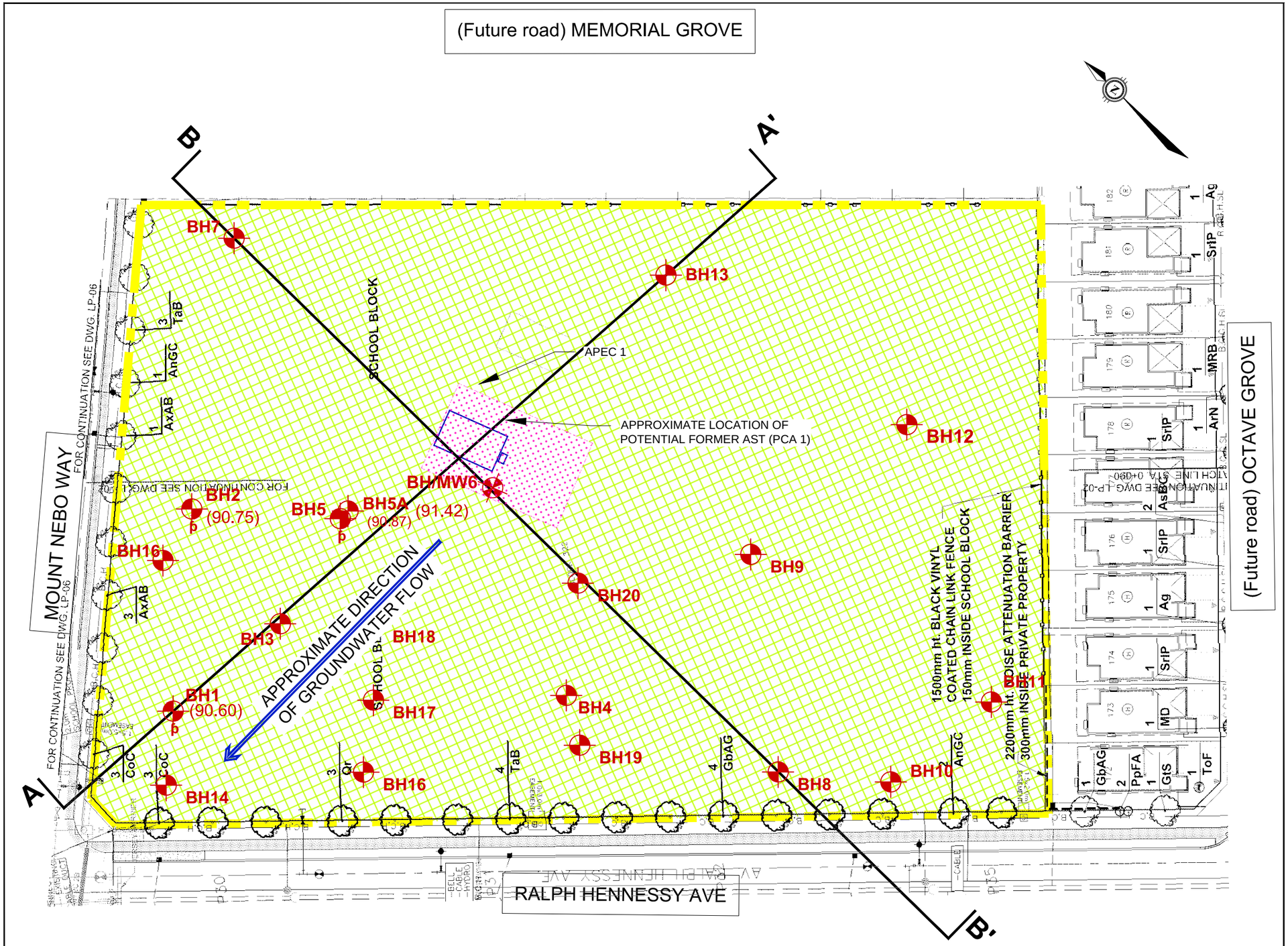

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APEC
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APEC 2 - FILL OF UNKNOWN QUALITY

BOREHOLES
BH12 — BOREHOLE LOCATION AND NUMBER
BH/MW6 — BOREHOLE/ MONITORING WELL LOCATION AND NUMBER
BH2 — BOREHOLE W/ INSTALLED PIEZOMETER LOCATION AND NUMBER
(90.75) — GROUNDWATER ELEVATIONS (METERS ABOVE SEA LEVEL) ON AUGUST 30/2018

CROSS-SECTION
A,B A',B' — GEO-TECHNICAL CROSS-SECTION A-A' & B-B'

SCALE 0 5m 10m 30m
HORIZONTAL 1:750

CLIENT
CONSEIL DES £COLES CATHOLIQUES DU CENTRE-EST

PROJECT
NEW CATHOLIC ELEMENTARY SCHOOL
925 RALPH HENNESSEY AVE,
OTTAWA, ON

TITLE
SITE PLAN & APECs

date SEPTEMBER 2018	project no. OTT-00245869-A0
design by D.C.	drawing no. FIG 3
prepared by J.R.	
reviewed by M.M.	

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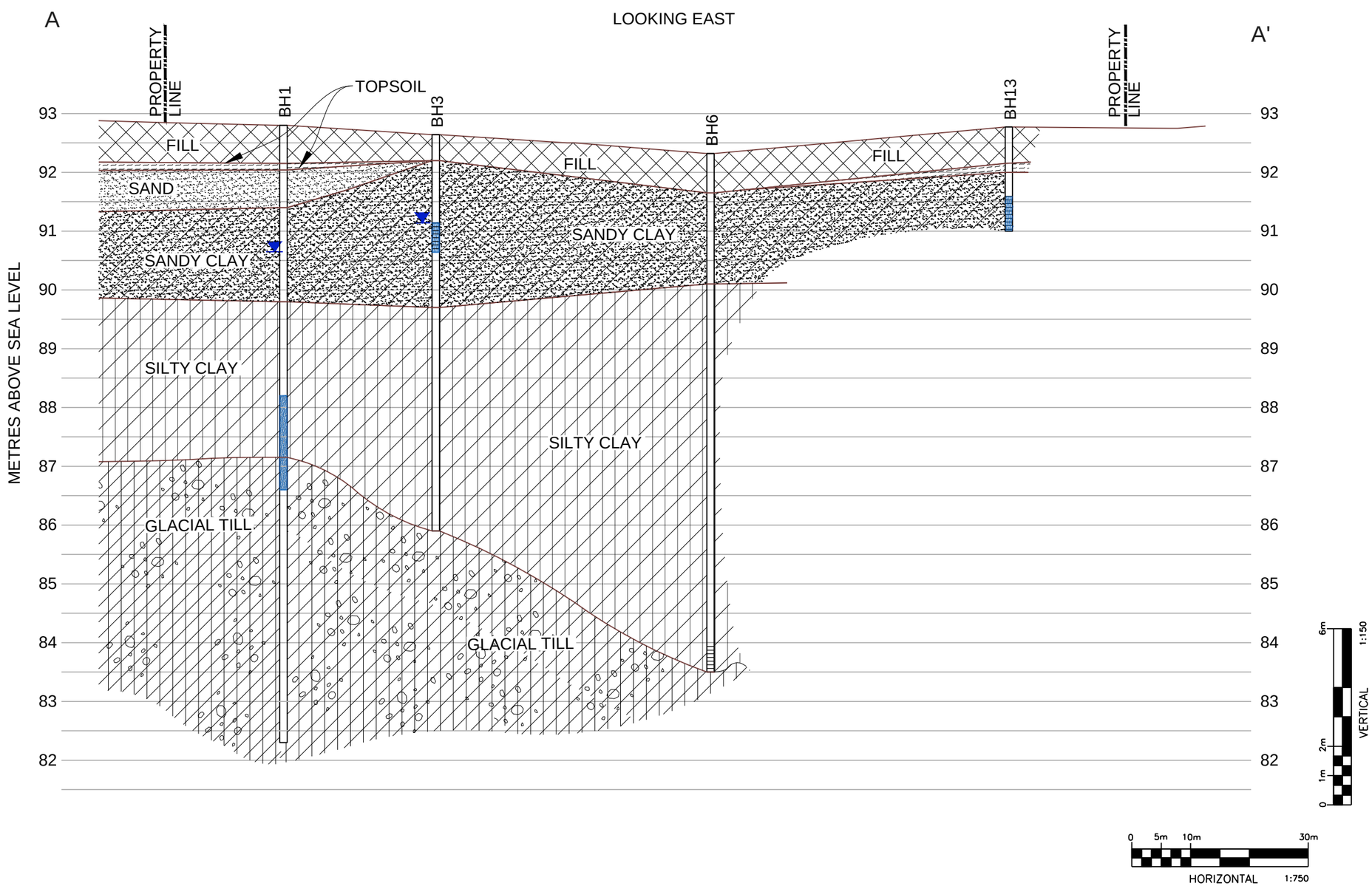

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CLIENT
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PROJECT
PROPOSED NEW RIVERSIDE SOUTH CATHOLIC ELEMENTARY SCHOOL

TITLE
CROSS-SECTION A-A'

date: SEPTEMBER 2018	project no. OTT-00245869-A0
design by: D.C.	drawing no. FIG 4A
prepared by: J.R.	
reviewed by:	

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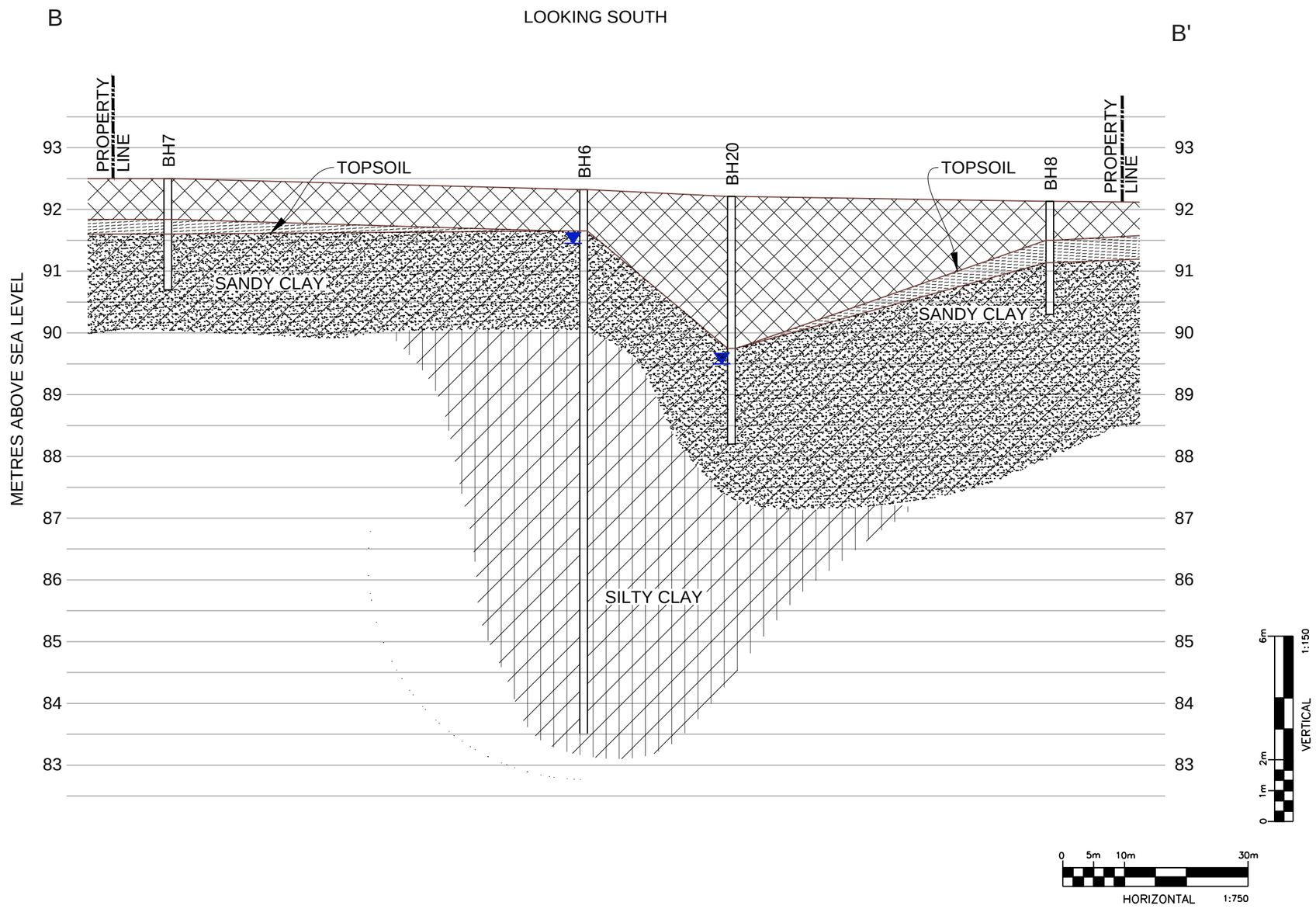

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PROJECT
PROPOSED NEW RIVERSIDE SOUTH CATHOLIC ELEMENTARY SCHOOL

TITLE
CROSS-SECTION B-B'

date: SEPTEMBER 2018	project no.: OTT-00245869-A0
design by: D.C.	drawing no.: FIG 4B
prepared by: J.R.	
reviewed by:	

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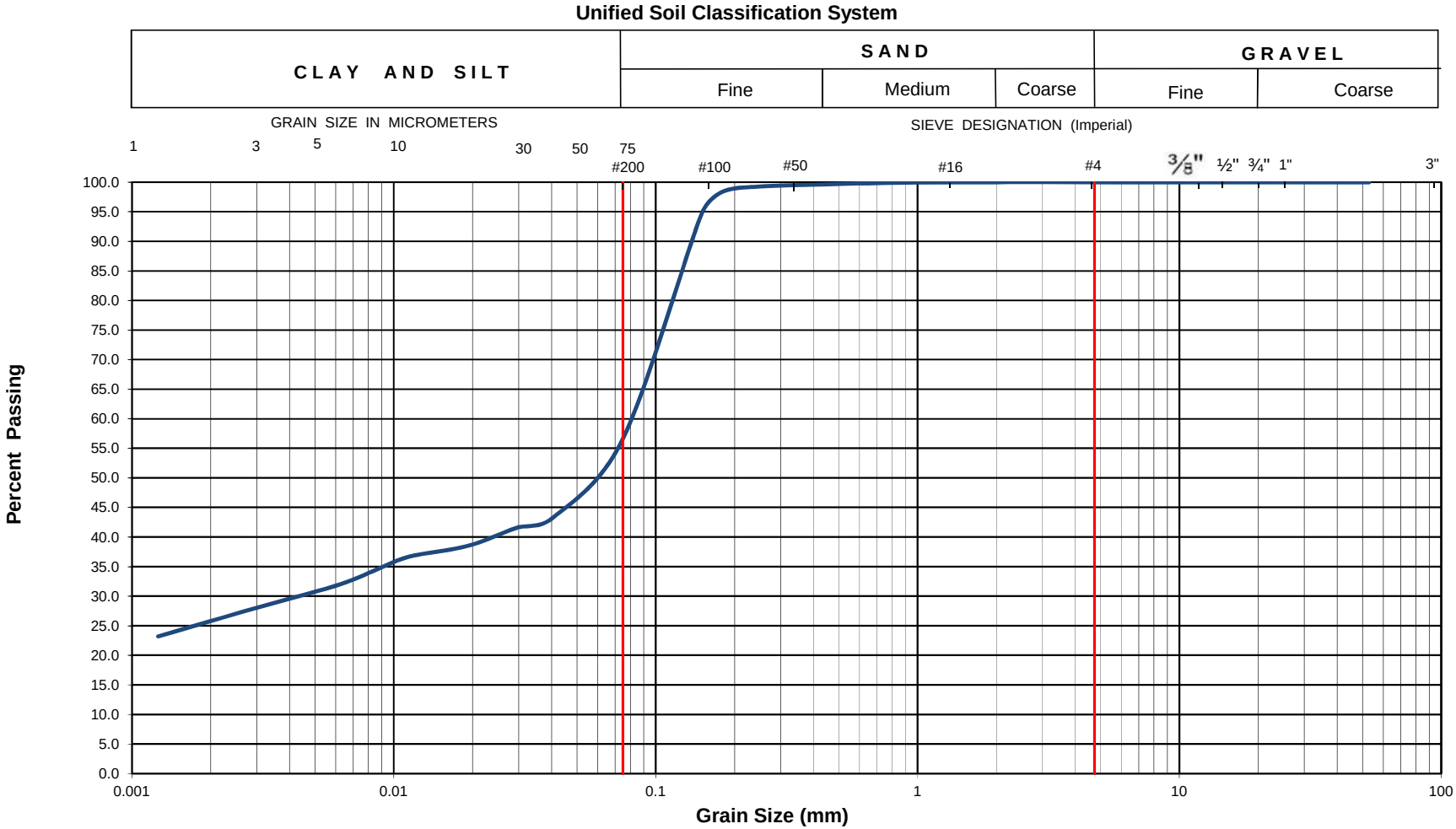
Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422



EXP Project No.:	**OTT-00245869-A0**	**Project Name :**	**Proposed New Riverside South Catholic Elementary School**						
Client :	**CECCE**	**Project Location :**	**Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.**						
Date Sampled :	**April 3, 2018**	**Borehole No:**	**BH1**		**Sample No.:**	**SS3**		**Depth (m) :**	**1.5-2.1**
Sample Description :		**% Silt and Clay**	**57**	**% Sand**	**43**	**% Gravel**	**0**	**Figure :**	**24**
Sample Description :		**Sandy Clay (CL)**							

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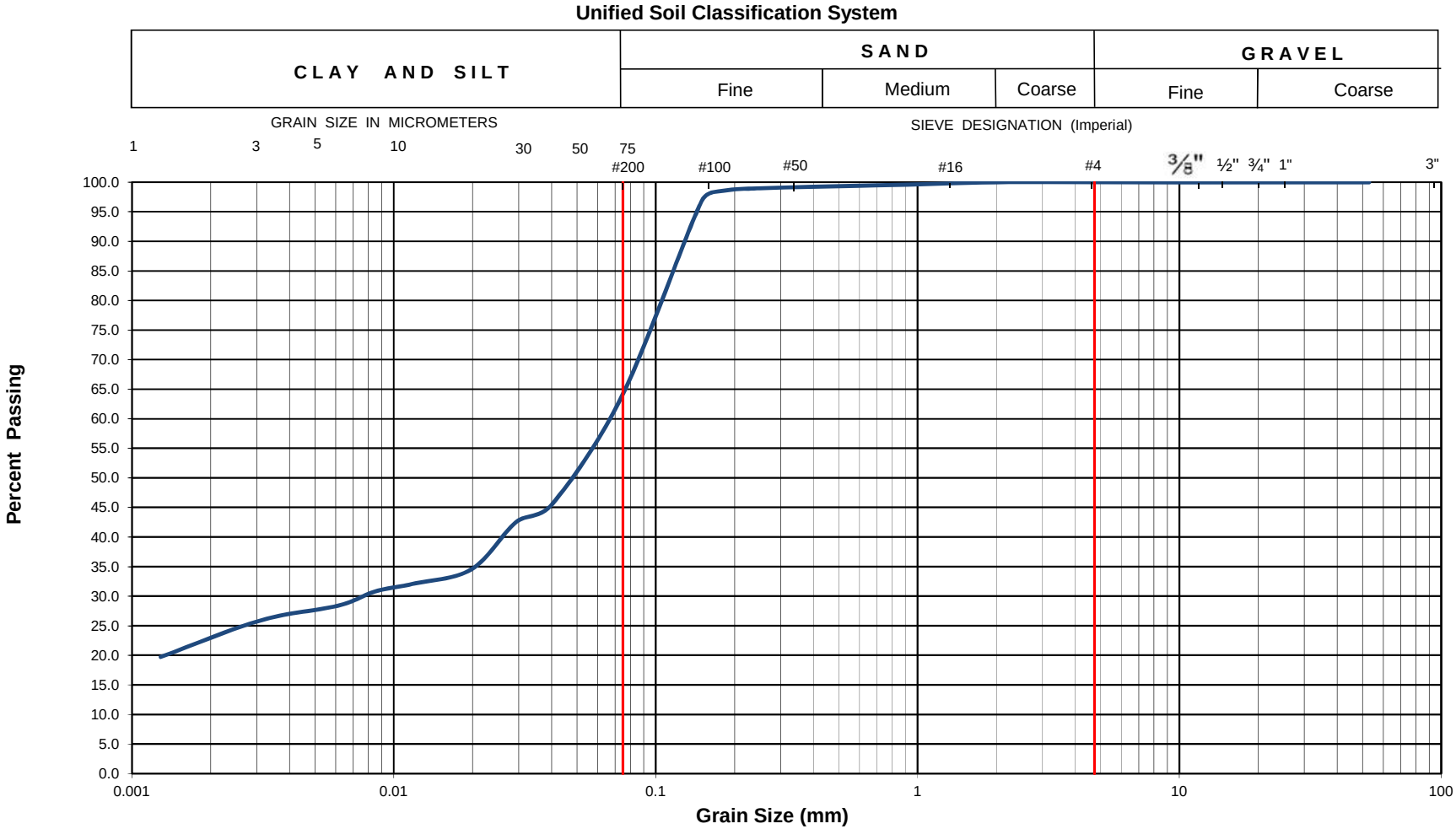
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422



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Client :	**CECCE**	**Project Location :**	**Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.**						
Date Sampled :	**April 3, 2018**	**Borehole No:**	**BH2**		**Sample No.:**	**SS4**		**Depth (m) :**	**2.3-2.9**
Sample Description :		**% Silt and Clay**	**64**	**% Sand**	**36**	**% Gravel**	**0**	**Figure :**	**25**
Sample Description :		**Sandy Clay (CL)**							

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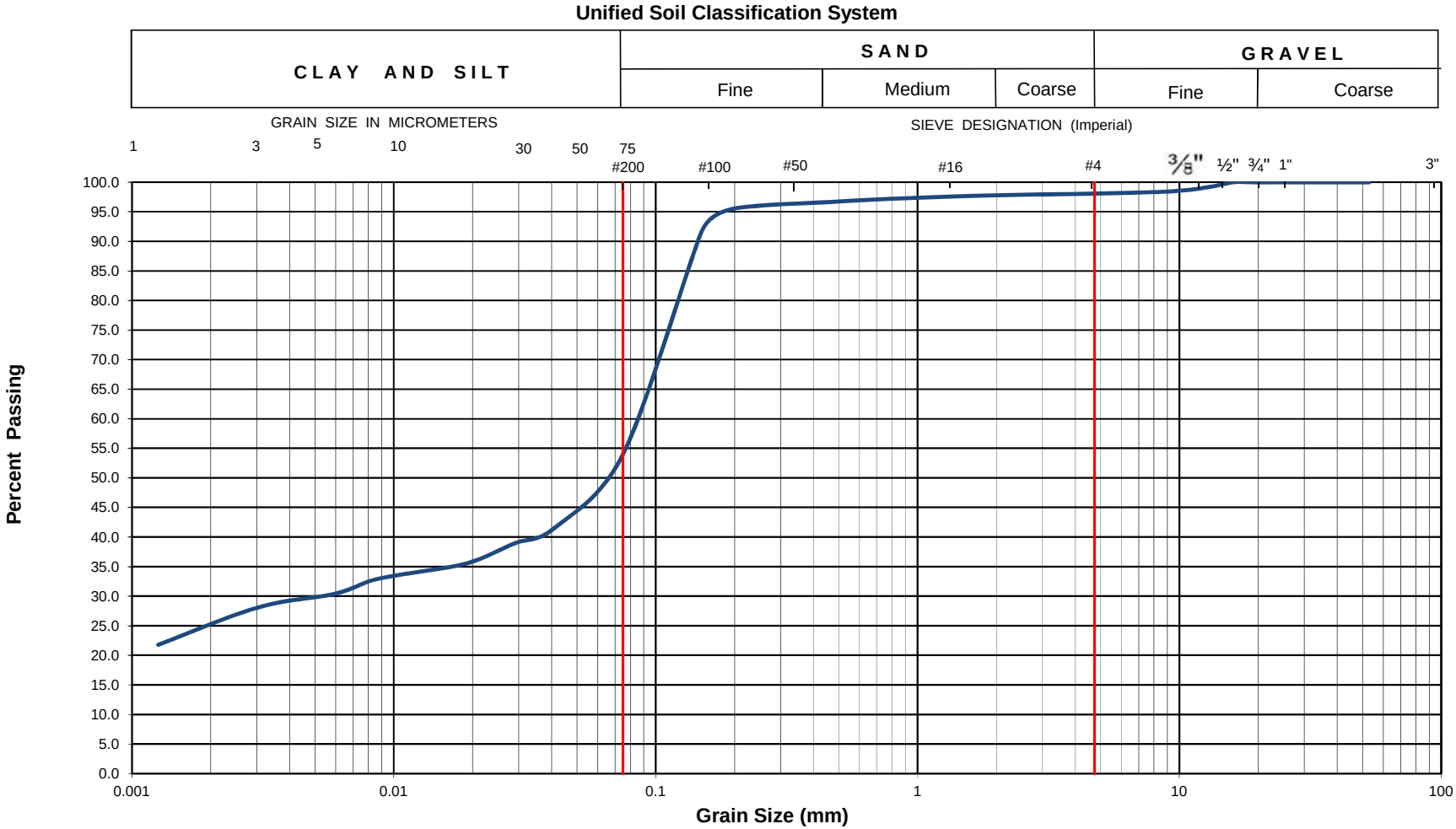
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422



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Client :	**CECCE**	**Project Location :**	**Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.**						
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Sample Description :		**% Silt and Clay**	**54**	**% Sand**	**44**	**% Gravel**	**2**	**Figure :**	**26**
Sample Description :		**Sandy Clay (CL)**							

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Method of Test For Particle Size Analysis of Soil
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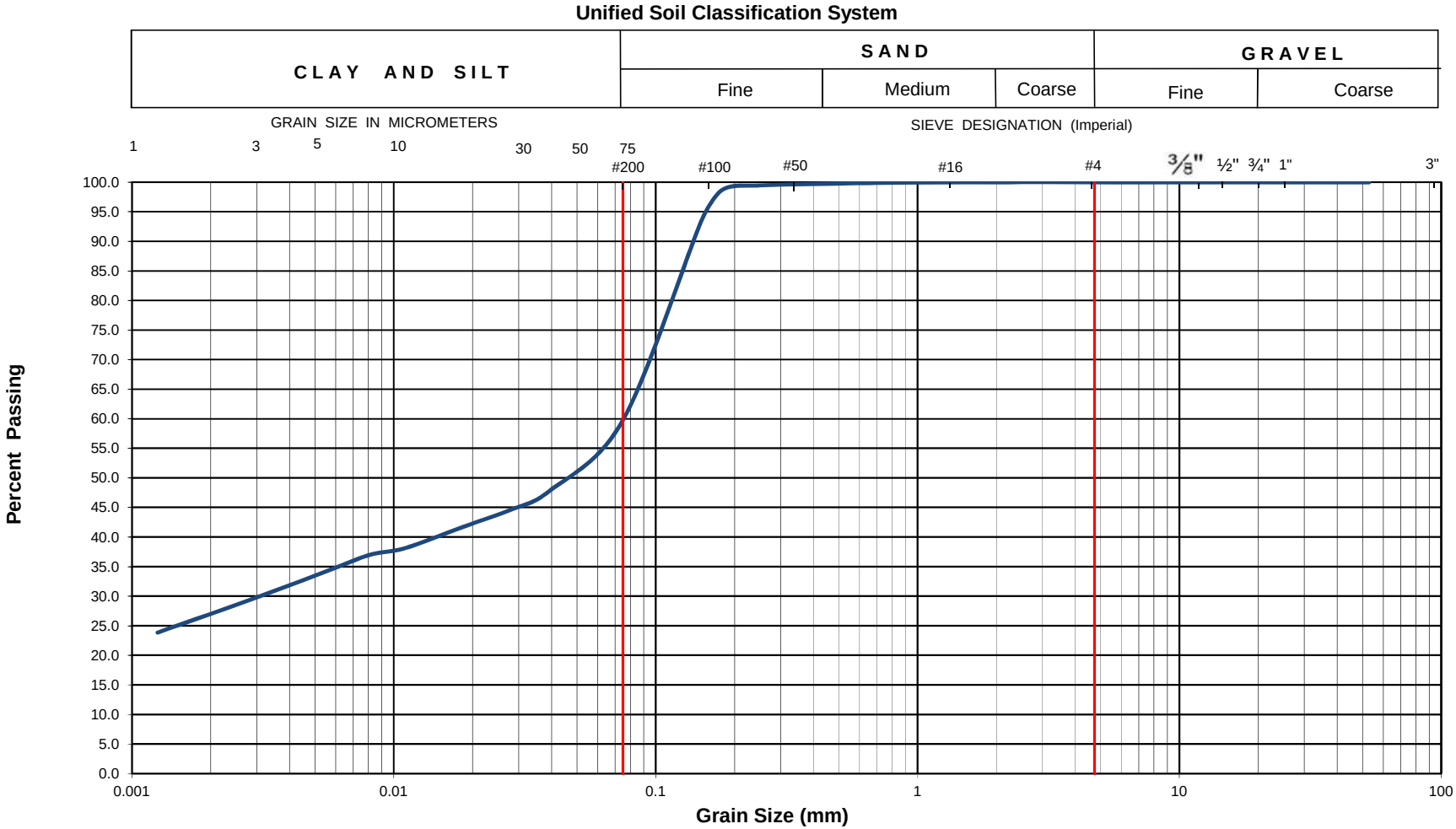

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Client :	**CECCE**	**Project Location :**	**Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.**				
Date Sampled :	**April 3, 2018**	**Borehole No:**	**BH4**	**Sample No.:**	**SS3**	**Depth (m) :**	**1.5-2.1**
Sample Description :		**% Silt and Clay**	**60**	**% Sand**	**40**	**% Gravel**	**0**
Sample Description :		**Sandy Clay (CL)**				**Figure :**	**27**

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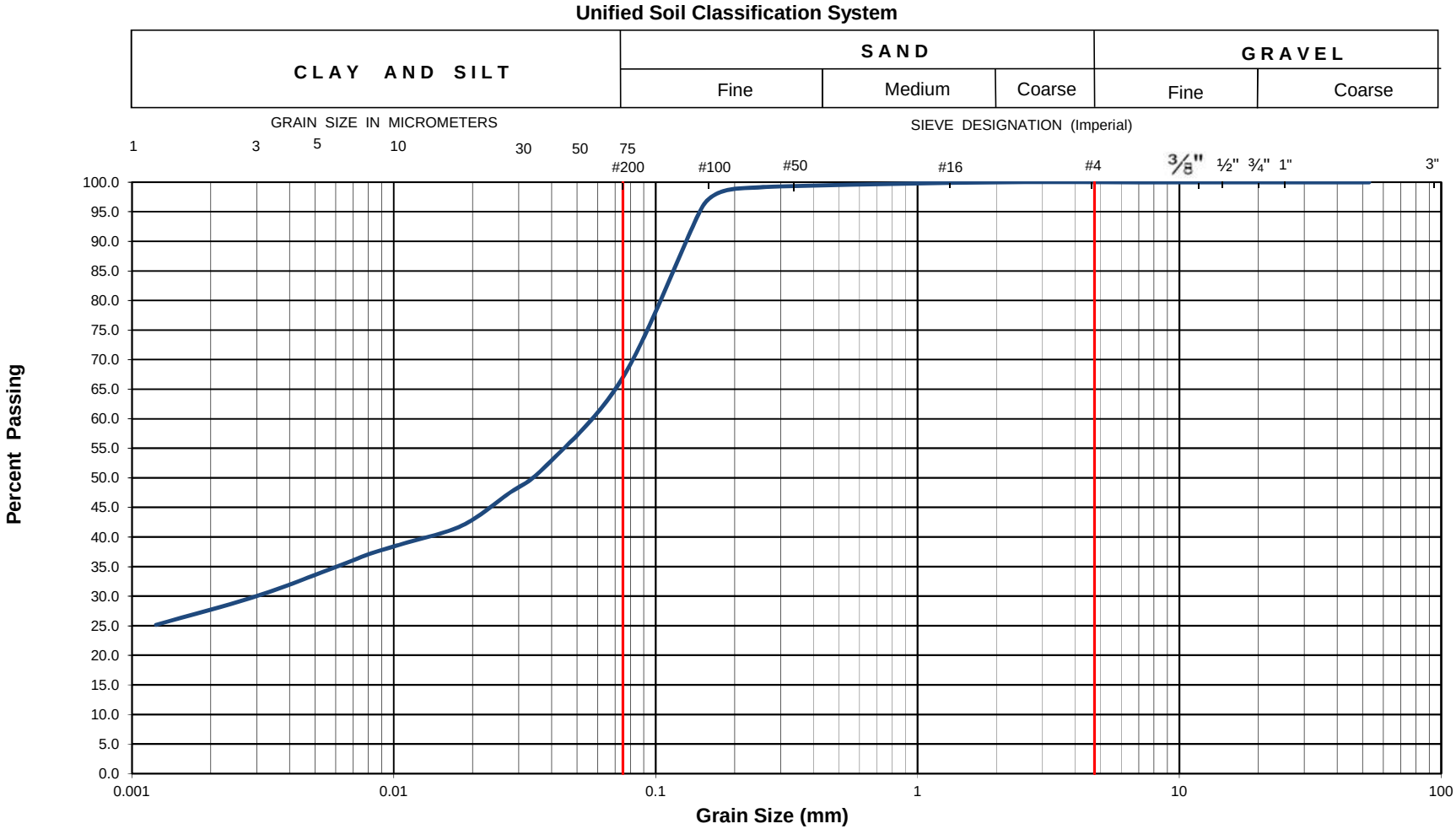

EXP Project No.:	**OTT-00245869-A0**	**Project Name :**	**Proposed New Riverside South Catholic Elementary School**						
Client :	**CECCE**	**Project Location :**	**Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.**						
Date Sampled :	**April 3, 2018**	**Borehole No:**	**BH5**		**Sample No.:**	**SS4**		**Depth (m) :**	**2.3-2.9**
Sample Description :		**% Silt and Clay**	**67**	**% Sand**	**33**	**% Gravel**	**0**	**Figure :**	**28**
Sample Description :		**Sandy Clay (CL)**							

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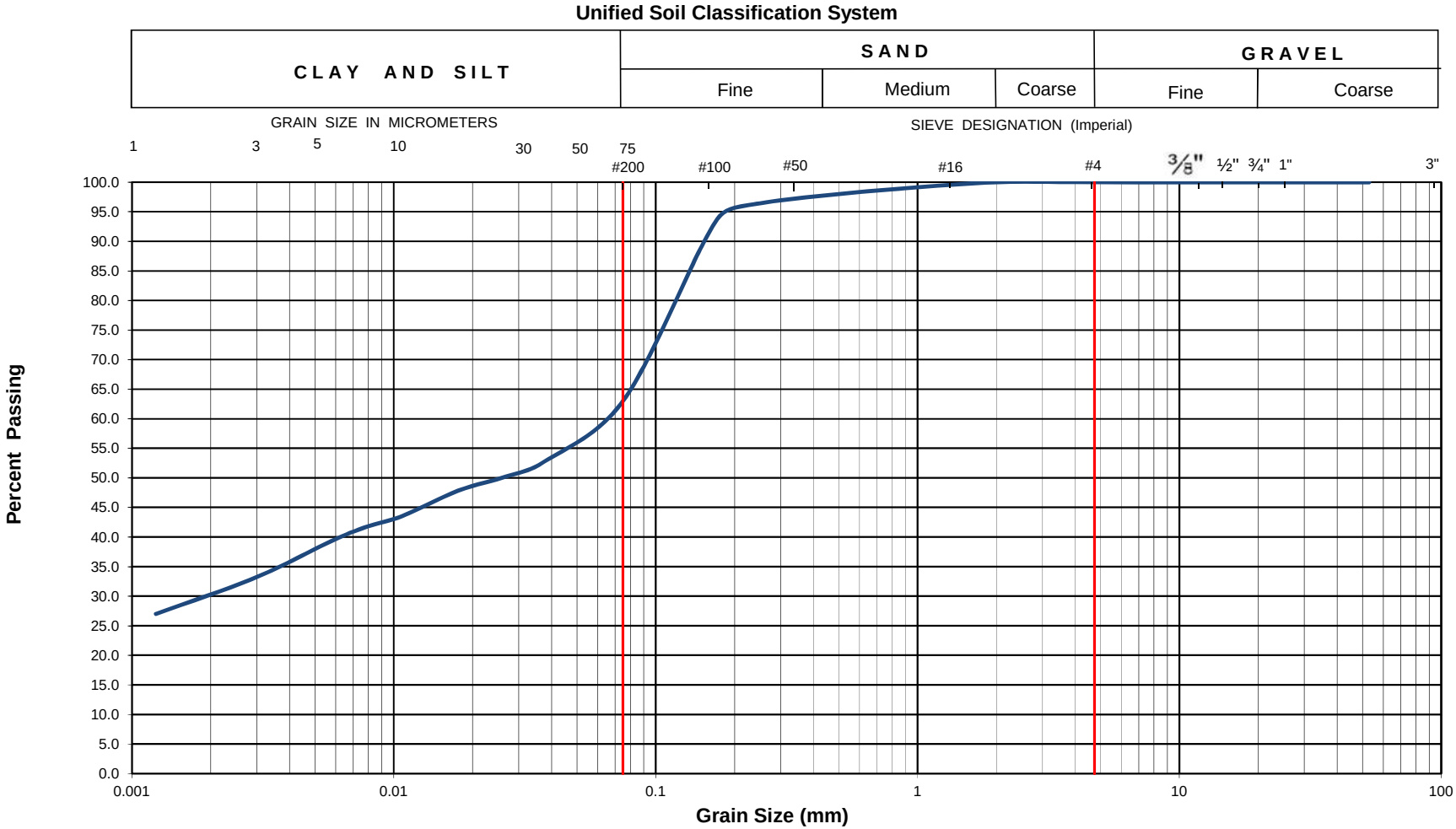

EXP Project No.:	**OTT-00245869-A0**	**Project Name :**	**Proposed New Riverside South Elementay School**						
Client :	**CECCE**	**Project Location :**	**Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.**						
Date Sampled :	**April 2, 2018**	**Borehole No:**	**BH6**		**Sample No.:**	**SS2**		**Depth (m) :**	**0.8-1.4**
Sample Description :		**% Silt and Clay**	**63**	**% Sand**	**37**	**% Gravel**	**0**	**Figure :**	**29**
Sample Description :		**Sandy Clay (CL)**							

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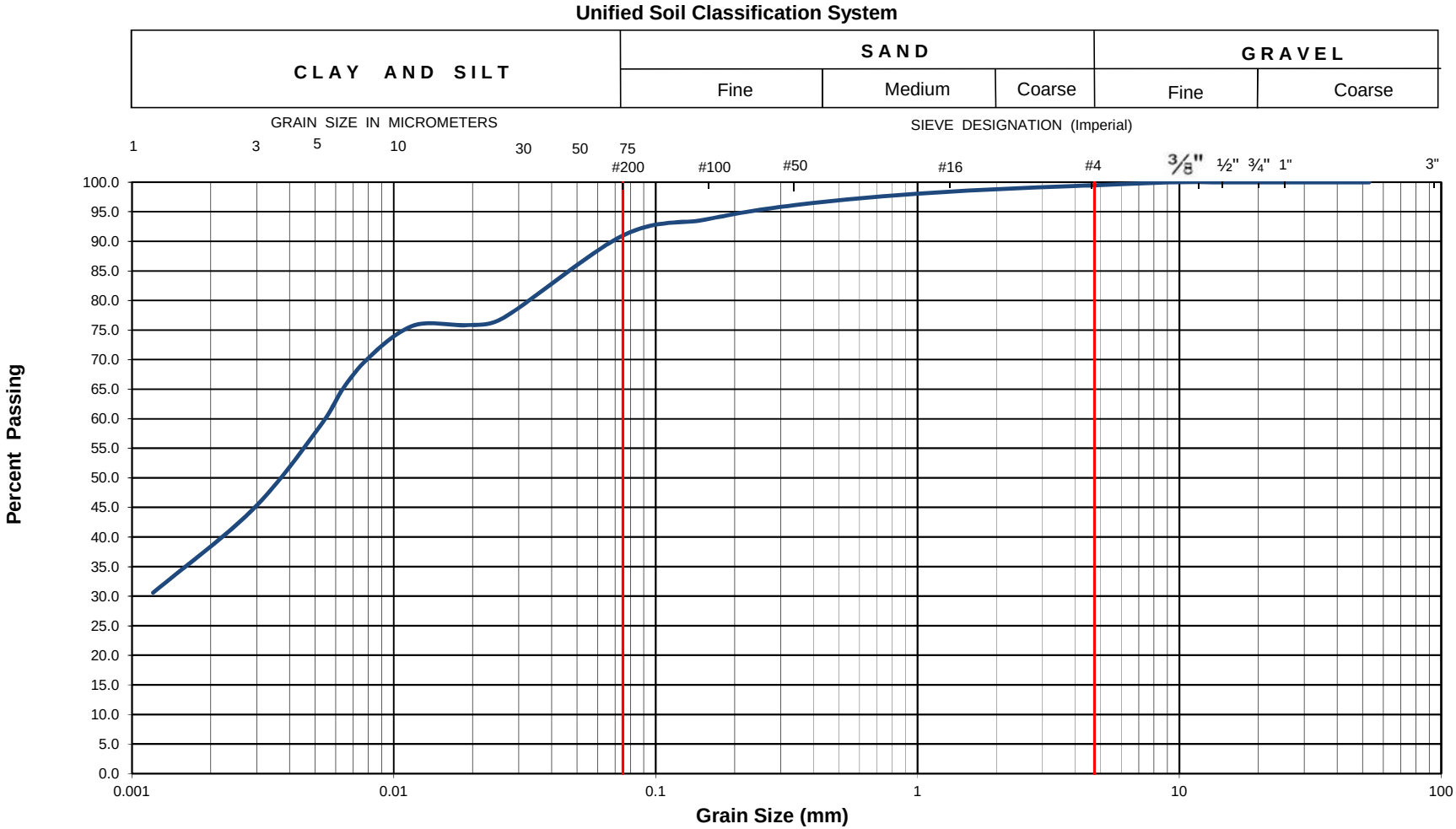
Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422



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Client :	**CECCE**	**Project Location :**	**Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.**						
Date Sampled :	**April 2, 2018**	**Borehole No:**	**BH3**		**Sample No.:**	**SS8**		**Depth (m) :**	**6.1-6.7**
Sample Description :		**% Silt and Clay**	**91**	**% Sand**	**8**	**% Gravel**	**1**	**Figure :**	**32**
Sample Description :		**Clay (CL)**							

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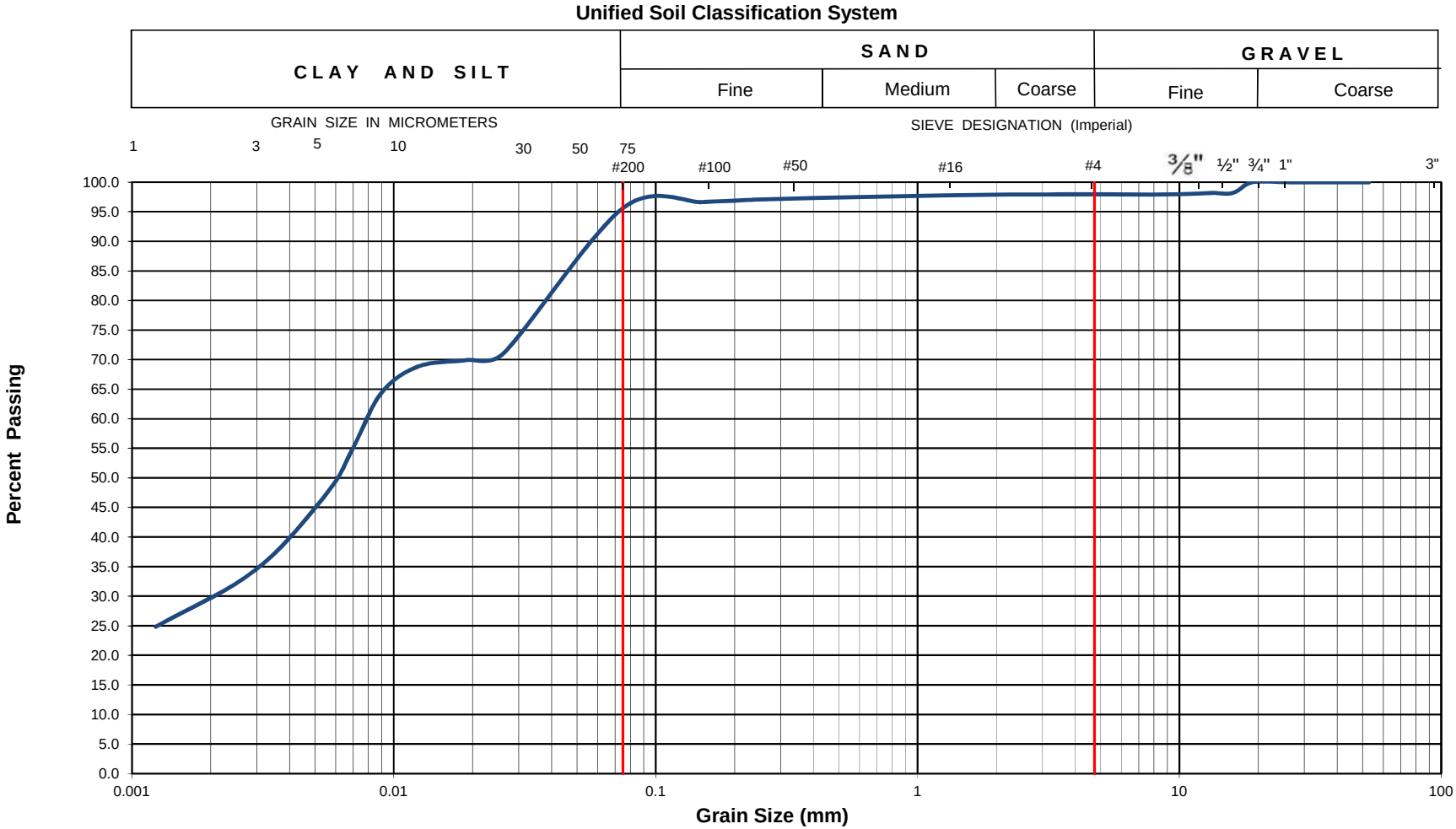

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Client :	**CECCE**	**Project Location :**	**Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.**						
Date Sampled :	**April 3, 2018**	**Borehole No:**	**BH 4**		**Sample No.:**	**SS9**		**Depth (m) :**	**7.6-8.2**
Sample Description :		**% Silt and Clay**	**96**	**% Sand**	**2**	**% Gravel**	**2**	**Figure :**	**33**
Sample Description :		**Silty Clay (CL)**							

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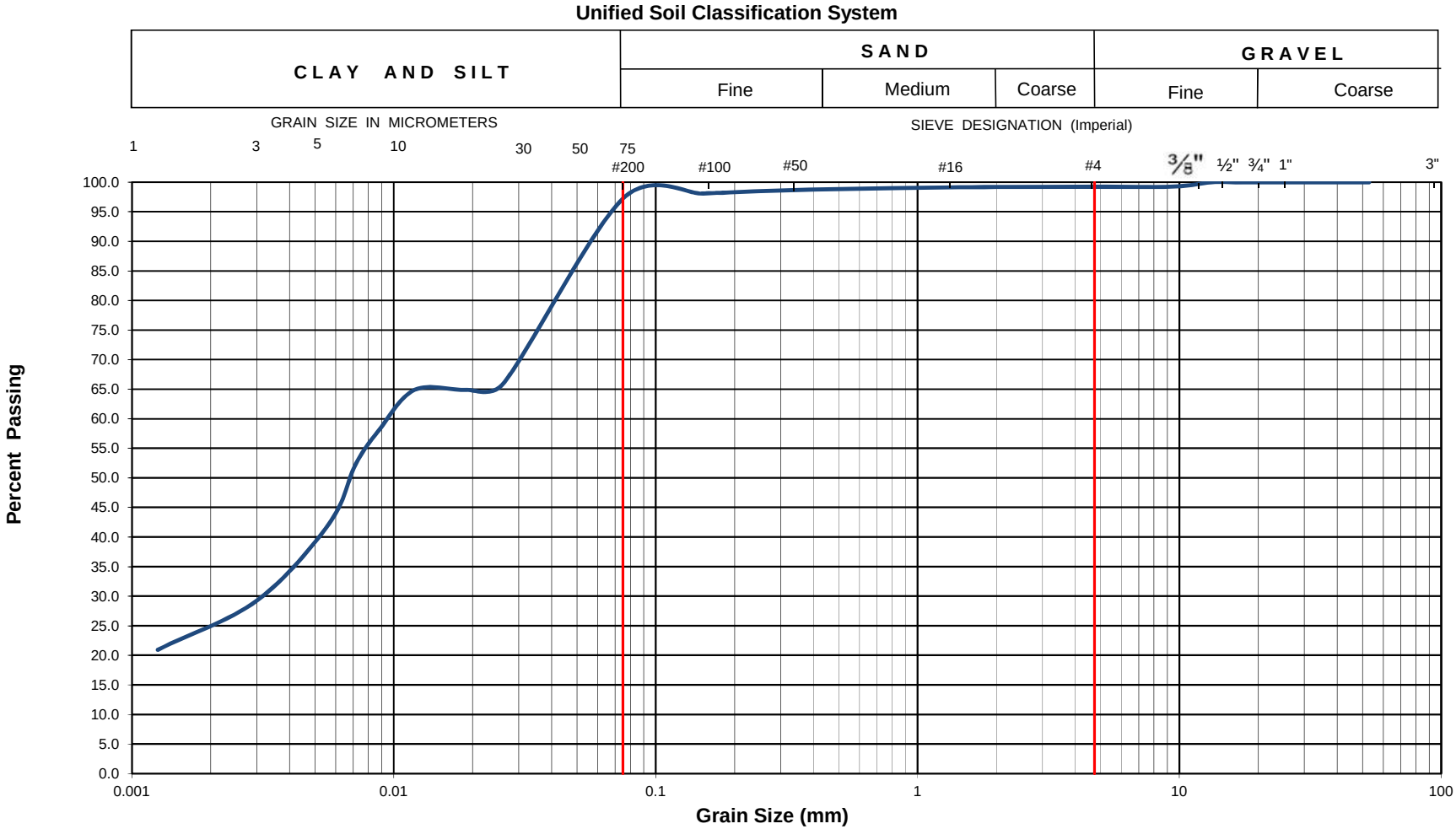
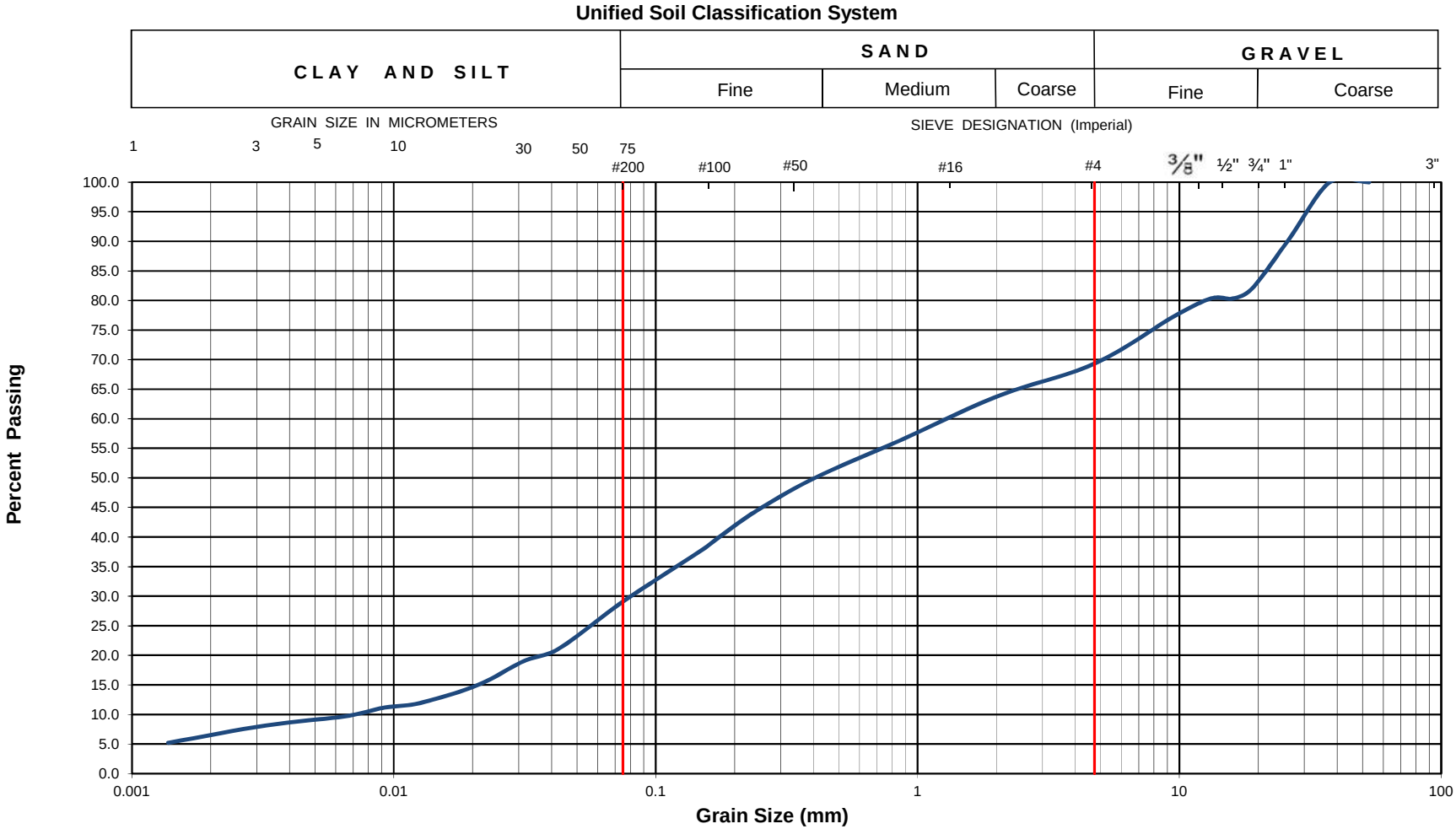
Grain-Size Distribution Curve
Method of Test For Particle Size Analysis of Soil
ASTM C-136/ASTM D422



EXP Project No.:	**OTT-00245869-A0**	**Project Name :**	**Proposed New Riverside South Catholic Elementary School**						
Client :	**CECCE**	**Project Location :**	**Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.**						
Date Sampled :	**April 2, 2018**	**Borehole No:**	**BH6**		**Sample No.:**	**SS8**		**Depth (m) :**	**6.1-6.7**
Sample Description :		**% Silt and Clay**	**97**	**% Sand**	**2**	**% Gravel**	**1**	**Figure :**	**34**
Sample Description :		**Silty Clay (CL)**							

EXP Services Inc.
100-2650 Queensview Drive
Ottawa, ON K2B 8H6

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



EXP Project No.:	**OTT-00245869-A0**	**Project Name :**	**Proposed New Riverside South Elementary School**						
Client :	**CECCE**	**Project Location :**	**Ralph Hennessy Avenue and Moutn Nebo Way, Ottawa, ON.**						
Date Sampled :	**April 3, 2018**	**Borehole No:**	**BH2**		**Sample No.:**	**SS9**		**Depth (m) :**	**7.6-8.2**
Sample Description :		**% Silt and Clay**	**29**	**% Sand**	**40**	**% Gravel**	**31**	**Figure :**	**38**
Sample Description :		**Silty Sand with Gravel (SM)**							

Appendix C: Borehole Logs

Explanation of Terms Used on Borehole Records

SOIL DESCRIPTION

Terminology describing common soil genesis:

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

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

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

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

Terminology describing soil structure:

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

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

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

Fissured: material breaks along plane of fracture.

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

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

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

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

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

Homogeneous: same color and appearance throughout.

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

Uniformly Graded: predominantly on grain size.

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

ISSMFE SOIL CLASSIFICATION

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

0.002 0.006 0.02 0.06 0.2 0.6 2.0 6.0 20 60 200

EQUIVALENT GRAIN DIAMETER IN MILLIMETRES

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

UNIFIED SOIL CLASSIFICATION

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

Table a: Percent or Proportion of Soil, Pp

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

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

Table b: Apparent Density of Cohesionless Soil

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

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

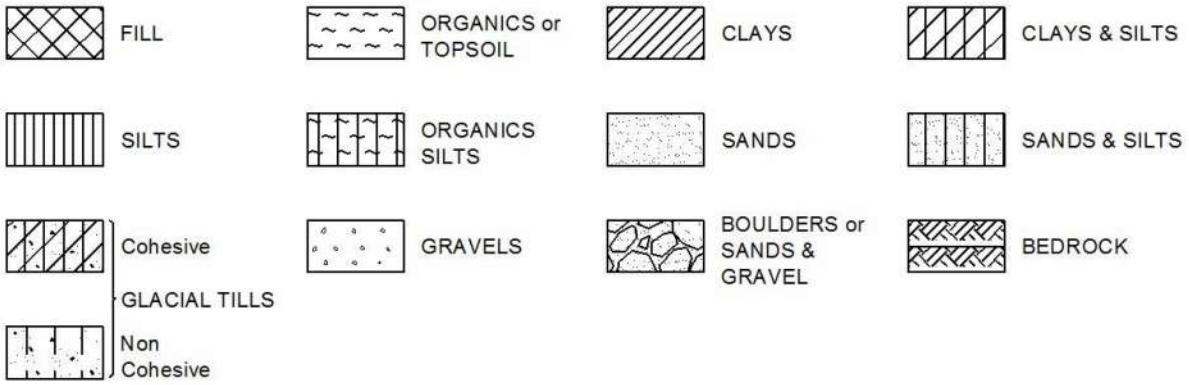
Table c: Consistency of Cohesive Soil

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

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

STRATA PLOT

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



WATER LEVEL MEASUREMENT

Log of Borehole BH-1

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 3

Page. 1 of 2

Date Drilled: 'April 2, 2018

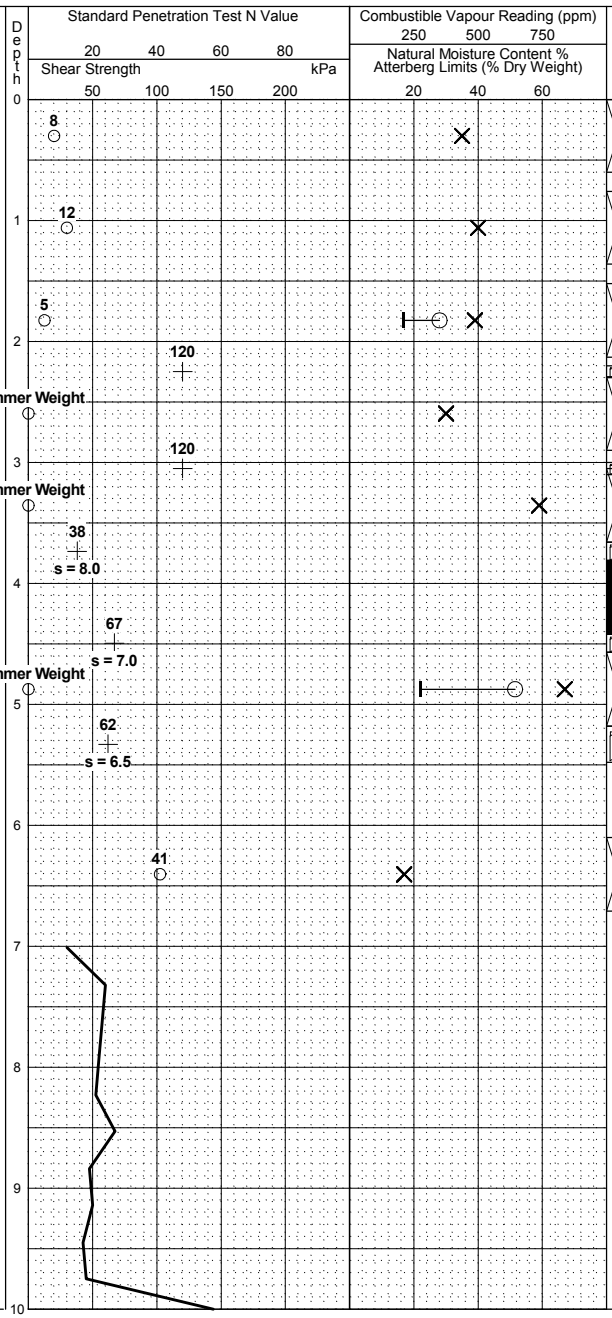
Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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		

Geodetic Elevation m	SOIL DESCRIPTION	Natural Unit Wt. kN/m³
92.81	**FILL** Mixture of silty sand and silty clay, gravel and wood debris, brown and grey, moist, (loose)	
92.1	**TOPSOIL** ~200mm	
91.9	**SILTY SAND** Brown, moist, (compact)	18.4
91.4	**SANDY CLAY** Low plastic, brown, moist, (very stiff)	
90.61		
89.8	**CLAY** Brown, wet, (very stiff)	
89.2	**CLAY** High plastic, sensitive, grey, wet, (firm to stiff)	
87.2	**GLACIAL TILL** Silty sand with gravel, cobbles, boulders, grey, wet, (dense)	
86.1	Dynamic Cone Penetration Test (DCPT) conducted from 7.0 m to Cone Refusal Depth of 10.5 m	



Continued Next Page

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm diameter standpipe piezometer installed in borehole 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-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	2.7	6.1
9 days	2.3	
35 days	2.2	

CORE DRILLING RECORD

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

Log of Borehole BH-1

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Figure No. 3

Page. 2 of 2

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
			82.81	10				
			82.3					
		Cone Refusal at 10.5 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm diameter standpipe piezometer installed in borehole 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-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	2.7	6.1
9 days	2.3	
35 days	2.2	

CORE DRILLING RECORD

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

Log of Borehole BH-2

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 4

Page. 1 of 2

Date Drilled: 'April 3, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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		

SOIL DESCRIPTION	Geodetic Elevation m	Natural Unit Wt. kN/m³
FILL Mixture of silty sand, silty clay and topsoil, brown and dark brown, wet, (compact)	92.55	
TOPSOIL ~100mm	91.9	
SILTY SAND Rootlets, brown, wet, (loose)	91.8	19.6
SANDY CLAY Low plastic, brown, moist, (very stiff)	91.2	
shell fragments from 2.3 m to 2.9 m depths	90.95	19.6
CLAY Sensitive, grey, wet, (stiff)	89.6	
GLACIAL TILL Silty sand with gravel, cobbles, boulders, grey, wet, (compact to very dense)	88.2	

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)

Depth (m): 0, 1, 2, 3, 5, 6, 7, 8, 9, 10

Samples: 12, 6, 2, 120, 2, 115, s = 4.8, Hammer Weight, 62, s = 5.2, Hammer Weight, 88, 69, 25, 13, 85

Continued Next Page

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm diameter standpipe piezometer installed in borehole 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-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	3.0	10.1
8 days	1.6	
34 days	1.6	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	10.1 - 10.4	100	33
2	10.4 - 12	100	97

Log of Borehole BH-2

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Figure No. 4

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		LIMESTONE BEDROCK Horizontal and vertical fractures, grey, (poor and exellent quality)	82.55 / 82.5	10			Run 1	
				11			Run 2	
			80.6	12				
		Borehole Terminated at 12.0 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm diameter standpipe piezometer installed in borehole 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-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	3.0	10.1
8 days	1.6	
34 days	1.6	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	10.1 - 10.4	100	33
2	10.4 - 12	100	97

Log of Borehole BH-3

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 5

Page. 1 of 1

Date Drilled: 'April 2, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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 (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % / Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		FILL Mixture of silty sand and silty clay, trace gravel, roots, brown and grey, wet, (very loose)	92.64	0	2			
		SANDY CLAY Low plastic, brown, wet, (very stiff)	92.2	1	6			19.2
		Roots and rootlets from 0.4 m to 1.4 m depths		2	4			
					101			
					Hammer Weight			
▼		**CLAY** Medium plastic, sensitive to extra-sensitive, grey, wet, (firm to stiff)	89.7 / 89.64	3	48 s = 13.3			
					Hammer Weight			
					29 s = 4.8			
					Hammer Weight			
					53 s = 4.4			
		shell fragments and very stiff below 5.6 m depth		5	43 s = 5.1			
				6	16			
		Borehole Terminated at 6.7 m Depth	85.9					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	3.0	6.1

CORE DRILLING RECORD

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

LOG OF BOREHOLE BH LOGS - 245869 - RIVERSIDE SOUTH SCHOOL.GPJ TROW OTTAWA.GDT 9/13/18

Log of Borehole BH-4

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 6

Page. 1 of 2

Date Drilled: 'April 3, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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	Natural Unit Wt. kN/m³
		TOPSOIL ~100mm	92.2	0	
		SILTY SAND Brown, moist, (loose)	92.1		17.4
			90.8	1	17.9
		SANDY CLAY Medium plastic, brown, moist, (soft)	90.0	2	
		CLAY Brown, wet, (stiff to very stiff)	89.2	3	
		CLAY Grey, wet, (firm to stiff)	86.5	5	
		SILTY CLAY Silt seams, low plastic, sensitive, grey, wet, (stiff to very stiff)	82.4	10	

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

Hammer Weight

N values: 4, 5, 2

Shear strength: 120; 77 (s = 8.0); 48 (s = 8.0); 53 (s = 7.3); 62 (s = 6.5); >120; 77 (s = 6.4); 1; 67

Continued Next Page

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	11.3 - 11.7	100	31
2	11.7 - 13.1	64	34
3	13.1 - 14.4	100	61

Log of Borehole BH-4

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Figure No. 6

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		SANDY CLAY Grey, wet, (soft) *(continued)*	82.2	10	3			
			81.7					
		GLACIAL TILL Silty sand with gravel, cobbles and boulders, grey, wet		11	50 for 75 mm			
			80.9					
		LIMESTONE BEDROCK Horizontal and vertical fractures, (poor and fair quality)		12				
				13				
				14				
			77.8					
		Borehole Terminated at 14.4 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	11.3 - 11.7	100	31
2	11.7 - 13.1	64	34
3	13.1 - 14.4	100	61

Log of Borehole BH-5

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 7

Page. 1 of 1

Date Drilled: 'April 2, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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	Natural Unit Wt. kN/m³
		FILL Mixture of silty sand, silty clay, gravel and topsoil, brown and dark brown, moist, (loose)	92.97	0	
		TOPSOIL ~150mm	92.3		
		SANDY CLAY Low plastic, brown, moist, (soft to firm)	92.1	1	19.1
			91.47	2	18.7
		CLAY Sensitive, grey, wet, (firm to stiff)	90.0	3	
		GLACIAL TILL Silty sand with gravel, cobbles and boulders, grey, wet, (very dense)	87.2	6	
		Auger Refusal at 7.7 m Depth	85.3	7	

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

Observations: 7; 7; 5; 2; 1; 29 (s = 4.0, Hammer Weight); 38 (s = 4.0, Hammer Weight); 53 (s = 4.4); 75; 60 for 100mm

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm diameter standpipe piezometer installed in borehole 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-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	3.3	7.6
9 days	1.5	
35 days	1.5	

CORE DRILLING RECORD

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

Log of Borehole BH-5A

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 8

Page. 1 of 1

Date Drilled: 'April 4, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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 (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
		Power Augered to a 1.5 m Depth	92.97	0				
			91.5	1				
		Dynamic Cone Penetration Test (DCPT) conducted from 1.8 m to Cone Refusal Depth of 9.6 m		2				
				3				
				4				
				5				
				6				
				7				
				8				
				9				
			83.4					
		Cone Refusal at 9.6 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

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

Log of Borehole BH-6

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 9

Page. 1 of 1

Date Drilled: 'April 2, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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	Natural Unit Wt. kN/m³
		FILL Mixture of silty sand and silty clay, roots, brown and dark brown, moist, (loose)	92.32 / 92.02	0	
		SANDY CLAY Medium plastic, brown, moist, (soft to firm)	91.6	1	
			90.1	2	
		CLAY Medium plastic, brown, moist, (very soft)	89.4	3	18.7
		CLAY Medium plastic, sensitive, grey, wet, (soft to stiff)		5	
			86.2	6	
		SILTY CLAY Low plastic, grey, wet, (firm)	85.6	7	
		Dynamic Cone Penetration Test (DCPT) conducted from 7.0 m to Cone Refusal Depth of 8.8 m	83.5	8	
		Cone Refusal at 8.8 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

Depth 0: 5
Depth 1: 7
Depth 2: 2
Depth 3: 1; 38, S = 5.3; 34, S = 7.0; Hammer Weight
Depth 5: 19, S = 4.0; Hammer Weight; 58, S = 4.8
Depth 6: 5

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 50 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-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	2.4	6.1
9 days	0.0	
35 days	0.3	

CORE DRILLING RECORD

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

Log of Borehole BH-7

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 10

Page. 1 of 1

Date Drilled: 'April 5 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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 (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % / Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		FILL Mixture of sand, gravel and clay, brown, wet, (very loose)	0	0	2	×		
		TOPSOIL ~200mm	-0.6					
		SANDY CLAY (possible fill) Brown, wet, (stiff)	-0.8	1	12	×		
					8	×		
		Borehole Terminated at 1.8 m Depth	-1.8					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

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

Log of Borehole BH-8

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 11

Page. 1 of 1

Date Drilled: 'April 4, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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 (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Mixture of silty sand and silty clay, brown, moist, (very loose)	92.13	0	2	×		
			91.5					
		TOPSOIL ~150mm	91.3					
		SANDY CLAY Brown, moist to wet, (firm to stiff)		1	7	×		19.0
					9	×		19.3
			90.3					
		Borehole Terminated at 1.8 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

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

Log of Borehole BH-9

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 12

Page. 1 of 1

Date Drilled: 'April 4, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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 (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~400mm	92.4	0				
		SANDY CLAY Brown, wet, (soft)	92.0		3	×		
				1	4	×		18.6
			90.6		3	×		
		Borehole Terminated at 1.8 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

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

Log of Borehole BH-10

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 13

Page. 1 of 1

Date Drilled: 'April 4, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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 (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Mixture of silty sand and silty clay, trace gravel, decayed grass shoots, dark grey and black, wet, (very loose)	92.56	0	2	×		
		TOPSOIL ~200mm	92.3					
		FILL Mixture of silty sand and silty clay, trace gravel, decayed grass shoots, reddish brown to brown, dark grey and black, wet, (loose)	92.1	1	7	×		17.5
		SANDY CLAY Brown, wet, (firm)	91.4		7	×		
		Borehole Terminated at 1.8 m Depth	90.8					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

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

Log of Borehole BH-11

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 14

Page. 1 of 1

Date Drilled: 'April 4, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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 (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~400mm	92.48	0				
		FILL Mixture of sandy clay and topsoil, decayed grass shoots, reddish brown to brown to dark grey to black, wet, (firm to stiff)	92.1		5	×		
				1	5	×		
			90.7		9	×		
		Borehole Terminated at 1.8 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

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

Log of Borehole BH-12

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 15

Page. 1 of 1

Date Drilled: 'April 4, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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 (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		TOPSOIL ~300mm	92.53	0				
		SANDY CLAY Brown, wet, (soft to firm)	92.2		5	×		17.7
		roots and rootlets from 0.3 m to 1.2 m depths		1	5	×		17.8
					3	×		
			90.7					
		Borehole Terminated at 1.8 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

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

Log of Borehole BH-13

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 16

Page. 1 of 1

Date Drilled: 'April 5, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: A.N. Checked by: S.P.

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 (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Mixture of sand, gravel and clay, brown, wet, (very loose)	92.77	0	2	×		
		TOPSOIL ~250mm	92.2					
		SILTY CLAYEY SAND Brown, wet, (loose/firm)	91.9	1	7	×		
					4	×		
		Borehole Terminated at 1.8 m Depth	91.0					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

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

Log of Borehole BH-14

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 17

Page. 1 of 1

Date Drilled: 'July 6, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: M.L. Checked by: S.P.

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 (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % / Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		FILL Mixture of silty sand and silty clay, gravel, brown and grey, moist, (very loose to loose)	93.35	0	3	×		
				1	2	×		
		dark brown to black organic type stains below 1.5 m depth		2	9	×		
		SANDY CLAY Grey sand seams, sensitive, brown, moist, (stiff)	91.2					
▼			90.35	3	4	×		
					86 + s-7.2			
			89.7		1	×		
		CLAY Sensitive, grey, wet, (firm)		4	1	×		
					29 + s=6.0 Hammer Weight			
				5		×		
			87.9		34 + s=5.6			
		Borehole Terminated at 5.5 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	3.0	4.6

CORE DRILLING RECORD

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

Log of Borehole BH-15

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 18

Page. 1 of 1

Date Drilled: 'July 6, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: M.L. Checked by: S.P.

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	Natural Unit Wt. kN/m³
		FILL Mixture of silty sand, silty clay and topsoil, wood debris, brown and dark brown, moist (very loose to compact)	92.73	0	
			91.2	1	20.2
		SANDY CLAY Grey sand seams, brown, moist, (soft)	90.4	2	18.7
▼		**CLAY** Extra-sensitive, grey, wet, (firm to stiff)	89.53 Hammer Weight	3	
		GLACIAL TILL Silty sand with gravel, cobbles, boulders, grey, wet, (very dense)	89.0	4	
		Borehole Terminated at 4.4 m Depth	88.3		

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

Values: 3; 14; 4; 70; s=9.3; 1; 48; s=8; 73

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	3.2	3.6

CORE DRILLING RECORD

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

Log of Borehole BH-16

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 19

Page. 1 of 1

Date Drilled: 'July 6, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: M.L. Checked by: S.P.

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	Natural Unit Wt. kN/m³
		TOPSOIL ~ 150 mm	92.31	0	
		FILL Mixture of silty sand and silty clay, rootlets, decayed grass shoots, brown and grey, moist, (loose)	92.1		
		SANDY CLAY Grey sand seams, low to medium plasticity, extra-sensitive, brown, wet, (stiff)	91.6	1	
				2	18.5
▼		**CLAY** Sensitive, grey, wet, (firm to stiff)	89.7	3	19.8
			89.41		
		Borehole Terminated at 4.7 m Depth	87.6		

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

Depth 0: 7; 1: 8; 2: 6; 96 s=8; 1; 3: 62 s=5.2; 0; Hammer Weight; 48 s=6.7

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	2.9	3.6

CORE DRILLING RECORD

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

LOG OF BOREHOLE BH LOGS - 245869 - RIVERSIDE SOUTH SCHOOL.GPJ TROW OTTAWA.GDT 9/13/18

Log of Borehole BH-17

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 20

Page. 1 of 1

Date Drilled: 'July 6, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: M.L. Checked by: S.P.

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	Natural Unit Wt. kN/m³
		SANDY CLAY Grey sand seams, sensitive, brown, moist, (very stiff) rootlets in the upper 600 mm	91.98	0	18.8
		CLAY Sensitive, grey, wet, (firm)	89.8	2	18.6
▼			88.98	3	
		Borehole Terminated at 4.7 m Depth	87.3		

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

Depth 0: 6 ○; 156 ▲; ×
Depth 1: 6 ○; 80 +; s=5.3; ×
Depth 2: 1 ○; ×
Depth 3: 3 ○; 43 +; s=7.2; 1 ○; Hammer Weight ○; 48 +; s=5.0; ×

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	3.0	3.6

CORE DRILLING RECORD

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

Log of Borehole BH-18

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 21

Page. 1 of 1

Date Drilled: 'July 6, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: M.L. Checked by: S.P.

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	Natural Unit Wt. kN/m³
		SANDY CLAY (possible fill) Grey sand seams, brown, moist, (firm)	92.21	0	19.2
		SANDY SILT Grey and seams, brown, moist, (loose)	91.5	1	
		CLAY Sensitive to extra-sensitive, grey, wet, (firm to stiff)	90.0	2	
▼			89.41	3	
		Borehole Terminated at 4.0 m Depth	88.2	4	

Standard Penetration Test N Value (20 40 60 80): 7, 5, 4, 58, 1, 38, 43

Shear Strength (50 100 150 200 kPa): s=6.0, s=8.0, s=6.0

Hammer Weight

Combustible Vapour Reading (ppm) (250 500 750)

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

SAMPLES

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	3.0	3.6

CORE DRILLING RECORD

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

Log of Borehole BH-19

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 22

Page. 1 of 1

Date Drilled: 'July 6, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

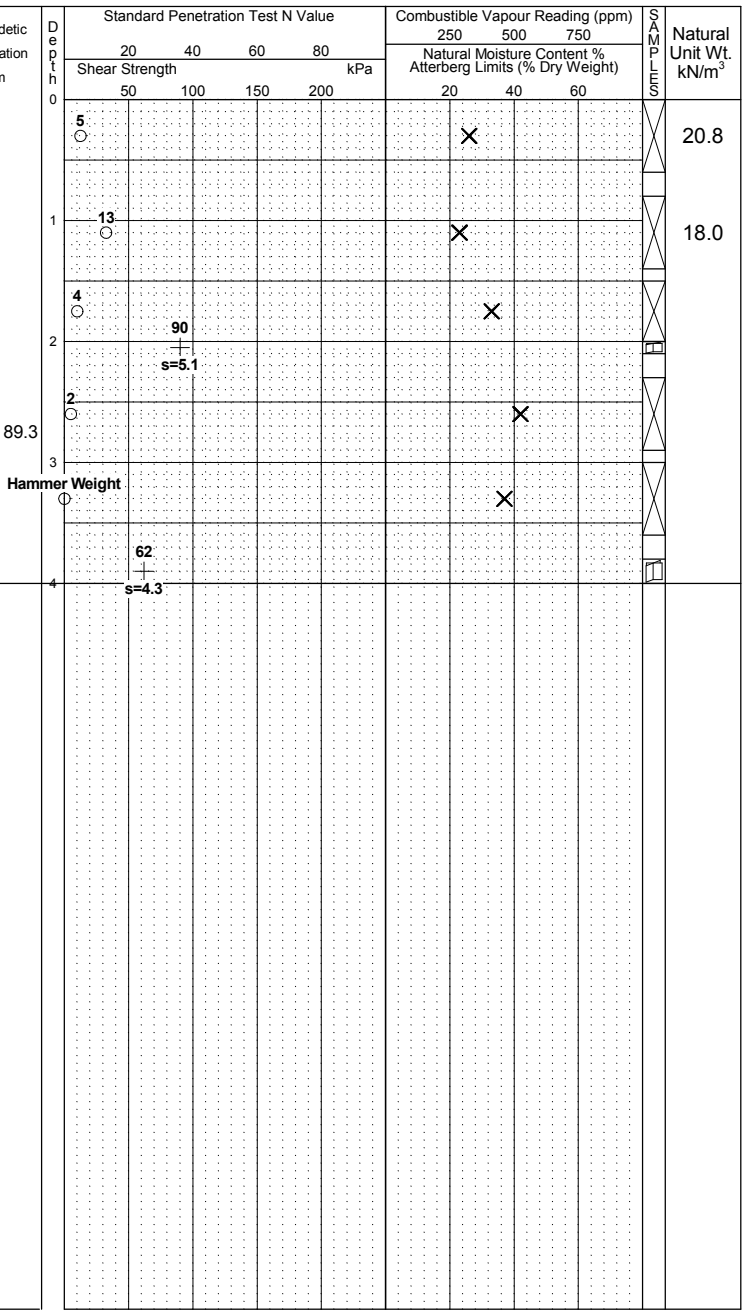
Logged by: M.L. Checked by: S.P.

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	Natural Unit Wt. kN/m³
		FILL Mixture of silty sand and silty clay, gravel, rootlets, brown and grey, (loose to compact)	92.1	0	20.8
		with reddish brown silty clay from 0.8 m to 1.5 m depths	90.6	1	18.0
		SANDY CLAY Grey sand seams, sensitive, brown, wet, (stiff)	89.9	2	
▼		**CLAY** Sensitive, grey, wet, (stiff)	89.3	3	
		Borehole Terminated at 4.0 m Depth	88.1	4	

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

Hammer Weight



NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	2.8	3.0

CORE DRILLING RECORD

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

LOG OF BOREHOLE BH LOGS - 245869 - RIVERSIDE SOUTH SCHOOL.GPJ TROW OTTAWA.GDT 9/13/18

Log of Borehole BH-20

Project No: OTT-00245869-A0

Project: Geotechnical Investigation - Proposed New Riverside South Catholic Elementary School

Location: Ralph Hennessy Avenue and Mount Nebo Way, Ottawa, ON.

Figure No. 23

Page. 1 of 1

Date Drilled: 'July 6, 2018

Drill Type: CME-75 Track Mount Drill Rig

Datum: Geodetic Elevation

Logged by: M.L. Checked by: S.P.

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 (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % / Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Mixture of silty sand, silty clay and topsoil, roots and rootlets, brown to dark brown and grey, moist (loose)	92.21	0	10	×		18.5
				1	6	×		
				2	4	×		
			89.8					
▼		**CLAY** Sensitive, grey, wet, (firm)	89.51		Hammer Weight	×		
				3	29 s=6.0			
					Hammer Weight	×		
			88.2	4	43 s=6.0			
		Borehole Terminated at 4.0 m Depth						

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled with cuttings upon completion.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00245869-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	2.7	3.0

CORE DRILLING RECORD

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

Appendix D - Analytical Summary Tables

TABLE 1 SOIL ANALYTICAL RESULTS *(µg/g)*
PETROLEUM HYDROCARBONS and BTEX
925 Ralph Hennessey Avenue, Ottawa, Ontario

Parameter	MECP Table 3[1]	MW/BH 6-S3	MW/BH 6-S30	BH7-SS1	BH8-SSS1	BH8-SS1A	BH9-SS1
Sample Date (d/m/y)	Institutional/ residential	2-Apr-18	dup of MW/BH 6-S3	30-Aug-18	30-Aug-18	dup of BH8-SS1	30-Aug-18
Sample Depth (mbsg)		1.5 - 2.1		0.1 - 0.3	0.1 - 0.3		0.1 - 0.3
Benzene	0.17	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Toluene	6	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Ethylbenzene	15	<0.020	<0.020	<0.020	<0.020	<0.020	<0.020
Total Xylenes	25	<0.040	<0.040	<0.040	<0.040	<0.040	<0.040
PHC F1	65	<10	<10	<10	<10	<10	<10
PHC F2	150	<10	NA	<10	<10	<10	<10
PHC F3	1300	<50	NA	<50	<50	<50	90
PHC F4	5600	<50	NA	<50	<50	<50	130
PHC F4 (gravimetric)	5600	NA	NA	NA	NA	NA	480

NOTES:

1 MECP *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 3, Use within in a non-potable groundwater, institutional/ residential standards, fine and medium grained soil.*

Shaded Concentration exceeds MECP Table 3 institutional/ residential soil quality standard.

NA Not Analyzed
NV No Value

TABLE 2 SOIL ANALYTICAL RESULTS *(µg/g)*
VOLATILE ORGANIC COMPOUNDS
925 Ralph Hennessey Avenue, Ottawa, Ontario

Parameter	MECP Table 3[1]	MW/BH 6-S1
Sample Date (d/m/y)	Institutional/ residential	2-Apr-18
Sample Depth (mbsg)		0 - 0.6
Acetone	28	<0.50
Benzene	0.17	<0.020
Bromodichloromethane	13	<0.050
Bromoform	0.26	<0.050
Bromomethane	0.05	<0.050
Carbon Tetrachloride	0.12	<0.050
Chlorobenzene	2.7	<0.050
Chloroform	0.18	<0.050
Dibromochloromethane	9.4	<0.050
1,2-Dichlorobenzene	4.3	<0.050
1,3-Dichlorobenzene	6	<0.050
1,4-Dichlorobenzene	0.097	<0.050
Dichlorodifluoromethane	25	<0.050
1,1-Dichloroethane	11	<0.050
1,2-Dichloroethane	0.05	<0.050
1,1-Dichloroethylene	0.05	<0.050
Cis-1,2-Dichloroethylene	30	<0.050
Trans-1,2-Dichloroethylene	0.75	<0.050
1,2-Dichloropropane	0.085	<0.050
Cis-1,3-Dichloropropylene	NV	<0.030
Trans-1,3-Dichloropropylene	NV	<0.040
1,3-Dichloropropene (cis + trans)	0.083	<0.050
Ethylbenzene	15	<0.020
Ethylene Dibromide	0.05	<0.050
Hexane(n)	34	<0.050
Methyl Ethyl Ketone	44	<0.50
Methylene Chloride	0.96	<0.050
Methyl Isobutyl Ketone	4.3	<0.50
Methyl-t-Butyl Ether	1.4	<0.050
Styrene	2.2	<0.050
1,1,1,2-Tetrachloroethane	0.05	<0.050
1,1,2,2-Tetrachloroethane	0.05	<0.050
Toluene	6	<0.020
Tetrachloroethylene	2.3	<0.050
1,1,1-Trichloroethane	3.4	<0.050
1,1,2-Trichloroethane	0.05	<0.050
Trichloroethylene	0.52	<0.050
Trichlorofluoromethane	5.8	<0.050
Vinyl Chloride	0.022	<0.020
Total Xylenes	25	<0.020

NOTES:

1 MECP *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 3, Use within in a non-potable groundwater, institutional/ residential standards, fine and medium grained soil.*

Shaded Concentration exceeds MECP Table 3 institutional/ residential soil quality standard.

NA Not Analyzed

NV No Value

TABLE 3 **SOIL ANALYTICAL RESULTS *(µg/g)***
METALS
925 Ralph Hennessey Avenue, Ottawa, Ontario

Parameter	MECP Table 3[1]	MW/BH 6-S1	BH7-SS1	BH8-SSS1	BH8-SS1A	BH9-SS1
Sample Date (d/m/y)	**Institutional/ residential**	2-Apr-18	30-Aug-18	30-Aug-18	dup of BH8-SS1	30-Aug-18
Sample Depth (mbsg)		0 - 0.6	0.1 - 0.3	0.1 - 0.3		0.1 - 0.3
Antimony	7.5	<0.20	<0.20	<0.20	<0.20	<0.20
Arsenic	18	1.6	1.5	1.7	1.4	2.6
Barium	390	270	150	180	180	160
Beryllium	5	0.93	0.57	0.67	0.63	0.51
Boron (Total)	120	7.2	5.1	6.2	6.5	5.1
Cadmium	1.2	0.24	0.11	0.19	0.22	<0.10
Chromium	160	61	34	47	45	36
Cobalt	22	14	6.9	8.5	8	8.7
Copper	180	29	13	12	11	19
Lead	120	10	7.8	10	10	9.9
Molybdenum	6.9	1.8	0.89	1.2	1.2	0.76
Nickel	130	31	16	21	20	20
Selenium	2.4	<0.50	<0.50	<0.50	<0.50	<0.50
Silver	25	<0.20	<0.20	<0.20	<0.20	<0.20
Thallium	1	0.26	0.14	0.18	0.18	0.16
Uranium	23	3.2	2.4	4.6	3.9	0.75
Vanadium	86	54	37	42	42	43
Zinc	340	100	58	74	71	50

NOTES:

1 MECP *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 3, Use within in a non-potable groundwater, institutional/ residential standards, fine and medium grained soil.*

Shaded Concentration exceeds MECP Table 3 institutional/ residential soil quality standard.

NA Not Analyzed

NV No Value

TABLE 4 GROUNDWATER ANALYTICAL RESULTS *(µg/L)*
PETROLEUM HYDROCARBONS and BTEX
925 Ralph Hennessey Avenue, Ottawa, Ontario

Parameter	**MECP Table 3[1]**	**MW/BH 6**
Sample Date (d/m/y)	**Institutional/ residential**	3-Apr-18
Benzene	430	<0.20
Toluene	18000	2
Ethylbenzene	2300	<0.20
Total Xylenes	4200	<0.40
PHC F1	750	<25
PHC F2	150	<100
PHC F3	500	<200
PHC F4	500	<200

NOTES:

1 MECP *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 3, Use within in a non-potable groundwater, institutional/ residential standards, fine and medium grained soil.*

Shaded Concentration exceeds MECP Table 3 institutional/ residential groundwater quality standard.

NA Not Analyzed

NV No Value

Appendix E – Laboratory Certificates of Analysis

Maxxam
A Bureau Veritas Group Company

Your Project #: OTT-00245869-AO
Site Location: RIVER SIDE SOUTH SCHOOL
Your C.O.C. #: 102863

Attention: Daniel Clarke

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

Report Date: 2018/04/06
Report #: R5067901
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B871983
Received: 2018/04/02, 13:30

Sample Matrix: Soil
Samples Received: 3

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
1,3-Dichloropropene Sum (1)	1	N/A	2018/04/05		EPA 8260C m
Petroleum Hydro. CCME F1 & BTEX in Soil (1, 2)	2	N/A	2018/04/05	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Soil (1, 3)	1	2018/04/04	2018/04/05	CAM SOP-00316	CCME CWS m
Strong Acid Leachable Metals by ICPMS (1)	1	2018/04/04	2018/04/04	CAM SOP-00447	EPA 6020B m
Moisture (1)	2	N/A	2018/04/04	CAM SOP-00445	Carter 2nd ed 51.2 m
Moisture (1)	1	N/A	2018/04/06	CAM SOP-00445	Carter 2nd ed 51.2 m
Volatile Organic Compounds in Soil (1)	1	N/A	2018/04/05	CAM SOP-00228	EPA 8260C m

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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

Your Project #: OTT-00245869-AO
Site Location: RIVER SIDE SOUTH SCHOOL
Your C.O.C. #: 102863

Attention: Daniel Clarke

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

Report Date: 2018/04/06
Report #: R5067901
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B871983
Received: 2018/04/02, 13:30

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jonathan Urben, Senior Project Manager
Email: jurben@maxxam.ca
Phone# (613) 274-0573
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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

Maxxam Job #: B871983
Report Date: 2018/04/06

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RIVER SIDE SOUTH SCHOOL
Sampler Initials: DC

RESULTS OF ANALYSES OF SOIL

Maxxam ID		GJF223		GJF224		GJF225		
Sampling Date		2018/04/02 11:30		2018/04/02 11:40		2018/04/02		
COC Number		102863		102863		102863		
	UNITS	**BH 6-S1**	**QC Batch**	**BH 6-S3**	**QC Batch**	**BH 6-S30**	**RDL**	**QC Batch**
Inorganics								
Moisture	%	25	5469868	29	5468703	29	1.0	5472799

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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

Maxxam Job #: B871983
Report Date: 2018/04/06

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RIVER SIDE SOUTH SCHOOL
Sampler Initials: DC

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		GJF223		
Sampling Date		2018/04/02 11:30		
COC Number		102863		
	UNITS	**BH 6-S1**	**RDL**	**QC Batch**
Metals				
Acid Extractable Antimony (Sb)	ug/g	<0.20	0.20	5469143
Acid Extractable Arsenic (As)	ug/g	1.6	1.0	5469143
Acid Extractable Barium (Ba)	ug/g	270	0.50	5469143
Acid Extractable Beryllium (Be)	ug/g	0.93	0.20	5469143
Acid Extractable Boron (B)	ug/g	7.2	5.0	5469143
Acid Extractable Cadmium (Cd)	ug/g	0.24	0.10	5469143
Acid Extractable Chromium (Cr)	ug/g	61	1.0	5469143
Acid Extractable Cobalt (Co)	ug/g	14	0.10	5469143
Acid Extractable Copper (Cu)	ug/g	29	0.50	5469143
Acid Extractable Lead (Pb)	ug/g	10	1.0	5469143
Acid Extractable Molybdenum (Mo)	ug/g	1.8	0.50	5469143
Acid Extractable Nickel (Ni)	ug/g	31	0.50	5469143
Acid Extractable Selenium (Se)	ug/g	<0.50	0.50	5469143
Acid Extractable Silver (Ag)	ug/g	<0.20	0.20	5469143
Acid Extractable Thallium (Tl)	ug/g	0.26	0.050	5469143
Acid Extractable Uranium (U)	ug/g	3.2	0.050	5469143
Acid Extractable Vanadium (V)	ug/g	54	5.0	5469143
Acid Extractable Zinc (Zn)	ug/g	100	5.0	5469143

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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

Maxxam Job #: B871983
Report Date: 2018/04/06

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RIVER SIDE SOUTH SCHOOL
Sampler Initials: DC

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		GJF223		
Sampling Date		2018/04/02 11:30		
COC Number		102863		
	UNITS	**BH 6-S1**	**RDL**	**QC Batch**
Calculated Parameters				
1,3-Dichloropropene (cis+trans)	ug/g	<0.050	0.050	5468781
Volatile Organics				
Acetone (2-Propanone)	ug/g	<0.50	0.50	5467202
Benzene	ug/g	<0.020	0.020	5467202
Bromodichloromethane	ug/g	<0.050	0.050	5467202
Bromoform	ug/g	<0.050	0.050	5467202
Bromomethane	ug/g	<0.050	0.050	5467202
Carbon Tetrachloride	ug/g	<0.050	0.050	5467202
Chlorobenzene	ug/g	<0.050	0.050	5467202
Chloroform	ug/g	<0.050	0.050	5467202
Dibromochloromethane	ug/g	<0.050	0.050	5467202
1,2-Dichlorobenzene	ug/g	<0.050	0.050	5467202
1,3-Dichlorobenzene	ug/g	<0.050	0.050	5467202
1,4-Dichlorobenzene	ug/g	<0.050	0.050	5467202
Dichlorodifluoromethane (FREON 12)	ug/g	<0.050	0.050	5467202
1,1-Dichloroethane	ug/g	<0.050	0.050	5467202
1,2-Dichloroethane	ug/g	<0.050	0.050	5467202
1,1-Dichloroethylene	ug/g	<0.050	0.050	5467202
cis-1,2-Dichloroethylene	ug/g	<0.050	0.050	5467202
trans-1,2-Dichloroethylene	ug/g	<0.050	0.050	5467202
1,2-Dichloropropane	ug/g	<0.050	0.050	5467202
cis-1,3-Dichloropropene	ug/g	<0.030	0.030	5467202
trans-1,3-Dichloropropene	ug/g	<0.040	0.040	5467202
Ethylbenzene	ug/g	<0.020	0.020	5467202
Ethylene Dibromide	ug/g	<0.050	0.050	5467202
Hexane	ug/g	<0.050	0.050	5467202
Methylene Chloride(Dichloromethane)	ug/g	<0.050	0.050	5467202
Methyl Ethyl Ketone (2-Butanone)	ug/g	<0.50	0.50	5467202
Methyl Isobutyl Ketone	ug/g	<0.50	0.50	5467202
Methyl t-butyl ether (MTBE)	ug/g	<0.050	0.050	5467202
Styrene	ug/g	<0.050	0.050	5467202
1,1,1,2-Tetrachloroethane	ug/g	<0.050	0.050	5467202
1,1,2,2-Tetrachloroethane	ug/g	<0.050	0.050	5467202

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2018/04/06

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RIVER SIDE SOUTH SCHOOL
Sampler Initials: DC

VOLATILE ORGANICS BY GC/MS (SOIL)

Maxxam ID		GJF223		
Sampling Date		2018/04/02 11:30		
COC Number		102863		
	UNITS	**BH 6-S1**	**RDL**	**QC Batch**
Tetrachloroethylene	ug/g	<0.050	0.050	5467202
Toluene	ug/g	<0.020	0.020	5467202
1,1,1-Trichloroethane	ug/g	<0.050	0.050	5467202
1,1,2-Trichloroethane	ug/g	<0.050	0.050	5467202
Trichloroethylene	ug/g	<0.050	0.050	5467202
Trichlorofluoromethane (FREON 11)	ug/g	<0.050	0.050	5467202
Vinyl Chloride	ug/g	<0.020	0.020	5467202
p+m-Xylene	ug/g	<0.020	0.020	5467202
o-Xylene	ug/g	<0.020	0.020	5467202
Total Xylenes	ug/g	<0.020	0.020	5467202
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	100		5467202
D10-o-Xylene	%	134 (1)		5467202
D4-1,2-Dichloroethane	%	96		5467202
D8-Toluene	%	97		5467202

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch
(1) Recovery or RPD for this parameter is outside control limits. The overall quality control for this analysis meets acceptability criteria.

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Sampler Initials: DC

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		GJF224			GJF225		
Sampling Date		2018/04/02 11:40			2018/04/02		
COC Number		102863			102863		
	UNITS	**BH 6-S3**	**RDL**	**QC Batch**	**BH 6-S30**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons							
Benzene	ug/g	<0.020	0.020	5469847	<0.020	0.020	5469847
Toluene	ug/g	<0.020	0.020	5469847	<0.020	0.020	5469847
Ethylbenzene	ug/g	<0.020	0.020	5469847	<0.020	0.020	5469847
o-Xylene	ug/g	<0.020	0.020	5469847	<0.020	0.020	5469847
p+m-Xylene	ug/g	<0.040	0.040	5469847	<0.040	0.040	5469847
Total Xylenes	ug/g	<0.040	0.040	5469847	<0.040	0.040	5469847
F1 (C6-C10)	ug/g	<10	10	5469847	<10	10	5469847
F1 (C6-C10) - BTEX	ug/g	<10	10	5469847	<10	10	5469847
F2-F4 Hydrocarbons							
F2 (C10-C16 Hydrocarbons)	ug/g	<10	10	5469687			
F3 (C16-C34 Hydrocarbons)	ug/g	<50	50	5469687			
F4 (C34-C50 Hydrocarbons)	ug/g	<50	50	5469687			
Reached Baseline at C50	ug/g	Yes		5469687			
Surrogate Recovery (%)							
1,4-Difluorobenzene	%	99		5469847	100		5469847
4-Bromofluorobenzene	%	101		5469847	101		5469847
D10-Ethylbenzene	%	92		5469847	96		5469847
D4-1,2-Dichloroethane	%	105		5469847	106		5469847
o-Terphenyl	%	99		5469687			

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B871983
Report Date: 2018/04/06

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Site Location: RIVER SIDE SOUTH SCHOOL
Sampler Initials: DC

TEST SUMMARY

Maxxam ID: GJF223
Sample ID: BH 6-S1
Matrix: Soil

Collected: 2018/04/02
Shipped:
Received: 2018/04/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	5468781	N/A	2018/04/05	Automated Statchk
Strong Acid Leachable Metals by ICPMS	ICP/MS	5469143	2018/04/04	2018/04/04	Daniel Teclu
Moisture	BAL	5469868	N/A	2018/04/04	Prgya Panchal
Volatile Organic Compounds in Soil	GC/MS	5467202	N/A	2018/04/05	Juan Pangilinan

Maxxam ID: GJF224
Sample ID: BH 6-S3
Matrix: Soil

Collected: 2018/04/02
Shipped:
Received: 2018/04/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5469847	N/A	2018/04/05	Georgeta Rusu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5469687	2018/04/04	2018/04/05	Zhiyue (Frank) Zhu
Moisture	BAL	5468703	N/A	2018/04/04	Prgya Panchal

Maxxam ID: GJF225
Sample ID: BH 6-S30
Matrix: Soil

Collected: 2018/04/02
Shipped:
Received: 2018/04/02

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5469847	N/A	2018/04/05	Georgeta Rusu
Moisture	BAL	5472799	N/A	2018/04/06	Gurpreet Kaur

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Site Location: RIVER SIDE SOUTH SCHOOL
Sampler Initials: DC

GENERAL COMMENTS

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

Package 1	12.3°C

Cooler custody seal was present and intact.

Sample GJF223 [BH 6-S1] : The recovery for the extraction surrogate compound was above the upper control limit for duplicate analyses of the soil sample. Visible loss of methanol was observed in this sample. As a result, there is an increased level of uncertainty associated with the values reported for this sample.

Sample GJF225 [BH 6-S30] : Please add moisture to the vials for this sample.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RIVER SIDE SOUTH SCHOOL
Sampler Initials: DC

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5467202	4-Bromofluorobenzene	2018/04/04	101	60 - 140	103	60 - 140	101	%		
5467202	D10-o-Xylene	2018/04/04	128	60 - 130	120	60 - 130	118	%		
5467202	D4-1,2-Dichloroethane	2018/04/04	95	60 - 140	102	60 - 140	103	%		
5467202	D8-Toluene	2018/04/04	100	60 - 140	97	60 - 140	95	%		
5469687	o-Terphenyl	2018/04/05	99	60 - 130	98	60 - 130	97	%		
5469847	1,4-Difluorobenzene	2018/04/04	101	60 - 140	102	60 - 140	99	%		
5469847	4-Bromofluorobenzene	2018/04/04	101	60 - 140	101	60 - 140	100	%		
5469847	D10-Ethylbenzene	2018/04/04	101	60 - 140	94	60 - 140	88	%		
5469847	D4-1,2-Dichloroethane	2018/04/04	107	60 - 140	107	60 - 140	104	%		
5467202	1,1,1,2-Tetrachloroethane	2018/04/04	103	60 - 140	100	60 - 130	<0.050	ug/g	NC	50
5467202	1,1,1-Trichloroethane	2018/04/04	103	60 - 140	97	60 - 130	<0.050	ug/g	NC	50
5467202	1,1,2,2-Tetrachloroethane	2018/04/04	100	60 - 140	107	60 - 130	<0.050	ug/g	NC	50
5467202	1,1,2-Trichloroethane	2018/04/04	98	60 - 140	102	60 - 130	<0.050	ug/g	NC	50
5467202	1,1-Dichloroethane	2018/04/04	100	60 - 140	98	60 - 130	<0.050	ug/g	NC	50
5467202	1,1-Dichloroethylene	2018/04/04	100	60 - 140	93	60 - 130	<0.050	ug/g	NC	50
5467202	1,2-Dichlorobenzene	2018/04/04	103	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
5467202	1,2-Dichloroethane	2018/04/04	97	60 - 140	103	60 - 130	<0.050	ug/g	NC	50
5467202	1,2-Dichloropropane	2018/04/04	99	60 - 140	100	60 - 130	<0.050	ug/g	NC	50
5467202	1,3-Dichlorobenzene	2018/04/04	104	60 - 140	96	60 - 130	<0.050	ug/g	NC	50
5467202	1,4-Dichlorobenzene	2018/04/04	104	60 - 140	97	60 - 130	<0.050	ug/g	NC	50
5467202	Acetone (2-Propanone)	2018/04/04	91	60 - 140	100	60 - 140	<0.50	ug/g	NC	50
5467202	Benzene	2018/04/04	100	60 - 140	98	60 - 130	<0.020	ug/g	NC	50
5467202	Bromodichloromethane	2018/04/04	99	60 - 140	102	60 - 130	<0.050	ug/g	NC	50
5467202	Bromoform	2018/04/04	99	60 - 140	107	60 - 130	<0.050	ug/g	NC	50
5467202	Bromomethane	2018/04/04	104	60 - 140	100	60 - 140	<0.050	ug/g	NC	50
5467202	Carbon Tetrachloride	2018/04/04	103	60 - 140	97	60 - 130	<0.050	ug/g	NC	50
5467202	Chlorobenzene	2018/04/04	102	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
5467202	Chloroform	2018/04/04	102	60 - 140	102	60 - 130	<0.050	ug/g	NC	50
5467202	cis-1,2-Dichloroethylene	2018/04/04	102	60 - 140	101	60 - 130	<0.050	ug/g	NC	50
5467202	cis-1,3-Dichloropropene	2018/04/04	92	60 - 140	94	60 - 130	<0.030	ug/g	NC	50
5467202	Dibromochloromethane	2018/04/04	100	60 - 140	103	60 - 130	<0.050	ug/g	NC	50

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QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RIVER SIDE SOUTH SCHOOL
Sampler Initials: DC

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5467202	Dichlorodifluoromethane (FREON 12)	2018/04/04	107	60 - 140	98	60 - 140	<0.050	ug/g	NC	50
5467202	Ethylbenzene	2018/04/04	99	60 - 140	92	60 - 130	<0.020	ug/g	NC	50
5467202	Ethylene Dibromide	2018/04/04	101	60 - 140	108	60 - 130	<0.050	ug/g	NC	50
5467202	Hexane	2018/04/04	99	60 - 140	91	60 - 130	<0.050	ug/g	NC	50
5467202	Methyl Ethyl Ketone (2-Butanone)	2018/04/04	87	60 - 140	100	60 - 140	<0.50	ug/g	NC	50
5467202	Methyl Isobutyl Ketone	2018/04/04	88	60 - 140	102	60 - 130	<0.50	ug/g	NC	50
5467202	Methyl t-butyl ether (MTBE)	2018/04/04	97	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
5467202	Methylene Chloride(Dichloromethane)	2018/04/04	104	60 - 140	105	60 - 130	<0.050	ug/g	NC	50
5467202	o-Xylene	2018/04/04	99	60 - 140	93	60 - 130	<0.020	ug/g	NC	50
5467202	p+m-Xylene	2018/04/04	98	60 - 140	91	60 - 130	<0.020	ug/g	NC	50
5467202	Styrene	2018/04/04	100	60 - 140	97	60 - 130	<0.050	ug/g	NC	50
5467202	Tetrachloroethylene	2018/04/04	107	60 - 140	98	60 - 130	<0.050	ug/g	NC	50
5467202	Toluene	2018/04/04	100	60 - 140	95	60 - 130	<0.020	ug/g	NC	50
5467202	Total Xylenes	2018/04/04					<0.020	ug/g	NC	50
5467202	trans-1,2-Dichloroethylene	2018/04/04	104	60 - 140	99	60 - 130	<0.050	ug/g	NC	50
5467202	trans-1,3-Dichloropropene	2018/04/04	92	60 - 140	93	60 - 130	<0.040	ug/g	NC	50
5467202	Trichloroethylene	2018/04/04	106	60 - 140	102	60 - 130	<0.050	ug/g	NC	50
5467202	Trichlorofluoromethane (FREON 11)	2018/04/04	103	60 - 140	95	60 - 130	<0.050	ug/g	NC	50
5467202	Vinyl Chloride	2018/04/04	100	60 - 140	94	60 - 130	<0.020	ug/g	NC	50
5468703	Moisture	2018/04/04							0	20
5469143	Acid Extractable Antimony (Sb)	2018/04/04	84	75 - 125	107	80 - 120	<0.20	ug/g	NC	30
5469143	Acid Extractable Arsenic (As)	2018/04/04	99	75 - 125	104	80 - 120	<1.0	ug/g	5.7	30
5469143	Acid Extractable Barium (Ba)	2018/04/04	NC	75 - 125	98	80 - 120	<0.50	ug/g	1.6	30
5469143	Acid Extractable Beryllium (Be)	2018/04/04	106	75 - 125	105	80 - 120	<0.20	ug/g	4.1	30
5469143	Acid Extractable Boron (B)	2018/04/04	88	75 - 125	102	80 - 120	<5.0	ug/g	7.0	30
5469143	Acid Extractable Cadmium (Cd)	2018/04/04	101	75 - 125	103	80 - 120	<0.10	ug/g	NC	30
5469143	Acid Extractable Chromium (Cr)	2018/04/04	NC	75 - 125	97	80 - 120	<1.0	ug/g	1.1	30
5469143	Acid Extractable Cobalt (Co)	2018/04/04	94	75 - 125	100	80 - 120	<0.10	ug/g	3.3	30
5469143	Acid Extractable Copper (Cu)	2018/04/04	NC	75 - 125	101	80 - 120	<0.50	ug/g	0.13	30
5469143	Acid Extractable Lead (Pb)	2018/04/04	103	75 - 125	104	80 - 120	<1.0	ug/g	0.21	30
5469143	Acid Extractable Molybdenum (Mo)	2018/04/04	98	75 - 125	102	80 - 120	<0.50	ug/g	NC	30

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QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RIVER SIDE SOUTH SCHOOL
Sampler Initials: DC

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5469143	Acid Extractable Nickel (Ni)	2018/04/04	NC	75 - 125	101	80 - 120	<0.50	ug/g	2.4	30
5469143	Acid Extractable Selenium (Se)	2018/04/04	96	75 - 125	102	80 - 120	<0.50	ug/g	NC	30
5469143	Acid Extractable Silver (Ag)	2018/04/04	98	75 - 125	103	80 - 120	<0.20	ug/g	NC	30
5469143	Acid Extractable Thallium (Tl)	2018/04/04	101	75 - 125	103	80 - 120	<0.050	ug/g	6.0	30
5469143	Acid Extractable Uranium (U)	2018/04/04	100	75 - 125	101	80 - 120	<0.050	ug/g	0.15	30
5469143	Acid Extractable Vanadium (V)	2018/04/04	NC	75 - 125	100	80 - 120	<5.0	ug/g	2.4	30
5469143	Acid Extractable Zinc (Zn)	2018/04/04	NC	75 - 125	103	80 - 120	<5.0	ug/g	2.8	30
5469687	F2 (C10-C16 Hydrocarbons)	2018/04/05	101	50 - 130	99	80 - 120	<10	ug/g	NC	30
5469687	F3 (C16-C34 Hydrocarbons)	2018/04/05	105	50 - 130	105	80 - 120	<50	ug/g	NC	30
5469687	F4 (C34-C50 Hydrocarbons)	2018/04/05	108	50 - 130	106	80 - 120	<50	ug/g	NC	30
5469847	Benzene	2018/04/04	100	60 - 140	102	60 - 140	<0.020	ug/g	NC	50
5469847	Ethylbenzene	2018/04/04	98	60 - 140	98	60 - 140	<0.020	ug/g	NC	50
5469847	F1 (C6-C10) - BTEX	2018/04/04					<10	ug/g	NC	30
5469847	F1 (C6-C10)	2018/04/04	101	60 - 140	99	80 - 120	<10	ug/g	NC	30
5469847	o-Xylene	2018/04/04	103	60 - 140	104	60 - 140	<0.020	ug/g	NC	50
5469847	p+m-Xylene	2018/04/04	99	60 - 140	100	60 - 140	<0.040	ug/g	NC	50
5469847	Toluene	2018/04/04	94	60 - 140	94	60 - 140	<0.020	ug/g	NC	50
5469847	Total Xylenes	2018/04/04					<0.040	ug/g	NC	50
5469868	Moisture	2018/04/04							1.5	20

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

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

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

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

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

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

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

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exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RIVER SIDE SOUTH SCHOOL
Sampler Initials: DC

VALIDATION SIGNATURE PAGE

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

Cristina Carriere

Cristina Carriere, Scientific Service Specialist

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

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CAM FCD-01191/3

CHAIN OF CUSTODY RECORD 102863

Page 1 of 1

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	exp	Company Name:	SAME	Quotation #:	Stream 3	[X] Regular TAT (5-7 days) Most analyses
Contact Name:	Daniel Clarke	Contact Name:		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	100-2650 Queensview Dr Ottawa	Address:		Project #:	OTT-00245869-A0	Rush TAT (Surcharges will be applied)
				Site Location:	Riverside South Study	[ ] 1 Day [ ] 2 Days [ ] 3-4 Days
Phone:	Fax:	Phone:	Fax:	Site #:		
Email:	Daniel.Clarke@exp.com	Email:		Sampled By:	DC	Date Required:

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

Rush Confirmation #:

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

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

Include Criteria on Certificate of Analysis: Y / N

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

LABORATORY USE ONLY

CUSTODY SEAL (Y) / N		COOLER TEMPERATURES
Present	Intact	
Y	Y	12, 12, 13

COOLING MEDIA PRESENT: (Y) / N

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE) Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)									HOLD- DO NOT ANALYZE	COMMENTS
1	BH6-51	Apr 12/18	11:30	Soil	4	/			X		X											
2	BH6-53	"	11:40	Soil	3	/	X	X														
3	BH6-53 30	"		Soil	1	/	X															
4																						
5																						RECEIVED IN OTTAWA
6																						
7																						
8																						Drice
9																						
10																						

02-Apr-18 13:30
Jonathan Urben
B871983
MVA OTT-001

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
[signature] / Daniel Clarke	Apr 12/18	13:30	Mariana Vascon / Vascon	2018/04/02	13:30	

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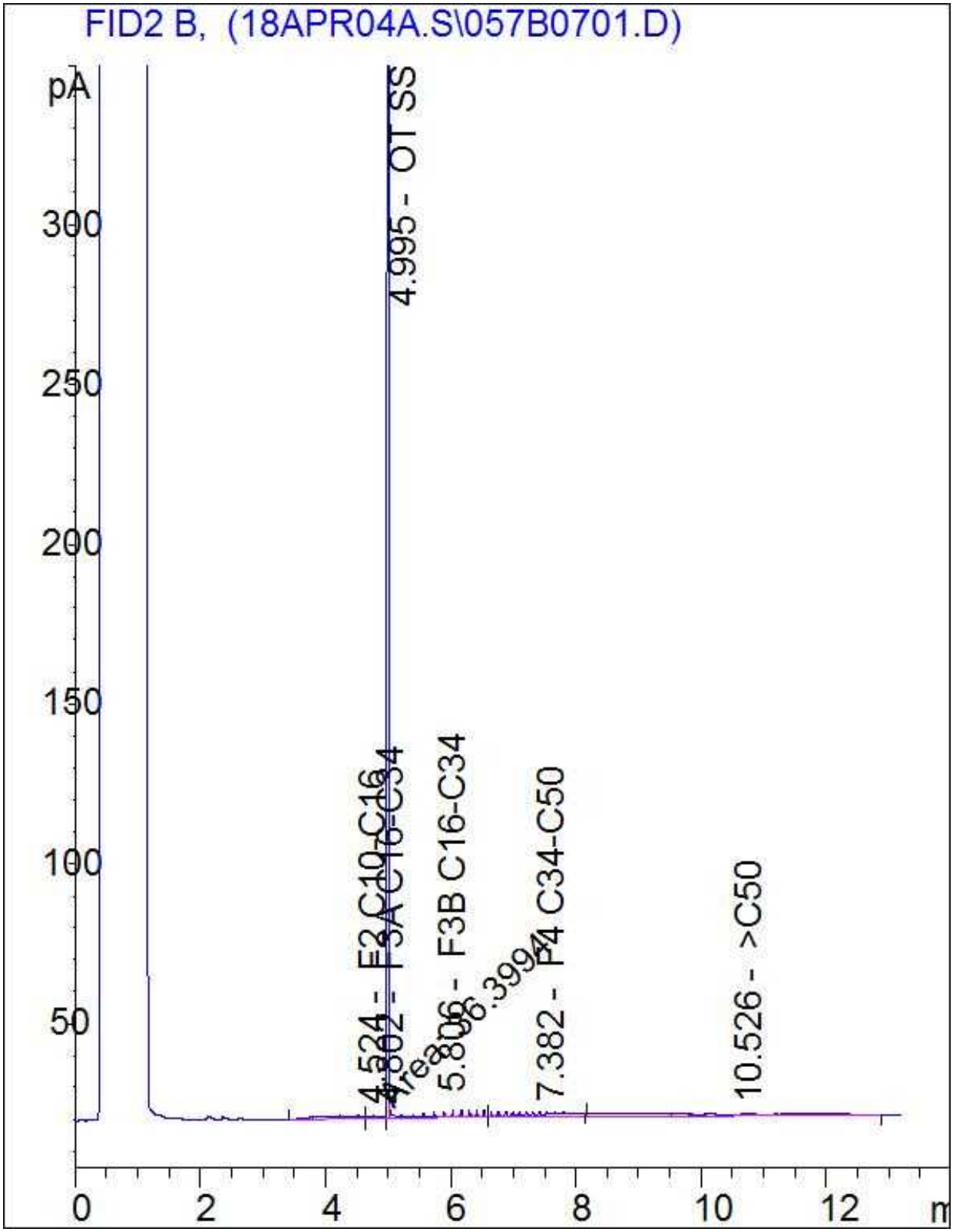
COC-1004 (03/17) White: Maxxam – Yellow: Client

Maxxam Job #: B871983
Report Date: 2018/04/06
Maxxam Sample: GJF224

exp Services Inc
Client Project #: OTT-00245869-AO
Project name: RIVER SIDE SOUTH SCHOOL
Client ID: BH 6-S3

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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

Maxxam
A Bureau Veritas Group Company

Your Project #: OTT-00245869-AO
Site Location: RALPH HENNESSY AVE
Your C.O.C. #: 117337

Attention: Mark McCalla

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

Report Date: 2018/09/06
Report #: R5388353
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8M4974
Received: 2018/08/30, 13:00

Sample Matrix: Soil
Samples Received: 4

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Petroleum Hydro. CCME F1 & BTEX in Soil (2)	4	N/A	2018/09/05	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Soil (3)	4	2018/08/30	2018/09/01	OTT SOP-00001	CCME CWS
F4G (CCME Hydrocarbons Gravimetric)	1	2018/09/05	2018/09/06	OTT SOP-00001	CCME CWS
Strong Acid Leachable Metals by ICPMS (1)	4	2018/09/04	2018/09/04	CAM SOP-00447	EPA 6020B m
Moisture	4	N/A	2018/09/04	CAM SOP-00445	McKeague 2nd ed 1978

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by Maxxam, results relate to the supplied samples tested.
This Certificate shall not be reproduced except in full, without the written approval of the laboratory.
Reference Method suffix "m" indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.

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

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CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B8M4974
Received: 2018/08/30, 13:00

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

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Alisha Williamson, Project Manager
Email: AWilliamson@maxxam.ca
Phone# (613) 274-0573
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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Maxxam Job #: B8M4974
Report Date: 2018/09/06

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RALPH HENNESSY AVE
Sampler Initials: ML

RESULTS OF ANALYSES OF SOIL

Maxxam ID		HPS501	HPS502	HPS503	HPS504		
Sampling Date		2018/08/30 12:00	2018/08/30 12:20	2018/08/30 12:20	2018/08/30 12:10		
COC Number		117337	117337	117337	117337		
	UNITS	**BH 7-SS1**	**BH 8-SS1**	**BH 8-SS1A**	**BH 9-SS1**	**RDL**	**QC Batch**
Inorganics							
Moisture	%	26	26	22	20	0.2	5708099

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Report Date: 2018/09/06

exp Services Inc
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Site Location: RALPH HENNESSY AVE
Sampler Initials: ML

ELEMENTS BY ATOMIC SPECTROSCOPY (SOIL)

Maxxam ID		HPS501	HPS501	HPS502	HPS503	HPS504		
Sampling Date		2018/08/30 12:00	2018/08/30 12:00	2018/08/30 12:20	2018/08/30 12:20	2018/08/30 12:10		
COC Number		117337	117337	117337	117337	117337		
	UNITS	**BH 7-SS1**	**BH 7-SS1 Lab-Dup**	**BH 8-SS1**	**BH 8-SS1A**	**BH 9-SS1**	**RDL**	**QC Batch**
Metals								
Acid Extractable Antimony (Sb)	ug/g	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5712689
Acid Extractable Arsenic (As)	ug/g	1.5	1.3	1.7	1.4	2.6	1.0	5712689
Acid Extractable Barium (Ba)	ug/g	150	140	180	180	160	0.50	5712689
Acid Extractable Beryllium (Be)	ug/g	0.57	0.52	0.67	0.63	0.51	0.20	5712689
Acid Extractable Boron (B)	ug/g	5.1	5.1	6.2	6.5	5.1	5.0	5712689
Acid Extractable Cadmium (Cd)	ug/g	0.11	0.15	0.19	0.22	<0.10	0.10	5712689
Acid Extractable Chromium (Cr)	ug/g	34	33	47	45	36	1.0	5712689
Acid Extractable Cobalt (Co)	ug/g	6.9	6.9	8.5	8.0	8.7	0.10	5712689
Acid Extractable Copper (Cu)	ug/g	13	13	12	11	19	0.50	5712689
Acid Extractable Lead (Pb)	ug/g	7.8	7.6	10	10	9.9	1.0	5712689
Acid Extractable Molybdenum (Mo)	ug/g	0.89	0.86	1.2	1.2	0.76	0.50	5712689
Acid Extractable Nickel (Ni)	ug/g	16	16	21	20	20	0.50	5712689
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	5712689
Acid Extractable Silver (Ag)	ug/g	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	5712689
Acid Extractable Thallium (Tl)	ug/g	0.14	0.14	0.18	0.18	0.16	0.050	5712689
Acid Extractable Uranium (U)	ug/g	2.4	2.2	4.6	3.9	0.75	0.050	5712689
Acid Extractable Vanadium (V)	ug/g	37	37	42	42	43	5.0	5712689
Acid Extractable Zinc (Zn)	ug/g	58	56	74	71	50	5.0	5712689

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

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Maxxam Job #: B8M4974
Report Date: 2018/09/06

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RALPH HENNESSY AVE
Sampler Initials: ML

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		HPS501	HPS502			HPS502			HPS503		
Sampling Date		2018/08/30 12:00	2018/08/30 12:20			2018/08/30 12:20			2018/08/30 12:20		
COC Number		117337	117337			117337			117337		
	UNITS	**BH 7-SS1**	**BH 8-SS1**	**RDL**	**QC Batch**	**BH 8-SS1 Lab-Dup**	**RDL**	**QC Batch**	**BH 8-SS1A**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons											
Benzene	ug/g	<0.02	<0.02	0.02	5715425	<0.02	0.02	5715425	<0.02	0.02	5715425
Toluene	ug/g	<0.02	<0.02	0.02	5715425	<0.02	0.02	5715425	<0.02	0.02	5715425
Ethylbenzene	ug/g	<0.02	<0.02	0.02	5715425	<0.02	0.02	5715425	<0.02	0.02	5715425
o-Xylene	ug/g	<0.02	<0.02	0.02	5715425	<0.02	0.02	5715425	<0.02	0.02	5715425
p+m-Xylene	ug/g	<0.04	<0.04	0.04	5715425	<0.04	0.04	5715425	<0.04	0.04	5715425
Total Xylenes	ug/g	<0.04	<0.04	0.04	5715425	<0.04	0.04	5715425	<0.04	0.04	5715425
F1 (C6-C10)	ug/g	<10	<10	10	5715425	<10	10	5715425	<10	10	5715425
F1 (C6-C10) - BTEX	ug/g	<10	<10	10	5715425	<10	10	5715425	<10	10	5715425
F2-F4 Hydrocarbons											
F2 (C10-C16 Hydrocarbons)	ug/g	<10	<10	10	5708088				<10	10	5708088
F3 (C16-C34 Hydrocarbons)	ug/g	<50	<50	50	5708088				<50	50	5708088
F4 (C34-C50 Hydrocarbons)	ug/g	<50	<50	50	5708088				<50	50	5708088
Reached Baseline at C50	ug/g	Yes	Yes		5708088				Yes		5708088
Surrogate Recovery (%)											
1,4-Difluorobenzene	%	106	112		5715425	106		5715425	103		5715425
4-Bromofluorobenzene	%	108	121		5715425	105		5715425	108		5715425
D10-Ethylbenzene	%	104	120		5715425	107		5715425	109		5715425
D4-1,2-Dichloroethane	%	96	91		5715425	96		5715425	98		5715425
o-Terphenyl	%	88	85		5708088				83		5708088

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

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Report Date: 2018/09/06

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RALPH HENNESSY AVE
Sampler Initials: ML

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		HPS504		
Sampling Date		2018/08/30 12:10		
COC Number		117337		
	UNITS	**BH 9-SS1**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons				
Benzene	ug/g	<0.02	0.02	5715425
Toluene	ug/g	<0.02	0.02	5715425
Ethylbenzene	ug/g	<0.02	0.02	5715425
o-Xylene	ug/g	<0.02	0.02	5715425
p+m-Xylene	ug/g	<0.04	0.04	5715425
Total Xylenes	ug/g	<0.04	0.04	5715425
F1 (C6-C10)	ug/g	<10	10	5715425
F1 (C6-C10) - BTEX	ug/g	<10	10	5715425
F2-F4 Hydrocarbons				
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	480	100	5715427
F2 (C10-C16 Hydrocarbons)	ug/g	<10	10	5708088
F3 (C16-C34 Hydrocarbons)	ug/g	90	50	5708088
F4 (C34-C50 Hydrocarbons)	ug/g	130	50	5708088
Reached Baseline at C50	ug/g	No		5708088
Surrogate Recovery (%)				
1,4-Difluorobenzene	%	108		5715425
4-Bromofluorobenzene	%	113		5715425
D10-Ethylbenzene	%	100		5715425
D4-1,2-Dichloroethane	%	98		5715425
o-Terphenyl	%	82		5708088

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B8M4974
Report Date: 2018/09/06

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RALPH HENNESSY AVE
Sampler Initials: ML

TEST SUMMARY

Maxxam ID: HPS501
Sample ID: BH 7-SS1
Matrix: Soil

Collected: 2018/08/30
Shipped:
Received: 2018/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5715425	N/A	2018/09/05	Fatemeh Habibagahi
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5708088	2018/08/30	2018/09/01	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5712689	2018/09/04	2018/09/04	Daniel Teclu
Moisture	BAL	5708099	N/A	2018/09/04	Samantha Arachchige

Maxxam ID: HPS501 Dup
Sample ID: BH 7-SS1
Matrix: Soil

Collected: 2018/08/30
Shipped:
Received: 2018/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Strong Acid Leachable Metals by ICPMS	ICP/MS	5712689	2018/09/04	2018/09/04	Daniel Teclu

Maxxam ID: HPS502
Sample ID: BH 8-SS1
Matrix: Soil

Collected: 2018/08/30
Shipped:
Received: 2018/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5715425	N/A	2018/09/05	Fatemeh Habibagahi
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5708088	2018/08/30	2018/09/01	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5712689	2018/09/04	2018/09/04	Daniel Teclu
Moisture	BAL	5708099	N/A	2018/09/04	Samantha Arachchige

Maxxam ID: HPS502 Dup
Sample ID: BH 8-SS1
Matrix: Soil

Collected: 2018/08/30
Shipped:
Received: 2018/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5715425	N/A	2018/09/05	Fatemeh Habibagahi

Maxxam ID: HPS503
Sample ID: BH 8-SS1A
Matrix: Soil

Collected: 2018/08/30
Shipped:
Received: 2018/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5715425	N/A	2018/09/05	Fatemeh Habibagahi
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5708088	2018/08/30	2018/09/01	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5712689	2018/09/04	2018/09/04	Daniel Teclu
Moisture	BAL	5708099	N/A	2018/09/04	Samantha Arachchige

Maxxam ID: HPS504
Sample ID: BH 9-SS1
Matrix: Soil

Collected: 2018/08/30
Shipped:
Received: 2018/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	5715425	N/A	2018/09/05	Fatemeh Habibagahi

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Report Date: 2018/09/06

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RALPH HENNESSY AVE
Sampler Initials: ML

TEST SUMMARY

Maxxam ID: HPS504
Sample ID: BH 9-SS1
Matrix: Soil

Collected: 2018/08/30
Shipped:
Received: 2018/08/30

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	5708088	2018/08/30	2018/09/01	Mariana Vascan
F4G (CCME Hydrocarbons Gravimetric)	BAL	5715427	2018/09/05	2018/09/06	Mariana Vascan
Strong Acid Leachable Metals by ICPMS	ICP/MS	5712689	2018/09/04	2018/09/04	Daniel Teclu
Moisture	BAL	5708099	N/A	2018/09/04	Samantha Arachchige

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exp Services Inc
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GENERAL COMMENTS

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

Package 1	19.7°C

Results relate only to the items tested.

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Maxxam Job #: B8M4974
Report Date: 2018/09/06

QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RALPH HENNESSY AVE
Sampler Initials: ML

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5708088	o-Terphenyl	2018/08/31	96	30 - 130	96	30 - 130	89	%		
5715425	1,4-Difluorobenzene	2018/09/05	115	60 - 140	108	60 - 140	113	%		
5715425	4-Bromofluorobenzene	2018/09/05	117	60 - 140	115	60 - 140	115	%		
5715425	D10-Ethylbenzene	2018/09/05	112	30 - 130	94	30 - 130	100	%		
5715425	D4-1,2-Dichloroethane	2018/09/05	103	60 - 140	95	60 - 140	95	%		
5708088	F2 (C10-C16 Hydrocarbons)	2018/08/31	91	50 - 130	91	80 - 120	<10	ug/g	NC	50
5708088	F3 (C16-C34 Hydrocarbons)	2018/08/31	91	50 - 130	91	80 - 120	<50	ug/g	NC	50
5708088	F4 (C34-C50 Hydrocarbons)	2018/08/31	91	50 - 130	91	80 - 120	<50	ug/g	NC	50
5708099	Moisture	2018/09/04							22	50
5712689	Acid Extractable Antimony (Sb)	2018/09/04	92	75 - 125	104	80 - 120	<0.20	ug/g	NC	30
5712689	Acid Extractable Arsenic (As)	2018/09/04	101	75 - 125	103	80 - 120	<1.0	ug/g	13	30
5712689	Acid Extractable Barium (Ba)	2018/09/04	NC	75 - 125	98	80 - 120	<0.50	ug/g	5.8	30
5712689	Acid Extractable Beryllium (Be)	2018/09/04	103	75 - 125	100	80 - 120	<0.20	ug/g	8.4	30
5712689	Acid Extractable Boron (B)	2018/09/04	96	75 - 125	95	80 - 120	<5.0	ug/g	0.054	30
5712689	Acid Extractable Cadmium (Cd)	2018/09/04	99	75 - 125	99	80 - 120	<0.10	ug/g	NC	30
5712689	Acid Extractable Chromium (Cr)	2018/09/04	NC	75 - 125	97	80 - 120	<1.0	ug/g	4.6	30
5712689	Acid Extractable Cobalt (Co)	2018/09/04	96	75 - 125	100	80 - 120	<0.10	ug/g	0.94	30
5712689	Acid Extractable Copper (Cu)	2018/09/04	92	75 - 125	99	80 - 120	<0.50	ug/g	2.3	30
5712689	Acid Extractable Lead (Pb)	2018/09/04	97	75 - 125	104	80 - 120	<1.0	ug/g	2.4	30
5712689	Acid Extractable Molybdenum (Mo)	2018/09/04	96	75 - 125	102	80 - 120	<0.50	ug/g	3.3	30
5712689	Acid Extractable Nickel (Ni)	2018/09/04	91	75 - 125	98	80 - 120	<0.50	ug/g	1.1	30
5712689	Acid Extractable Selenium (Se)	2018/09/04	99	75 - 125	101	80 - 120	<0.50	ug/g	NC	30
5712689	Acid Extractable Silver (Ag)	2018/09/04	100	75 - 125	101	80 - 120	<0.20	ug/g	NC	30
5712689	Acid Extractable Thallium (Tl)	2018/09/04	99	75 - 125	102	80 - 120	<0.050	ug/g	2.8	30
5712689	Acid Extractable Uranium (U)	2018/09/04	100	75 - 125	104	80 - 120	<0.050	ug/g	7.6	30
5712689	Acid Extractable Vanadium (V)	2018/09/04	NC	75 - 125	97	80 - 120	<5.0	ug/g	1.9	30
5712689	Acid Extractable Zinc (Zn)	2018/09/04	NC	75 - 125	105	80 - 120	<5.0	ug/g	3.4	30
5715425	Benzene	2018/09/05	70	60 - 140	66	60 - 140	<0.02	ug/g	NC	50
5715425	Ethylbenzene	2018/09/05	76	60 - 140	75	60 - 140	<0.02	ug/g	NC	50
5715425	F1 (C6-C10) - BTEX	2018/09/05					<10	ug/g	NC	50
5715425	F1 (C6-C10)	2018/09/05	88	60 - 140	93	80 - 120	<10	ug/g	NC	50

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

Maxxam Job #: B8M4974
Report Date: 2018/09/06

QUALITY ASSURANCE REPORT(CONT'D)

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RALPH HENNESSY AVE
Sampler Initials: ML

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5715425	o-Xylene	2018/09/05	71	60 - 140	68	60 - 140	<0.02	ug/g	NC	50
5715425	p+m-Xylene	2018/09/05	72	60 - 140	71	60 - 140	<0.04	ug/g	NC	50
5715425	Toluene	2018/09/05	89	60 - 140	83	60 - 140	<0.02	ug/g	NC	50
5715425	Total Xylenes	2018/09/05					<0.04	ug/g	NC	50
5715427	F4G-sg (Grav. Heavy Hydrocarbons)	2018/09/06			98	65 - 135	<100	ug/g	6.9	50

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

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

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

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

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

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

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

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Maxxam Job #: B8M4974
Report Date: 2018/09/06

exp Services Inc
Client Project #: OTT-00245869-AO
Site Location: RALPH HENNESSY AVE
Sampler Initials: ML

VALIDATION SIGNATURE PAGE

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

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

Liliana Gaburici, VOC Lab

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

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

Maxxam
A Bureau Veritas Group Company

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

CHAIN OF CUSTODY RECORD 117337

Page 1 of 1

Invoice Information		Report Information (if differs from invoice) (Same)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	EXP Services Inc	Company Name:		Quotation #:	Stream 3	☑ Regular TAT (5-7 days) Most analyses
Contact Name:	Mark McCalla	Contact Name:		P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	2650 Queensview Dr.	Address:		Project #:	OTT-00245869-A0	Rush TAT (Surcharges will be applied)
				Site Location:	Ralph Hennessy Ave	☐ 1 Day ☐ 2 Days ☐ 3-4 Days
Phone:	613-688-1899 Fax:	Phone:	Fax:	Site #:		
Email:	Mark.Mccalla@exp.com	Email:		Sampled By:	Maxime Leroux	Date Required:

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

Rush Confirmation #:

Regulation 153	Other Regulations
☐ Table 1 ☐ Res/Park ☐ Med/ Fine	☐ CCME ☐ Sanitary Sewer Bylaw
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ MISA ☐ Storm Sewer Bylaw
☑ Table 3 ☐ Agri/ Other	☐ PWQO Region
☐ Table ____	☐ Other (Specify)
FOR RSC (PLEASE CIRCLE) Y / N	☐ REG 558 (MIN. 3 DAY TAT REQUIRED)

Include Criteria on Certificate of Analysis: Y / N

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

Analysis Requested

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE): Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)									HOLD- DO NOT ANALYZE	COMMENTS
1	BH7-SS1	2018/08/30	12:00pm	S			✓	✓			✓											0 ice
2	BH8-SS1		12:20pm				✓	✓			✓											
3	BH8-SS1A		12:20pm				✓	✓			✓											
4	BH9-SS1		12:10pm				✓	✓			✓											
5																						
6																						
7																						
8																						
9																						
10																						

LABORATORY USE ONLY

CUSTODY SEAL Y / N		COOLER TEMPERATURES
Present	Intact	
Y	Y	20, 19, 20

COOLING MEDIA PRESENT: Y / N

RECEIVED IN OTTAWA

30-Aug-18 13:00
Alisha Williamson
B8M4974
KIV OTT-001

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Maxime Leroux	2018/08/30	1:00pm	Alisha Campbell	2018/08/30	13:00	

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

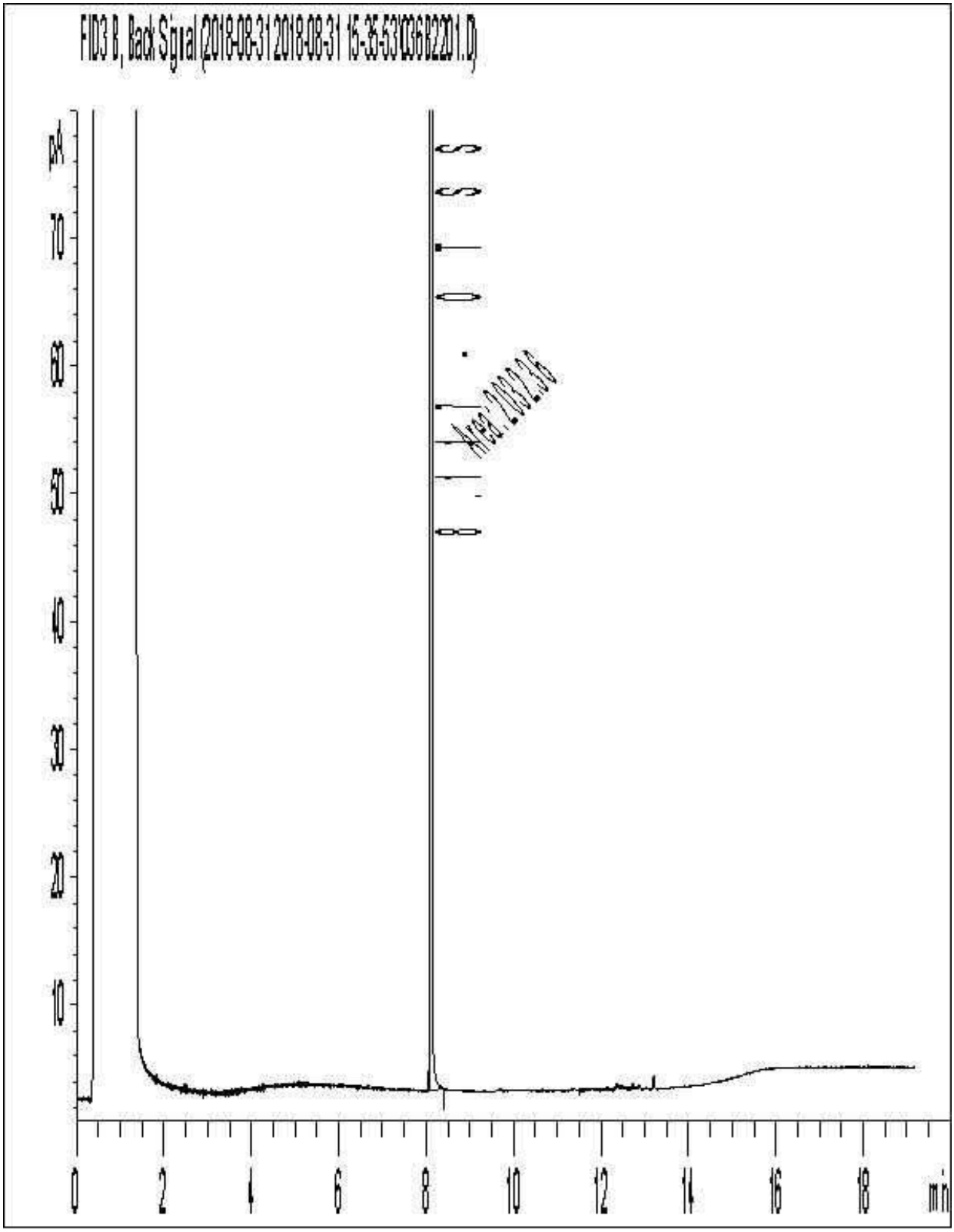
COC-1004 (03/17)

White: Maxxam ~ Yellow: Client

Maxxam Job #: B8M4974
Report Date: 2018/09/06
Maxxam Sample: HPS501

exp Services Inc
Client Project #: OTT-00245869-AO
Project name: RALPH HENNESSY AVE
Client ID: BH 7-SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

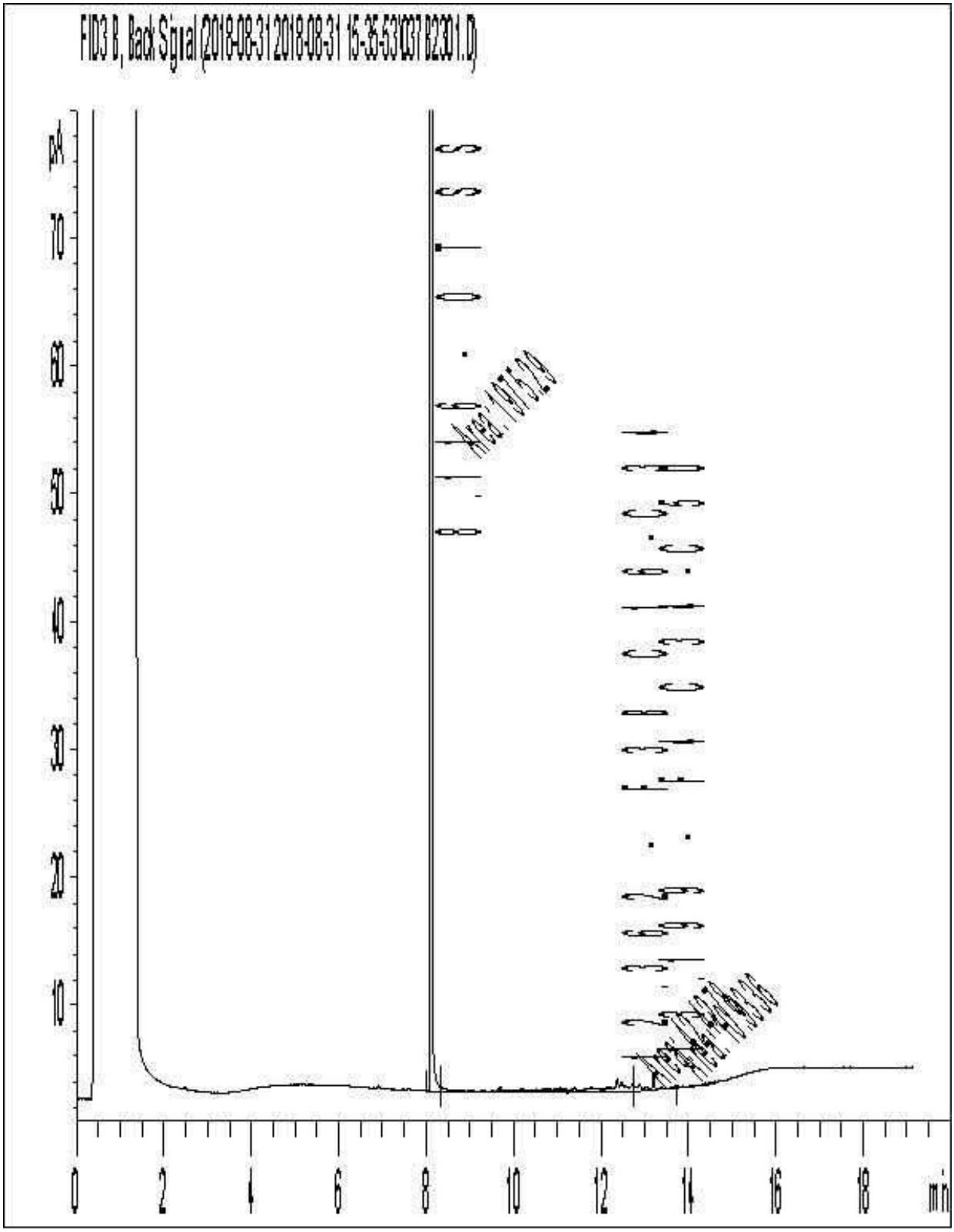


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8M4974
Report Date: 2018/09/06
Maxxam Sample: HPS502

exp Services Inc
Client Project #: OTT-00245869-AO
Project name: RALPH HENNESSY AVE
Client ID: BH 8-SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

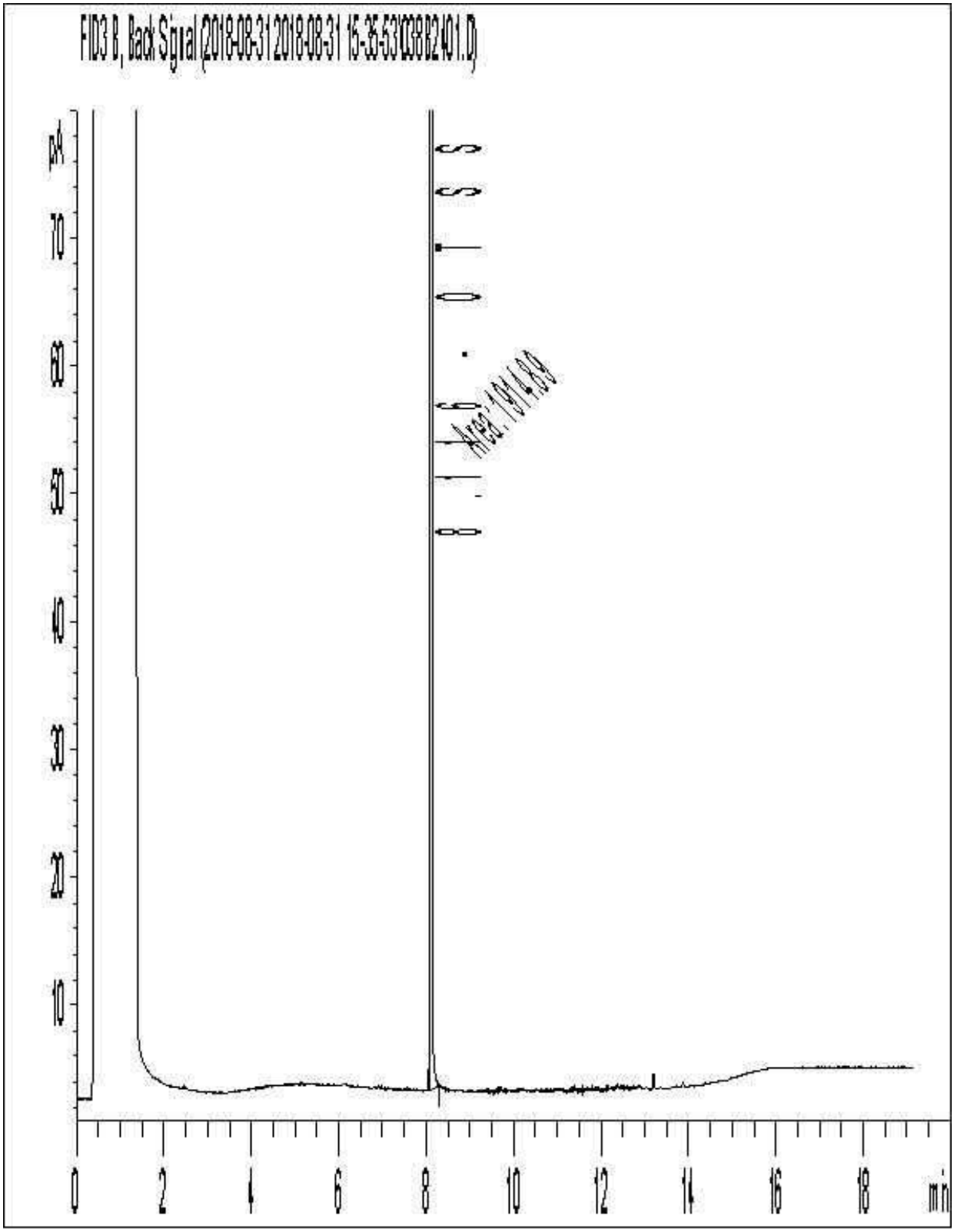


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8M4974
Report Date: 2018/09/06
Maxxam Sample: HPS503

exp Services Inc
Client Project #: OTT-00245869-AO
Project name: RALPH HENNESSY AVE
Client ID: BH 8-SS1A

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram

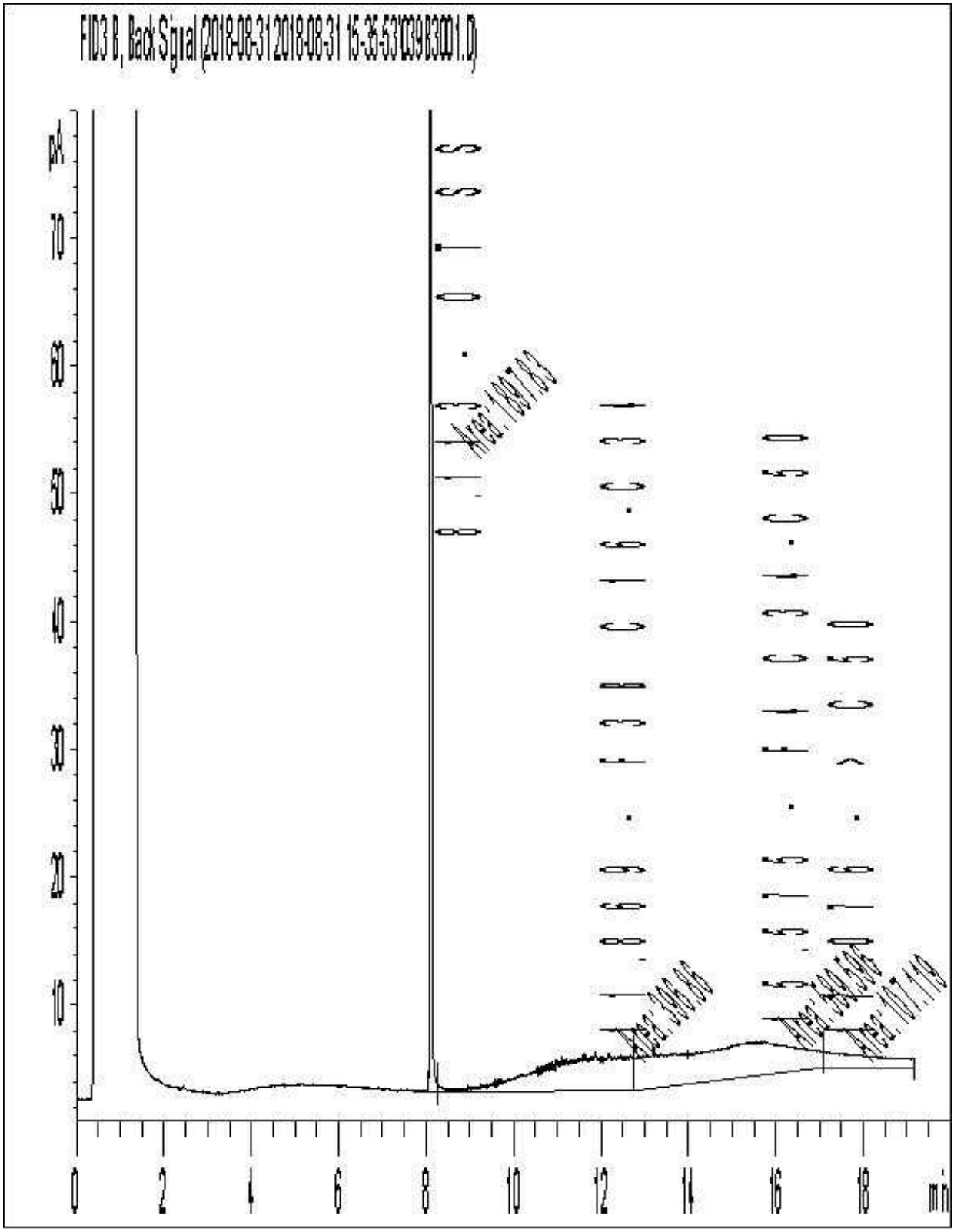


Note: This information is provided for reference purposes only. Should detailed chemist interpretation or fingerprinting be required, please contact the laboratory.

Maxxam Job #: B8M4974
Report Date: 2018/09/06
Maxxam Sample: HPS504

exp Services Inc
Client Project #: OTT-00245869-AO
Project name: RALPH HENNESSY AVE
Client ID: BH 9-SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



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

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

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

ATTENTION TO: **Susan Potyondy**

PROJECT: **OTT-00245869-AO**

AGAT WORK ORDER: **18Z327739**

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

DATE REPORTED: **Apr 16, 2018**

PAGES (INCLUDING COVER): **5**

VERSION*: **1**

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

NOTES

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

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

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

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

AGAT Laboratories

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

Certificate of Analysis

AGAT WORK ORDER: 18Z327739

PROJECT: OTT-00245869-AO

CLIENT NAME: EXP SERVICES INC

ATTENTION TO: Susan Potyondy

SAMPLING SITE:Riverside South Elementary School

SAMPLED BY:exp

Inorganic Chemistry (Soil)

DATE RECEIVED: 2018-04-10 **DATE REPORTED: 2018-04-16**

			SAMPLE DESCRIPTION:	**BH#2 SS3 5'-7'**	**BH#3 SS5 10'-12'**	**BH#6 SS3 5'-7'**
			SAMPLE TYPE:	**Soil**	**Soil**	**Soil**
			DATE SAMPLED:	**2018-04-03**	**2018-04-02**	**2018-04-02**
Parameter	**Unit**	**G / S**	**RDL**	**9174559**	**9174560**	**9174561**
Chloride (2:1)	µg/g		2	4	3	3
Sulphate (2:1)	µg/g		2	42	104	84
pH (2:1)	pH Units		N/A	7.47	8.01	7.91

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

9174559-9174561 Chloride, Sulphate and pH were determined on the DI water extract obtained from the 2:1 leaching procedure (2 parts DI water:1 part soil).

Certified By: Amanjot Bhela

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

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

Quality Assurance

CLIENT NAME: EXP SERVICES INC

PROJECT: OTT-00245869-AO

SAMPLING SITE:Riverside South Elementary School

AGAT WORK ORDER: 18Z327739

ATTENTION TO: Susan Potyondy

SAMPLED BY:exp

Soil Analysis

RPT Date:			DUPLICATE			Method Blank	REFERENCE MATERIAL			METHOD BLANK SPIKE			MATRIX SPIKE		
PARAMETER	Batch	Sample Id	Dup #1	Dup #2	RPD		Measured Value	Acceptable Limits		Recovery	Acceptable Limits		Recovery	Acceptable Limits	
								Lower	Upper		Lower	Upper		Lower	Upper
Inorganic Chemistry (Soil)															
Chloride (2:1)	9174559	9174559	4	4	NA	< 2	101%	70%	130%	101%	70%	130%	104%	70%	130%
Sulphate (2:1)	9174559	9174559	42	37	12.7%	< 2	95%	70%	130%	105%	70%	130%	112%	70%	130%
pH (2:1)	9174559	9174559	7.47	7.51	0.5%	N/A	101%	90%	110%	NA			NA		

Comments: NA signifies Not Applicable.
Duplicate Qualifier: As the measured result approaches the RL, the uncertainty associated with the value increases dramatically, thus duplicate acceptance limits apply only where the average of the two duplicates is greater than five times the RL.

Certified By: Amanjot Bhela

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

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

Method Summary

CLIENT NAME: EXP SERVICES INC

AGAT WORK ORDER: 18Z327739

PROJECT: OTT-00245869-AO

ATTENTION TO: Susan Potyondy

SAMPLING SITE:Riverside South Elementary School

SAMPLED BY:exp

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

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

AGAT Laboratories

1 large

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

Chain of Custody Record

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

Laboratory Use Only

Work Order #: 18Z327739

Cooler Quantity: one

Arrival Temperatures: 23.1 | 23.1 | 23.0

LT- 3.1 | 5.5 | 6.5

Custody Seal Intact: ☐Yes ☐No ☐N/A

Notes: no ice ON ICE

Report Information:

Company: exp Services Inc. Ottawa
Contact: Susan Potyondy
Address: 2650 Queensview Dr. Unit 100
Ottawa K2B 8H6
Phone: 613-688-1899 Fax:
Reports to be sent to:
1. Email: susan.potyondy@exp.com
2. Email:

Regulatory Requirements: ☐ No Regulatory Requirement

(Please check all applicable boxes)

☐ Regulation 153/04
Table ___ (Indicate One)
☐ Ind/Com
☐ Res/Park
☐ Agriculture

Soil Texture (Check One)
☐ Coarse
☐ Fine

☐ Sewer Use
☐ Sanitary
☐ Storm
Region ___ (Indicate One)
☐ MISA

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

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

Report Guideline on Certificate of Analysis ☐ Yes ☐ No

Turnaround Time (TAT) Required:

Regular TAT ☑ 5 to 7 Business Days

Rush TAT (Rush Surcharges Apply)

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

OR Date Required (Rush Surcharges May Apply):

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

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

Project Information:

Project: OTT-00245869-A0
Site Location: Riverside South Elementary School
Sampled By: exp
AGAT Quote #: PO:
Please note: If quotation number is not provided, client will be billed full price for analysis.

Invoice Information:

Bill To Same: Yes ☑ No ☐

Company:
Contact:
Address:
Email:

Sample Matrix Legend

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

Sample Identification	Date Sampled	Time Sampled	# of Containers	Sample Matrix	Comments/ Special Instructions	Field Filtered - Metals, Hg, CrVI (Y/N)	Metals and Inorganics (☐ All Metals ☐ 153 Metals (excl. Hydrides) ☐ Hydride Metals ☐ 153 Metals (incl. Hydrides))	ORPs: ☐ B-HWS ☐ Cl- ☐ CN ☐ Cr^{6+} ☐ EC ☐ FOC ☐ Hg ☐ pH ☐ SAR	Full Metals Scan	Regulation/Custom Metals	Nutrients: ☐ TP ☐ NH_3 ☐ TKN ☐ NO_3 ☐ NO_2 ☐ NO_3+NO_2	Volatiles: ☐ VOC ☐ BTEX ☐ THM	PHCs F1 - F4	ABNs	PAHs	PCBs: ☐ Total ☐ Aroclors	Organochlorine Pesticides	TCLP: ☐ M&I ☐ VOCs ☐ ABNs ☐ B(a)P ☐ PCBs	Sewer Use	pH	sulphate	chlorides
BH#2 SS3 5'-7'	Apr. 3		1	S																	✓	✓	✓
BH#3 SS5 10'-12'	Apr. 2		1	S																	✓	✓	✓
BH#6 SS3 5'-7'	Apr. 2		1	S																	✓	✓	✓

Samples Relinquished By (Print Name and Sign):	Date	Time	Samples Received By (Print Name and Sign):	Date	Time
Jeff MacMillan	Apr. 10/18		Berthelett Bell	10-Apr-18	12h44
CB/07 to FedEx	10-Apr-18	16h00	Avineet Minhas AM	Apr 11/18	8:51

Page 1 of 1

№: T 063377

Document ID: DIV-78-1513.014

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

Date Issued: February 22, 2017

Maxxam
A Bureau Veritas Group Company

Your Project #: OTT-00245869-A
Your C.O.C. #: 102805

Attention: Mark Devlin

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

Report Date: 2018/04/10
Report #: R5072713
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B873851
Received: 2018/04/03, 16:10

Sample Matrix: Water
Samples Received: 1

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Petroleum Hydro. CCME F1 & BTEX in Water	1	N/A	2018/04/09	OTT SOP-00002	CCME CWS
Petroleum Hydrocarbons F2-F4 in Water (1)	1	2018/04/05	2018/04/05	OTT SOP-00001	CCME Hydrocarbons

Remarks:

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

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

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

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

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

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

(1) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Maxxam conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following "Alberta Environment's Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003". Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

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

Your Project #: OTT-00245869-A
Your C.O.C. #: 102805

Attention: Mark Devlin

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

Report Date: 2018/04/10
Report #: R5072713
Version: 1 - Final

CERTIFICATE OF ANALYSIS

MAXXAM JOB #: B873851
Received: 2018/04/03, 16:10

Encryption Key

Please direct all questions regarding this Certificate of Analysis to your Project Manager.
Jonathan Urben, Senior Project Manager
Email: jurben@maxxam.ca
Phone# (613) 274-0573
==========
Maxxam has procedures in place to guard against improper use of the electronic signature and have the required "signatories", as per section 5.10.2 of ISO/IEC 17025:2005(E), signing the reports. For Service Group specific validation please refer to the Validation Signature Page.

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

Maxxam Job #: B873851
Report Date: 2018/04/10

exp Services Inc
Client Project #: OTT-00245869-A
Sampler Initials: MAD

PETROLEUM HYDROCARBONS (CCME)

Maxxam ID		GJO529		
Sampling Date		2018/04/03 15:00		
COC Number		102805		
	UNITS	**BH6**	**RDL**	**QC Batch**
BTEX & F1 Hydrocarbons				
Benzene	ug/L	<0.20	0.20	5475300
Toluene	ug/L	2.0	0.20	5475300
Ethylbenzene	ug/L	<0.20	0.20	5475300
o-Xylene	ug/L	<0.20	0.20	5475300
p+m-Xylene	ug/L	<0.40	0.40	5475300
Total Xylenes	ug/L	<0.40	0.40	5475300
F1 (C6-C10)	ug/L	<25	25	5475300
F1 (C6-C10) - BTEX	ug/L	<25	25	5475300
F2-F4 Hydrocarbons				
F2 (C10-C16 Hydrocarbons)	ug/L	<100	100	5470767
F3 (C16-C34 Hydrocarbons)	ug/L	<200	200	5470767
F4 (C34-C50 Hydrocarbons)	ug/L	<200	200	5470767
Reached Baseline at C50	ug/L	Yes		5470767
Surrogate Recovery (%)				
1,4-Difluorobenzene	%	105		5475300
4-Bromofluorobenzene	%	100		5475300
D10-Ethylbenzene	%	113		5475300
D4-1,2-Dichloroethane	%	98		5475300
o-Terphenyl	%	111		5470767

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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Maxxam Job #: B873851
Report Date: 2018/04/10

exp Services Inc
Client Project #: OTT-00245869-A
Sampler Initials: MAD

TEST SUMMARY

Maxxam ID: GJO529
Sample ID: BH6
Matrix: Water

Collected: 2018/04/03
Shipped:
Received: 2018/04/03

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Petroleum Hydro. CCME F1 & BTEX in Water	HSGC/MSFD	5475300	N/A	2018/04/09	Lyndsey Hart
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	5470767	2018/04/05	2018/04/05	Fatemeh Habibagahi

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GENERAL COMMENTS

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

Package 1	5.7°C

Cooler custody seal was present and intact.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

exp Services Inc
Client Project #: OTT-00245869-A
Sampler Initials: MAD

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
5470767	o-Terphenyl	2018/04/05	110	30 - 130	112	30 - 130	112	%		
5475300	1,4-Difluorobenzene	2018/04/09	105	70 - 130	104	70 - 130	105	%		
5475300	4-Bromofluorobenzene	2018/04/09	94	70 - 130	93	70 - 130	95	%		
5475300	D10-Ethylbenzene	2018/04/09	116	70 - 130	112	70 - 130	114	%		
5475300	D4-1,2-Dichloroethane	2018/04/09	98	70 - 130	100	70 - 130	99	%		
5470767	F2 (C10-C16 Hydrocarbons)	2018/04/05	98	50 - 130	100	80 - 120	<100	ug/L	NC	50
5470767	F3 (C16-C34 Hydrocarbons)	2018/04/05	98	50 - 130	100	80 - 120	<200	ug/L	NC	50
5470767	F4 (C34-C50 Hydrocarbons)	2018/04/05	98	50 - 130	100	80 - 120	<200	ug/L	NC	50
5475300	Benzene	2018/04/09	101	70 - 130	105	70 - 130	<0.20	ug/L	7.1	40
5475300	Ethylbenzene	2018/04/09	95	70 - 130	96	70 - 130	<0.20	ug/L	6.5	40
5475300	F1 (C6-C10) - BTEX	2018/04/09					<25	ug/L	11	40
5475300	F1 (C6-C10)	2018/04/09	96	70 - 130	114	70 - 130	<25	ug/L	8.1	40
5475300	o-Xylene	2018/04/09	100	70 - 130	103	70 - 130	<0.20	ug/L	1.1	40
5475300	p+m-Xylene	2018/04/09	93	70 - 130	95	70 - 130	<0.40	ug/L	3.4	40
5475300	Toluene	2018/04/09	88	70 - 130	89	70 - 130	<0.20	ug/L	1.2	40
5475300	Total Xylenes	2018/04/09					<0.40	ug/L	2.2	40

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

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

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

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

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

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

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exp Services Inc
Client Project #: OTT-00245869-A
Sampler Initials: MAD

VALIDATION SIGNATURE PAGE

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

Steve Roberts, Ottawa Lab Manager

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

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Maxxam
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CAM FCD-01191/3

CHAIN OF CUSTODY RECORD 102805

Page 1 of 1

Invoice Information		Report Information (if differs from invoice)		Project Information (where applicable)		Turnaround Time (TAT) Required
Company Name:	EXP Services Inc.	Company Name:		Quotation #:	Stream 3	[X] Regular TAT (5-7 days) Most analyses
Contact Name:	Mark Devlin / Dan Clarke	Contact Name:	Same	P.O. #/ AFE#:		PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS
Address:	100-2650 Queensview Dr. Ottawa	Address:		Project #:	OTT-00245864-A	Rush TAT (Surcharges will be applied) [ ] 1 Day [ ] 2 Days [ ] 3-4 Days
				Site Location:		
Phone:	613 688 1899 Fax:	Phone:	Fax:	Site #:		
Email:		Email:		Sampled By:	MAD	Date Required:

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

Rush Confirmation #:

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

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

Include Criteria on Certificate of Analysis: Y / N

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

LABORATORY USE ONLY

CUSTODY SEAL Y / N Present	Intact	COOLER TEMPERATURES
Y	Y	6, 6, 5

COOLING MEDIA PRESENT: (Y) N

	SAMPLE IDENTIFICATION	DATE SAMPLED (YYYY/MM/DD)	TIME SAMPLED (HH:MM)	MATRIX	# OF CONTAINERS SUBMITTED	FIELD FILTERED (CIRCLE): Metals / Hg / CrVI	BTEX/ PHC F1	PHCs F2 - F4	VOCs	REG 153 METALS & INORGANICS	REG 153 ICPMS METALS	REG 153 METALS (Hg, Cr VI, ICPMS Metals, HWS - B)								HOLD- DO NOT ANALYZE	COMMENTS
1	BH6	2018/04/03	3:00pm	GW	4		X	X													
2																					
3																					
4																					
5																					
6																					
7																					
8																					
9																					ON Que
10																					

RECEIVED IN OTTAWA

03-Apr-18 16:10
Jonathan Urben
B873851
KIY OTT 001

RELINQUISHED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	RECEIVED BY: (Signature/Print)	DATE: (YYYY/MM/DD)	TIME: (HH:MM)	MAXXAM JOB #
Mark Devlin	2018/04/03	4:06pm	Kevin Jungam	2018/04/03	16.10	
Mark Devlin						

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

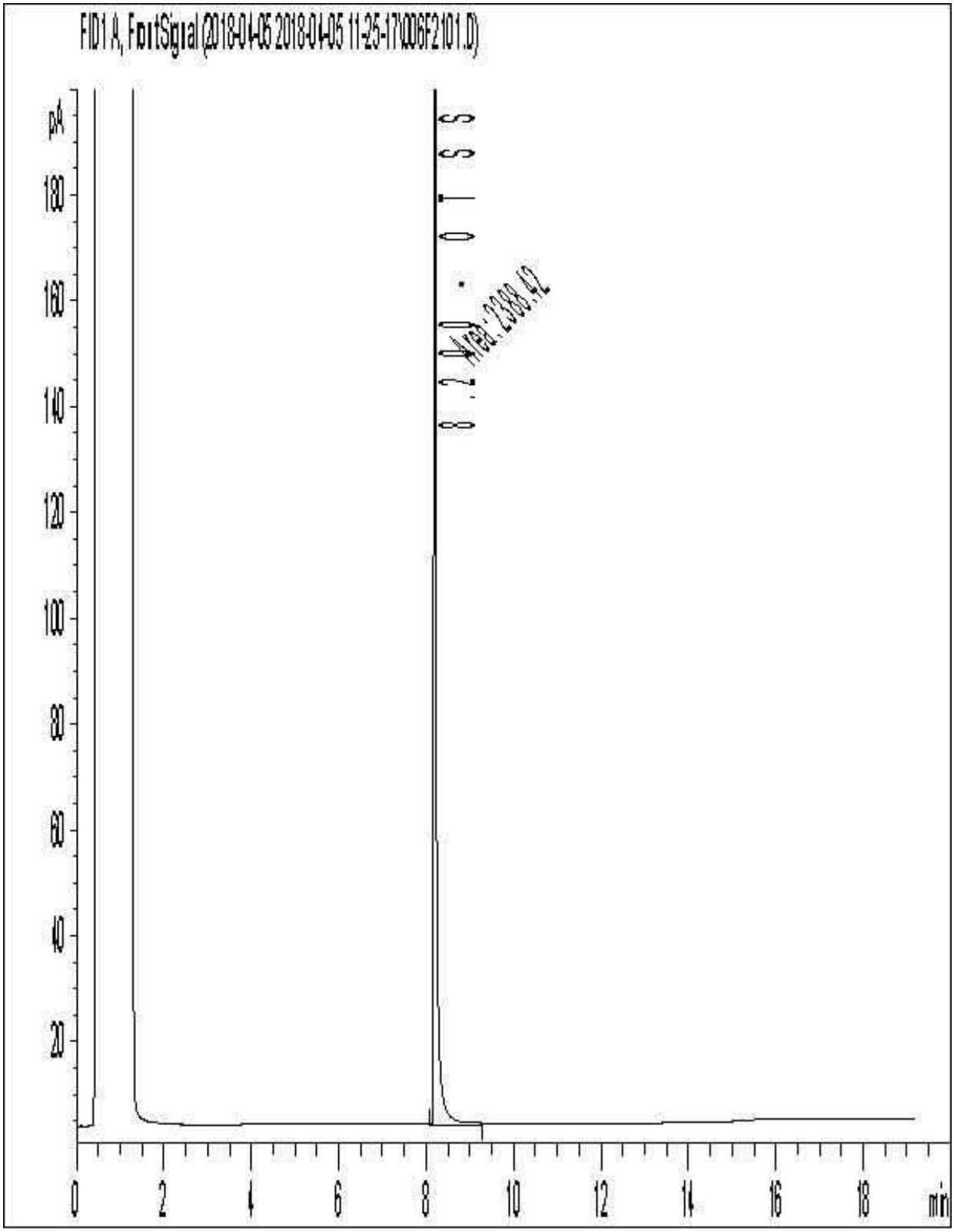
COC-1004 (03/17)

White: Maxxam – Yellow: Client

Maxxam Job #: B873851
Report Date: 2018/04/10
Maxxam Sample: GJO529

exp Services Inc
Client Project #: OTT-00245869-A
Client ID: BH6

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



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