Phase Two Environmental Site Assessment
177 Armstrong Street and 268 Carruthers Avenue Ottawa, Ontario

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Project Number:
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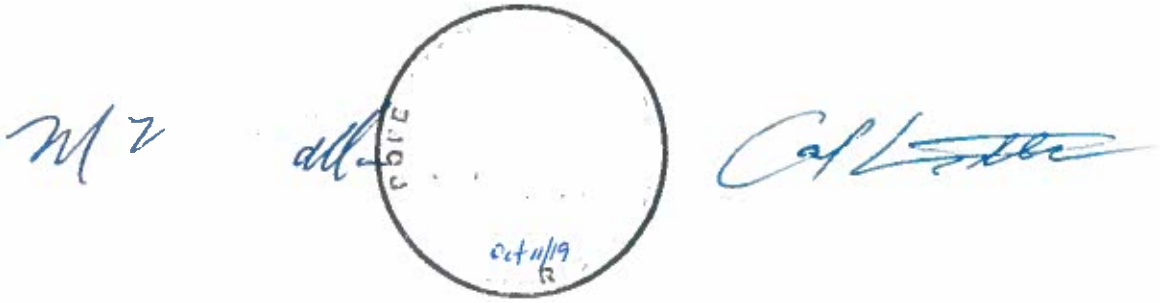

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Executive Summary

EXP Services Inc. (EXP) was retained by McCormick Park Developments Incorporated to complete a Phase Two Environmental Site Assessment (ESA) of the property located at 177 Armstrong Street and 268 Carruthers 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 Two Property by EXP. It is understood that this report is required as part of the permitting process with the City of Ottawa. We understand that a Record of Site Condition (RSC) is required due to a change in land use.

The findings of a Phase One ESA were presented in a report entitled *Phase One Environmental Site* Assessment, 177 Armstrong Street and 268 Carruthers Avenue, Ottawa*, Ontario* dated September 3, 2019. The Phase One ESA identified the following APECs:

Table EX.1: Areas of Potential Environmental Concern

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)	Contaminants of Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
1. AST Fuel storage tanks in basement 177 Armstrong Street	Southwest part	#28: Gasoline and Associated Products in Fixed Tanks	PHCs and BTEX	Soil and groundwater
2. AST Fuel storage tanks in basement 179 Armstrong Street	Southeast part	#28: Gasoline and Associated Products in Fixed Tanks	PHCs and BTEX	Soil and groundwater
3. AST Fuel storage tanks in basement 268 Carruthers Avenue	Northeast part	#28: Gasoline and Associated Products in Fixed Tanks	PHCs and BTEX	Soil and groundwater
4. Fill material in gravel parking lot	Entire property	#30: Importation of Fill Material of Unknown Quality	PHCs, PAH, metals, and BTEX	Soil
5. Former and active automotive repair garages at 1 Grant Street and 180 Armstrong Street	South part	#10: Commercial Autobody Shops	PHCs, metals, and VOC	Groundwater

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

For assessment purposes, EXP selected the Site Condition Standards (SCS), provided in Table 7 of *Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act*, Ministry of the Environment, Conservation and Parks (MECP), 2011 for residential/institutional land use at a site with coarse textured soil in accordance with Ontario Regulation 153/04 (as amended).

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

- On June 11 and August 30, and September 3, 2019, a total of 8 boreholes (BH-1 to MW-8) were advanced at the Phase Two property and five were instrumented with a monitoring well.
- Based on the Phase Two ESA, A 35 mm layer of asphalt was observed in BH5 and MW-6. A 75 mm to 350 cm layer of granular fill was observed at the ground surface of several boreholes. Sand and gravel fill material was observed under the asphalt and granular fill to a maximum depth of 1.2 m. A layer of medium sand was observed below the sand and gravel fill in BH-4 at a depth of 0.8 m to 1.2 m. No petroleum odours were identified in the fill material. No native soil was observed in the boreholes.
- Limestone bedrock was encountered from 0.4 m to 1.2 m bgs. Groundwater was encountered at a depth of 4.18 m bgs in BH-1 to 5.66 m bgs in MW-7. No petroleum sheens were observed in the monitoring wells during the sampling event. Based on the groundwater elevations, the groundwater flow direction is to the northwest.
- Based on the results of the investigation, there are one or more soil samples located in the fill material above the limestone bedrock that had one or more MECP Table 7 SCS exceedances of PHC F3, PHC F4, several PAHs, antimony, cadmium and lead. The estimated volume of impacted soil is approximately 1,350 m^3. This is based on an area of 30 m x 45 m x 1.0 m deep.
- All of the groundwater samples had concentrations of VOC and PHC that were less than the 2011 MECP Table 7 SCS.

It is recommended that the impacted soil be removed from the Phase Two property. 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 McCormick Park Developments Incorporated to complete a Phase Two Environmental Site Assessment (ESA) of the property located at 177 Armstrong Street and 268 Carruthers Avenue in Ottawa, Ontario, hereinafter referred to as the 'Phase Two property'. The objective of the Phase Two ESA was to address areas of potential environmental concern (APEC) identified in a Phase One ESA conducted at the Phase Two property by EXP. EXP understands that McCormick Park Developments Inc. plans to re-develop the land as medium density residential and that this report is required as part of the permitting process with the City of Ottawa. We understand that a Record of Site Condition (RSC) is required.

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

1.1 Site Description

The Phase Two property is located within a residential neighbourhood on the north side of Armstrong Street and west side of Carruthers Avenue. The property at 177 Armstrong Street is improved with a vacant residential building and a vacant commercial building. The residential building at 268 Carruthers Avenue was unoccupied. The Phase Two property has an area of 0.12 hectares. A Site Location Plan is provided as Figures 1 and 2, and a Site Plan is provided as Figure 3 in Appendix B.

The Phase One properties have the following municipal information:

- 177 Armstrong Street – area of 0.086 hectares, property identification number (PIN) 040940154, and legal description of PLAN 83 PT LOTS 4 5 & 6 PLAN;109 N PT LOT 1 ARMSTRONG N; and,
- 268 Carruthers Street – area of 0.028 hectares, property identification number (PIN) 040940153, and legal description of PLAN 83 N PT LOT 6; CARRUTHERS W.

The Phase Two property is located within a municipally serviced area of the City of Ottawa (Figure 2 in Appendix B). Topographically, the Phase One property is relatively flat. The surrounding area has a slope down towards the north. Regional groundwater flow direction is inferred to be in the northerly direction towards the Ottawa River, found approximately 1km to the north of the Phase One property.

The approximate Universal Transverse Mercator (UTM) coordinates for the Phase One property centroid is NAD83, Zone 18T, 443042.55 m E, 5027976.66 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 Property Ownership

At the time of the investigation, the Phase Two Property was owned by McCormick Park Developments Incorporated.

Owner Contact: Mr. Jean Desjardins
Maybach Homes Inc.
P.O. Box 74155 Beechwood Avenue
Ottawa, Ontario K1M 2H9

1.3 Current and Proposed Future Uses

At the time of the Phase Two ESA investigation, the Phase Two Property's land usage was a mix of commercial and residential. The future land use will be residential. Therefore, under Section 168.3.1 of the Act, a Record of Site Condition is required. A site plan is included in Appendix B.

1.4 Applicable Site Condition Standards

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

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

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

- The predominant soil type on the Phase Two property was considered to be coarse textured (refer to the results of the Grain Size Analysis as provided in the Certificates of Analysis presented in Appendix E);
- There was no intention to carry out a stratified restoration at the Phase Two property.
- More than two-thirds of the Phase Two property has an overburden thickness less than 2 m.
- The Phase Two property is not located within 30 m of a surface water body or an area of natural significance.
- The soil at the Phase Two property has a pH value between 5 and 9 for surficial soils; and, between 5 and 11 for subsurface soils.
- The property is not within an area of natural significance; does not include, nor is it adjacent to an area of natural significance, nor is it part of such an area; and, it does not include land that is within 30 m of an area of natural significance, nor is it part of such an area.
- The Phase Two property is serviced by the City of Ottawa's water distribution system and the surrounding properties are municipally serviced.
- The Phase Two property is planned for residential use.

2 Background Information

2.1 Physical Setting

The Phase Two property has an area of 0.12 hectares and is occupied by 2 vacant residential buildings and a vacant commercial building. The Phase Two property is located within a municipally serviced area of the City of Ottawa (Figure 2 in Appendix B).

Previous geotechnical work that has been completed at the site shows 0.4 m to 1.2 m of fill material overlying limestone bedrock. Groundwater was found within the limestone at a depth of 4.7 m below grade.

Topographically, the Phase Two property is relatively flat. The local groundwater flow direction is inferred to be toward the north. The Ottawa River is approximately 1 km north of the Phase Two property.

2.2 First Developed Use Determination

Based on a review of historical aerial photographs, chain of title for the property, historical maps, and other records review, it appears that the Phase One property was first developed for use as residences between 1912 and 1928. The Phase Two property has been used for residential and various commercial businesses since that time.

2.3 Past Investigations

The following previous report was provided to EXP for review.

- *Phase One ESA for 177 Armstrong Street, Ottawa, Ontario*. Houle Chevrier Engineering, 2014.

This report addressed only 177 Armstrong, and not the north part of the Phase One property. The report references an environmental screening report *177 Armstrong Street, Groundwater Sampling*, completed by Houle Chevrier in 2013. Two monitoring wells were installed on the property, and one groundwater sample was collected from each of the wells. The samples were analyzed for petroleum hydrocarbons (PHC), volatile organic compounds (VOC), polycyclic aromatic hydrocarbons (PAH), metals and general inorganics. No exceedances were identified when compared with MECP Table 7, Generic Site Condition Standards for Shallow Coarse Textured Soils in a Non-Potable Groundwater Conditions.

A geotechnical report, *Geotechnical Investigation, Proposed Residential Development, 177 Armstrong Street, Ottawa, Ontario,* completed by Houle Chevrier in 2014 was also referenced. The report identified a total of 330mm of imported fill material on site.

The report also identified several potential contaminating activities in the study area. The Phase One ESA identified the following areas of potential environmental concern (APEC):

- Fuel storage tanks in basements;
- Staining of gravel ground surface at 177 Armstrong Street;
- Presence of fill of unknown quality; and,
- Impacts from off-site spills and vehicle maintenance.

A Phase Two ESA was recommended to assess these APECs.

- *Technical Memorandum, 177 Armstrong Street – Groundwater Sampling*, Houle Chevrier Engineering February 12, 2013.

Two monitoring wells were installed to a depth of 6.1 m. Both were 6 and 8 m north of the two on-site buildings. Groundwater samples were collected and submitted for laboratory analysis of PHCs, PAHs, VOCs), metals, and inorganic parameters. There were no exceedences of the Ontario Ministry of Environment, Conservation and Parks (MECP) site condition standards. Borehole logs and a site plan showing the monitoring well locations were not included in the memorandum

- *Technical Memorandum, 177 Armstrong Street*, Houle Chevrier Engineering March 22, 2013.

This memorandum is similar to the previous one, but it mentions the depth to bedrock and soil testing had not been carried out. Borehole logs and a site plan showing the monitoring well locations were not included in the memorandum

The findings of 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)	Contaminants of Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
1. AST Fuel storage tanks in basement 177 Armstrong Street	Southwest part	#28: Gasoline and Associated Products in Fixed Tanks	PHCs and BTEX	Soil and groundwater
2. AST Fuel storage tanks in basement 179 Armstrong Street	Southeast part	#28: Gasoline and Associated Products in Fixed Tanks	PHCs and BTEX	Soil and groundwater
3. AST Fuel storage tanks in basement 268 Carruthers Avenue	Northeast part	#28: Gasoline and Associated Products in Fixed Tanks	PHCs and BTEX	Soil and groundwater
4. Fill material in gravel parking lot	Entire property	#30: Importation of Fill Material of Unknown Quality	PHCs, PAH, metals, and BTEX	Soil
5. Former and active automotive repair garages at 1 Grant Street and 180 Armstrong Street	South part	#10: Commercial Autobody Shops	PHCs, metals, and VOC	Groundwater

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

3 Scope of the Investigation

3.1 Overview of Site Investigation

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

It is understood that the Phase Two Property is to be re-developed for medium density residential use from a commercial land use; therefore, the regulation 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 Two property;
- Retain a private utility locating company to mark any underground utilities present in the vicinity of the borehole locations and to clear the individual borehole locations;
- Advance a total of seven (7) boreholes and complete four of them as groundwater monitoring wells;
- Attempt to collect representative soil samples for chemical analysis of metals, PHC and BTEX;
- Attempt to collect representative groundwater samples for chemical analysis of metals, VOC, PHC and BTEX;
- Measure groundwater levels in the monitoring wells;
- Completion of a survey of the borehole locations relative to a geodetic or other permanent benchmark and in reference with the Universal Transverse Mercator (UTM) coordinate system for vertical and horizontal control; and
- Review the analytical data and prepare a report of the findings.

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

3.3 Media Investigated

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

The potential contaminants of concern (PCOCs) identified in EXP's (2019) Phase One ESA were identified as target parameters for this Phase Two ESA. The areas of potential environmental concern (APEC) and PCOCs identified in the Phase One ESA are outlined in Table 2.1.

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

3.4 Phase One ESA Conceptual Site Model

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

3.4.1 Current and Past Uses

Based on a review of historical aerial photographs, chain of title for the property, historical maps, and other records review, it appears that the Phase One property was first developed for use as residences between 1912 and 1928. The Phase Two property has been used for residential and various restaurant businesses since that time.

3.4.2 Summary of Potentially Contaminating Activities

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

- PCA 1 – 177 Armstrong Street – Above ground furnace oil storage tank in basement. (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Since this is located on the Phase One property, it is considered an APEC. APEC1.
- PCA 2 – 179 Armstrong Street – Above ground furnace oil storage tank in basement. (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Since this is located on the Phase One property, it is considered an APEC. APEC2.
- PCA 3 – 268 Carruthers Avenue – Above ground furnace oil storage tank in basement. (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Since this is located on the Phase One property, it is considered an APEC. APEC3.
- PCA 4 – 177 Armstrong Street – Fill material identified during drilling program in 2013. (PCA #30 – Importation of Fill Material of Unknown Quality). Since this is located on the Phase One property, it is considered an APEC. APEC4.
- PCA 5 – 180 Armstrong Street/1 McCormick Street – Former automotive repair shop, located 20 m to the south of the Phase One property. The site was also listed under Ontario Regulation 347 as a waste generator from 2001-2004 (PCA #10 – Commercial Auto Body Shops, PCA #other). Wastes included: paint, pigment, and coating residue. Due to the proximity to the Phase One site, and the direction of groundwater flow, this contributes to an APEC in the south part of the Phase One property. APEC 5.
- PCA 6 – 1 Grant Street – Automotive repair shop, located 40 m south of the Phase One property (PCA #10 – Commercial Auto Body Shops). Due to the proximity to the Phase One site, and the direction of groundwater flow this contributes to an APEC in the south part of the Phase One property. APEC 5.
- PCA 7 – 271 Carruthers Avenue – Automotive repair shop, located 20 m south of the Phase One property (PCA #10 – Commercial Auto Body Shops). Due to the northerly direction of groundwater flow, this is not considered an APEC.
- PCA 8 – 131 Armstrong Street – Former automotive repair shop, located 170 m to the east of the Phase One property (PCA #10 – Commercial Auto Body Shops). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.

- PCA 9 – 1064 Wellington Street – Former automotive repair shop and dry cleaner, located 250m east of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks, PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 10 – 1067 Wellington Street – Former automotive repair shop and dry cleaner, located 250m east of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks, PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 11 – 1069 Wellington Street – Former dry cleaner, located 250m east of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 12 – 1091 Wellington Street – Former Chinese laundry, located 145m southeast of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 13 – 1092-94, 1096 Wellington Street – Former service station located 145m to the southeast of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 14 – 1097 Wellington Street – Former dry cleaner, located 150m southeast of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 15 – 1112 Wellington Street – Former dry cleaner, located 120m southeast of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 16 – 1119 Wellington Street – Former dry cleaner, located 70m southeast of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 17 – 1120 Wellington Street – Former Chinese laundry, located 125m southeast of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 18 – 1124 Wellington Street – Former service station located 120 m to the southeast of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 19 – 1125 Wellington Street – Former dry cleaner, located 100 m southeast of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the intervening distance, this is not considered an APEC.
- PCA 20 – 1132 Wellington Street – Former service station located 110 m southeast of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on the intervening distance, this is not considered an APEC.
- PCA 21 – 1134 Wellington Street – Former automotive repair shop and Chinese laundry, located 110 m southeast of the Phase One property (PCA #28 – Gasoline and Associated Products Stored

in Fixed Tanks, PCA #37 – Operation of Dry-Cleaning Equipment). Based on the intervening distance, this is not considered an APEC.

- PCA 22– 1141/1149 Wellington Street – Former automotive repair shop and service station, located 115 m south of the Phase One property (PCA #10 – Commercial Auto Body Shops, PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on the intervening distance, this is not considered an APEC.
- PCA 23 – 1175 Wellington Street – Former service station located 170 m southwest of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on the intervening distance and northerly groundwater flow direction, this is not considered an APEC.
- PCA 24 – 300 Parkdale Avenue – Commercial printers located 215 m to the west of the Phase One property (PCA Other). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 25 – 380 Parkdale Avenue – Former dry cleaners located 215 m to the west of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 26 – 390 Parkdale Avenue – Former service station located 235 m to the southwest of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.

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

3.4.3 Areas of Potential Environmental Concern

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

- APEC 1 – 177 Armstrong Street – Above ground furnace oil storage tank in basement. (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). This APEC is associated with PCA 1. The potential contaminants of concern include: PHCs and BTEX.
- APEC 2 – 179 Armstrong Street – Above ground furnace oil storage tank in basement. (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). This APEC is associated with PCA 2. The potential contaminants of concern include: PHCs and BTEX.
- APEC 3 – 268 Carruthers Avenue – Above ground furnace oil storage tank in basement. (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). This APEC is associated with PCA 3. The potential contaminants of concern include: PHCs and BTEX.
- APEC 4 – 177 Armstrong Street – Fill material identified during drilling program in 2013. (PCA #30 – Importation of Fill Material of Unknown Quality). This APEC is associated with PCA 4. The potential contaminants of concern include: PHCs, PAH, metals, and BTEX.
- APEC 5 – 180 Armstrong Street/1 McCormick Street – Former automotive repair shop, located 20 m to the south of the Phase One property (PCA #10 – Commercial Auto Body Shops, PCA #other). This APEC is associated with PCA 5. The potential contaminants of concern include: PHCs, metals, and VOC.

- APEC 5 – 1 Grant Street – Automotive repair shop, located 40 m south of the Phase One property (PCA #10 – Commercial Auto Body Shops). This APEC is associated with PCA 6. The potential contaminants of concern include: PHCs, metals, and VOC.

It is noted that any significant uncertainty or absence of information has the ability to affect the Phase Two Conceptual Site Model. However, based on the information and findings presented within the Phase Two 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 Site is relatively flat. Beneath any fill, the surficial geology of the Phase Two property is characterised by coarse textured deposits of likely less than 1 m thickness. The bedrock geology underlying the Phase One property consists of limestone with minor shale of the Bobcaygeon Formation.

3.4.5 Estimated Groundwater Flow Direction

Topographically, the Phase Two property is relatively flat. The inferred local groundwater flow direction is toward the north based on topography in the area. The Ottawa River is approximately 1 km north from the Phase Two property.

3.4.6 Underground Utilities

The Phase Two property is connected to the municipal water and sewage systems, the natural gas distribution network, and overhead Hydro/telephone/cable lines.

3.5 Deviations from Sampling and Analysis Plan

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

3.6 Impediments

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

4 Investigation Method

4.1 General

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

4.2 Borehole Drilling and Excavating

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

On June 11 and August 30, and September 3, 2019, a total of 8 boreholes (BH-1 to MW-8) were advanced at the Phase Two property by Marathon Drilling, a licensed well contractor, under the full-time supervision of EXP staff. A truck mounted CME drill rig with split spoon samplers was used to collect the soil samples. The locations of the boreholes and monitoring wells are presented on Figure 4 in Appendix B.

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

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

4.3 Soil Sampling

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

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

Soil samples identified for possible laboratory analysis were collected from the split spoon sampler and placed directly into pre-cleaned, laboratory-supplied glass sample jars/vials. Samples to be analysed for 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, Bureau Veritas Ltd. (BVL) 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

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

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

A portion of each soil sample collected from the boreholes was placed in a sealed “zip-lock” plastic bag and allowed to reach ambient temperature prior to field screening using an RKI Eagle combustible vapour meter, calibrated to hexane. The samples are left to equilibrate within the bag at a temperature above 15^{o}C for thirty minutes before measurement of the peak headspace concentration is taken. The 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 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 contamination and the selection of soil samples for analysis. The field screening measurements, in ppmv hexane equivalents, are presented with the borehole logs provided in Appendix C.

4.5 Soil Sample Submission

Soil samples were selected for laboratory analysis based on combustible vapour measurements and visual and olfactory evidence of impacts, where observed. One worst case soil sample from each borehole was submitted for laboratory analysis of metals, PAH, PHC, and BTEX.

4.6 Groundwater Monitoring Well Installation

Groundwater monitoring wells were installed in MW-6 to MW-8 and standpipes were installed in BH-1 and BH-4 by Marathon Drilling. The monitoring wells were installed in general accordance with the Ontario Water Resources Act - R.R.O. 1990, Regulation 903 (as-amended).

The monitoring wells consisted of a 3.0 m length of 37 mm diameter Schedule 40 PVC screen and an appropriate length of PVC riser pipe. The standpipes consisted o 19 mm diameter piping with a 1.5 m long hand slotted screen. 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)
BH-1	64.76	62.4	62.1	60.6	60.6	4.2
BH-4	64.43	60.7	60.4	58.9	58.9	5.5
MW-6	64.08	61.3	61.0	58.0	58.0	6.1
MW-7	64.54	62.0	61.7	58.7	58.7	4.1
MW-8	64.33	72.1	61.8	58.8	58.5	5.8

Note: Elevations were collected using a high precision GPS unit and a geodetic datum was established at the Phase Two Property.
mbgs – metres below ground surface
MASL metres above mean sea level

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 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. The meter was calibrated by Pine Environmental Limited prior to the fieldwork using standard pH and conductivity solution.

4.8 Groundwater: Sampling

Groundwater samples were collected from the monitoring wells on September 19, 2019. The monitoring activities consisted of measuring the depth to groundwater in each monitoring well so that groundwater flow

and direction below the Phase Two Property could be assessed. The water level measurements were recorded on water level log sheets. The water level meter probe was decontaminated between monitoring well locations with a spray bottle of water and alconox solution, paper towel, then potable water.

The well was then sampled using a “low flow” technique whereby the well was continuously purged using an electric pump (equipped with dedicated tubing) and parameters within the purged water were monitored using a groundwater chemistry multi-meter probe (YSI 550) at 3-minute intervals. These parameters include: pH, conductivity, temperature, and salinity. Once these parameters were found to deviate less than 10% over three testing events, equilibrium was deemed to have occurred and a sample of the groundwater was collected. The samples submitted for metals analysis were filtered in the field using an in-line 0.45 µm filter.

The purge water was also continuously monitored for visual and olfactory evidence of petroleum and solvent impact (sheen and odour). The groundwater sampling during the completion of this Phase Two ESA was undertaken in accordance with the Sampling and Analysis Plan presented in Appendix A.

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

4.9 Sediment: Sampling

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

4.10 Analytical Testing

The contracted laboratory selected to perform chemical analysis on all soil and water samples was Bureau Veritas Ltd. BVL 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. The geodetic reference was provided by the City of Ottawa GeoOttawa website.

4.12 Residue Management

The minor amount of drill cuttings was placed in steel drums at the Phase Two property.

Purge water was also stored in a steel drum at the Phase Two property.

4.13 Quality Assurance and Quality Control Measures

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

intended quality objectives. The QA/QC program implemented by EXP incorporated the following components:

- Collection and analysis of blind duplicate soil and groundwater samples to ensure analytical precision;
- Using dedicated and/or disposal sampling equipment;
- Using a trip blank for VOC during groundwater 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.

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

5 Review and Evaluation

5.1 Geology

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

5.1.1 Fill Material

A 35 mm layer of asphalt was observed in BH5 and MW-6. A 75 mm to 350 cm layer of granular fill was observed at the ground surface of several boreholes. Sand and gravel fill material was observed under the asphalt and granular fill to a maximum depth of 1.2 m. A layer of medium sand was observed below the sand and gravel fill in BH-4 at a depth of 0.8 m to 1.2 m. No petroleum odours were identified in the fill material.

5.1.2 Native Material

No native soil was observed in the boreholes. There was no groundwater observed in the shallow overburden. Therefore, it was assumed that the site is considered to be coarse grained because the water table was found within the bedrock.

5.1.3 Bedrock

Limestone bedrock was encountered from 0.4 m to 1.2 m bgs.

5.2 Aquifers

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

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

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

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

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

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

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

5.3 Groundwater Elevations and Flow Direction

The monitoring well network advanced as part of this Phase Two ESA consists of four monitoring wells (BH-1, BH-4, MW6, MW7 and MW8) screened within the limestone bedrock at the Phase Two property. BH-1 is a standpipe screened within the limestone bedrock.

Groundwater elevations and water levels were measured at the Phase Two property on September 19, 2019. Groundwater was encountered at a depth of 4.67 m bgs in BH-4 to 5.66 m bgs in MW-7. 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)	September 19, 2019	
		Water Level (mbg)	Water Level (MASL)
BH-1	64.76	Dry (<4.18)	<60.58
BH-4	64.43	4.67	59.76
MW-6	64.08	5.65	58.43
MW-7	64.54	5.66	58.88
MW-8	64.33	4.72	59.61

Note: Elevations were referenced using a high precision GPS unit and a geodetic datum was established at the Phase Two Property.
MASL – metres above sea level
mbg – metres below ground

Based on the groundwater elevations from September 19, 2019, the groundwater flow direction is to the northwest as shown on Figure 5 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

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 gradients for the groundwater flow components identified in the bedrock aquifer (i.e. northwest flow) based on the September 2019 groundwater elevations was 0.044.

5.5 Single Well Response Tests (SWRTs) Analysis

Single well response tests were conducted on BH-4 and MW-8 as a part of this Phase Two ESA. The calculated hydraulic conductivity of the limestone bedrock in BH-4 was 3.8×10^{-8} m/s.

5.6 Groundwater: Hydraulic Conductivity

The horizontal hydraulic conductivity in the overburden unit was estimated from the analysis of the soil types observed during the drilling activities and from a review of the grain size analysis. The majority of the native soils consisted of sand and gravel fill overlying limestone bedrock. The water table was found within the limestone bedrock approximately 4.5 m from ground surface. Based on estimates provided by *Freeze and Cherry (1979),* the approximate horizontal hydraulic conductivity for limestone bedrock ranges from 10^{-6} m/s to 10^{-9} m/s. Since the calculated hydraulic conductivity of the limestone at the site was much higher than this range, it indicates that the shale at the site is likely fractured.

5.7 Soil Texture

Three soil samples were submitted for grain size analysis. The results showed that the soil/fill at the site would be considered coarse textured. The grain size analyses are presented in Appendix B.

5.8 Soil: Field Screening

Field screening involved using the combustible vapour meter to measure vapour concentrations, in parts per million volume (ppmv) hexane equivalent, in the collected soil samples in order to assess the presence of soil gases which would imply potential petroleum hydrocarbon impact. The vapour readings obtained during the drilling activities are presented on the borehole logs in Appendix D. As indicated, vapour readings ranged from 0 ppmv to 15 ppmv.

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. Two soil sample from BH-1 was submitted for pH analysis with results of 8.6. The pH value is within the acceptable range for the application of MECP Table 7 SCS.

5.9.1 Petroleum Hydrocarbons

Six (6) soil samples and a blind duplicate were submitted for PHC and BTEX analyses. The concentrations of PHC and BTEX measured in the analysed soil samples were less than the MECP 2011 Table 7 SCS, with the exception of PHC F3 in the soil sample from BH1 and PHC F2 and F4 in the soil sample from MW-7 and its blind duplicate, as shown in Table 1 in Appendix D. The area of PHC impact to soil is shown on Figure 6 and on cross-sections shown on Figures 9A and 10A.

5.9.2 Metals

Six (6) soil samples and a blind duplicate were submitted for metals analyses. The concentrations of metals measured in the analysed soil samples were less than the MECP 2011 Table 7 SCS, with the exception of lead in the soil samples from BH-2, BH-3, and MW-8 and antimony, cadmium and lead in the soil sample from MW-7 and/or its blind duplicate, as shown in Table 2 in Appendix D. The area of metals impact to soil is shown on Figure 7 and on cross-sections shown on Figures 9B and 10B.

5.9.3 Polycyclic Aromatic Hydrocarbons

Six (6) soil samples and a blind duplicate were submitted for PAH analyses. As shown in Table 3 in Appendix D, the concentrations of PAH measured in the analysed soil samples were less than the MECP 2011 Table 7 SCS, with the exception of benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, fluoranthene, and indeno[1,2,3-cd]pyrene in the soil sample from BH-3. The area of PAH impact to soil is shown on Figure 9 and on the cross-section shown on Figures 9C and 10C.

5.9.4 Chemical Transformation and Soil Contaminant Sources

There are one or more soil samples located in the fill material above the limestone bedrock that had one or more MECP Table 7 SCS exceedances of PHC F3, PHC F4, several PAHs, antimony, cadmium and lead. The maximum soil concentrations measured at the Phase Two property are presented in Table 4. Chemical transformations are a concern at the Phase Two property. However, based on the obtained results, soils are not expected to be acting as a contaminant mass that could impact the Site's groundwater since the contaminants are not very mobile.

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 Two property. Evidence of free phase product (i.e. visible film or sheen), and odour was not noted during well development or purging.

The groundwater analytical results are summarized on Tables 5 and 6 in Appendix D and the Certificates of Analysis are enclosed in Appendix E.

5.10.1 Petroleum Hydrocarbons

Four (4) groundwater samples 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 the groundwater samples were non-detect and below the MECP Table 7 SCS.

5.10.2 Volatile Organic Compounds

Four (4) groundwater samples and a blind duplicate and a trip blank were submitted for the chemical analysis of volatile organic compounds (VOC). As shown in Table 6 in Appendix D, the concentrations of VOC parameters in the groundwater sample were below the MECP Table 7 SCS.

5.10.3 Chemical Transformation and Contaminant Sources

There were no exceedances of the MECP Table 7 SCS in the groundwater samples. The maximum groundwater concentrations measured at the Phase Two property are presented in Table 7.

5.10.4 Evidence of Non-Aqueous Phase Liquid

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

5.11 Sediment Quality

As there were no water bodies on the Phase Two 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 Two property. QA/QC measures, as described in Section 4.13, included:

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

Review of field activity documentation indicated that recommended sample volumes were collected from groundwater for each analytical test group into appropriate containers and preserved with proper chemical reagents in accordance with the protocols set out in the *Protocol for Analytical Methods used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act* (MOE, 2004). Samples were

preserved at the required temperatures in insulated coolers and met applicable holding time requirements, when relinquished to the receiving laboratory. Where the concentrations of the analyzed representative soil sample and/or the duplicate were not greater than five times the laboratory MDL, RPDs could not be calculated. The results of the analyses where the concentrations were at least five times the laboratory MDL compared to the duplicate sample concentrations were within an acceptable degree of variance. The RPD results are found in Tables 10 to 16 in Appendix D. Since laboratory duplicate measures laboratory precision while field duplicates measures laboratory and field precision, alert limits for field duplicates are two times the laboratory RPD.

Duplicate soil sample pair MW-7 SS1 and its duplicate dupe were submitted for chemical analysis of BTEX, PHC, metals and PAH. 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 RPD for PHC, metals and PAH were less that the alert limits and therefore the soil data is acceptable from a RPD perspective.

Duplicate groundwater sample pair BH-4 and its duplicate MW-101 were submitted for chemical analysis of VOC and PHC. The concentrations of VOC and PHC were less than the laboratory reported detection limits for both the primary and duplicate samples. The RPDs for metals were less than the alert limits and therefore the data is acceptable from a RPD perspective.

Certificates of Analysis were received from BVL 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.

6 Phase Two Conceptual Site Model

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

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

6.1 Site Identification Information

The Phase One property is located within a residential neighbourhood on the north side of Armstrong Street and west side of Carruthers Avenue. The property at 177 Armstrong Street has a vacant residential building and a vacant commercial building. The residential building at 268 Carruthers Avenue was unoccupied. The Phase One property has an area of 0.12 hectares. The Phase Two property is located within a municipally serviced area of the City of Ottawa. At the time of the investigation, the Phase Two property was owned by McCormick Park Developments Inc.

Refer to the following table for the Phase Two property identification information.

Civic Address	177 Armstrong Street and 268 Carruthers Avenue, Ottawa, ON
Current Land Use	Residential and Commercial
Proposed Land Use	Residential
Legal Description	PLAN 83 PT LOTS 4 5 & 6 PLAN;109 N PT LOT 1 ARMSTRONG N; and PLAN 83 N PT LOT 6;CARRUTHERS W., City of Ottawa
Property Identification Number	040940154 and 040940153
UTM Coordinates	443042.55 m E, 5027976.66 m N
Phase One Property Area	0.12 ha
Property Owner	McCormick Park Developments Inc.
Owner Contact	Mr. Jean Desjardins
Owner Address	P.O. Box 74155 Beechwood Avenue, Ottawa, ON

6.2 Physical Site Description

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

The Phase Two property is located in a residential area of Ottawa where potable water is supplied by the City of Ottawa and therefore the MECP Table 7 Site Condition Standards (SCS) are applied to the Phase

Two property. The City of Ottawa obtains its water from the Ottawa River, located approximately 1.0 km northwest of the Phase Two property.

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

Based on the Phase Two ESA investigation, the Phase Two property is a shallow soil property as defined in Section 43.1 of the regulation.

6.3 Geological and Hydrogeological Setting

Based on the Phase Two ESA, A 35 mm layer of asphalt was observed in BH5 and MW-6. A 75 mm to 350 cm layer of granular fill was observed at the ground surface of several boreholes. Sand and gravel fill material was observed under the asphalt and granular fill to a maximum depth of 1.2 m. A layer of medium sand was observed below the sand and gravel fill in BH-4 at a depth of 0.8 m to 1.2 m. No petroleum odours were identified in the fill material. No native soil was observed in the boreholes.

There was no groundwater observed in the shallow overburden. Therefore, it was assumed that the site is considered to be coarse grained because the water table was found within the bedrock.

The Phase Two property stratigraphy characteristics are summarized in Table 6.1.

Table 6.1: Site Geological Characteristics

Stratigraphy	Details	Minimum Depth Observed (m bgs)	Maximum Depth Observed (m bgs)	Approximate Elevation Range (m ASL)
Surface	Asphalt / Concrete / Topsoil	0	0.1	64.08
	Fill Material – Gravel/Crushed Stone	0.0	0.35	64.8 to 63.7
Overburden	Silty Sand and Gravel Fill	0.2	1.2	64.7 to 63.2
Bedrock	Limestone	0.4	1.2	63.2 to 63.6

The geology of the Phase Two property is illustrated on the cross-sections (Figures 9A to 10C).

Limestone bedrock was encountered from 0.4 m to 1.2 m bgs. Groundwater was encountered at a depth of 4.18 m bgs in BH-1 to 5.66 m bgs in MW-7. No petroleum sheens were observed in the monitoring wells during the sampling event.

Topographically, the Phase One property is relatively flat. The surrounding area has a slope down towards the north. Regional groundwater flow direction is inferred to be in the northerly direction towards the Ottawa River, found approximately 1 km to the north of the Phase One property. Based on the groundwater elevations, the groundwater flow direction is to the north.

Refer to Table 6.2 for the Phase Two property hydrogeology characteristics based on groundwater monitoring observations.

Table 6.2: Site Hydrogeology Characteristics

Location	Observations
Depth to Groundwater	4.67 m to 5.66 m bgs
Groundwater Elevation	58.43 m AMSL to 59.76 m AMSL
Direction of Groundwater Flow	Northwest
Hydraulic Conductivity (1)	3.8 x 10-8 m/s.
Horizontal Hydraulic Gradient	0.044 m/m

m bgs = meters below ground surface; m AMSL = meters above mean sea level

(1) Based on values calculated in the Phase Two ESA (EXP, 2019)

The hydrogeology of the Phase Two property is illustrated on the groundwater contour plan (Figure 5) and are based on the most recent groundwater information collected from the Phase Two property.

6.3.3 Site Sensitivity

The Phase Two property Sensitivity classification with respect to the conditions set out under Section 41 and 43.1 of O.Reg.153/04 were evaluated to determine if the Phase Two property is sensitive, as presented in Table 6.7.

Table 6.3: Site Sensitivity

Sensitivity	Classification	Does Sensitivity Apply to Phase Two Property?
Section 41 applies if	(i) property is within an area of natural significance	No
	(ii) property includes or is adjacent to an area of natural significance or part of such an area	No
	(iii) property includes land that is within 30 m of an area of natural significance or part of such an area	No
	(iv) soil at property has a pH value for surface soil less than 5 or greater than 9	No
	(v) soil at property has a pH value for sub-surface soil less than 5 or greater than 11	No
	(vi) a qualified person is of the opinion that, given the characteristics of the property and the certifications the qualified person would be required to make in a record of Phase Two Property condition in relation to the property as specified in Schedule A, it is appropriate to apply this section to the property	No
Section 43.1 applies if	(i) property is a shallow soil property	Yes
	(ii) property includes all or part of a water body or is adjacent to a water body or includes land that is within 30 m of a water body	No

6.3.6 Land Use

Based on a review of historical aerial photographs, chain of title for the property, historical maps, and other records review, it appears that the Phase One property was first developed for use as residences between 1912 and 1928. The Phase Two property has been used for residential and various restaurant businesses since that time

The intended future land use of the Phase Two property is residential.

6.4 Subsurface Structures and Utilities

The Phase Two property is municipally serviced by underground utilities such as bell, gas, water and sewer. The groundwater flow pattern in the overburden could be influenced by buried services.

6.5 Potentially Contaminating Activities

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

- PCA 1 – 177 Armstrong Street – Above ground furnace oil storage tank in basement. (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Since this is located on the Phase One property, it is considered an APEC. APEC1.
- PCA 2 – 179 Armstrong Street – Above ground furnace oil storage tank in basement. (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Since this is located on the Phase One property, it is considered an APEC. APEC2.
- PCA 3 – 268 Carruthers Avenue – Above ground furnace oil storage tank in basement. (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Since this is located on the Phase One property, it is considered an APEC. APEC3.
- PCA 4 – 177 Armstrong Street – Fill material identified during drilling program in 2013. (PCA #30 – Importation of Fill Material of Unknown Quality). Since this is located on the Phase One property, it is considered an APEC. APEC4.
- PCA 5 – 180 Armstrong Street/1 McCormick Street – Former automotive repair shop, located 20 m to the south of the Phase One property. The site was also listed under Ontario Regulation 347 as a waste generator from 2001-2004 (PCA #10 – Commercial Auto Body Shops, PCA #other). Wastes included: paint, pigment, and coating residue. Due to the proximity to the Phase One site, and the direction of groundwater flow, this contributes to an APEC in the south part of the Phase One property. APEC 5.
- PCA 6 – 1 Grant Street – Automotive repair shop, located 40 m south of the Phase One property (PCA #10 – Commercial Auto Body Shops). Due to the proximity to the Phase One site, and the direction of groundwater flow this contributes to an APEC in the south part of the Phase One property. APEC 5.
- PCA 7 – 271 Carruthers Avenue – Automotive repair shop, located 20 m south of the Phase One property (PCA #10 – Commercial Auto Body Shops). Due to the northerly direction of groundwater flow, this is not considered an APEC.

- PCA 8 – 131 Armstrong Street – Former automotive repair shop, located 170 m to the east of the Phase One property (PCA #10 – Commercial Auto Body Shops). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 9 – 1064 Wellington Street – Former automotive repair shop and dry cleaner, located 250m east of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks, PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 10 – 1067 Wellington Street – Former automotive repair shop and dry cleaner, located 250m east of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks, PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 11 – 1069 Wellington Street – Former dry cleaner, located 250m east of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 12 – 1091 Wellington Street – Former Chinese laundry, located 145m southeast of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 13 – 1092-94, 1096 Wellington Street – Former service station located 145m to the southeast of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 14 – 1097 Wellington Street – Former dry cleaner, located 150m southeast of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 15 – 1112 Wellington Street – Former dry cleaner, located 120m southeast of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 16 – 1119 Wellington Street – Former dry cleaner, located 70m southeast of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 17 – 1120 Wellington Street – Former Chinese laundry, located 125m southeast of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 18 – 1124 Wellington Street – Former service station located 120 m to the southeast of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 19 – 1125 Wellington Street – Former dry cleaner, located 100 m southeast of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the intervening distance, this is not considered an APEC.
- PCA 20 – 1132 Wellington Street – Former service station located 110 m southeast of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on the intervening distance, this is not considered an APEC.

- PCA 21 – 1134 Wellington Street – Former automotive repair shop and Chinese laundry, located 110 m southeast of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks, PCA #37 – Operation of Dry-Cleaning Equipment). Based on the intervening distance, this is not considered an APEC.
- PCA 22– 1141/1149 Wellington Street – Former automotive repair shop and service station, located 115 m south of the Phase One property (PCA #10 – Commercial Auto Body Shops, PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on the intervening distance, this is not considered an APEC.
- PCA 23 – 1175 Wellington Street – Former service station located 170 m southwest of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on the intervening distance and northerly groundwater flow direction, this is not considered an APEC.
- PCA 24 – 300 Parkdale Avenue – Commercial printers located 215 m to the west of the Phase One property (PCA Other). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 25 – 380 Parkdale Avenue – Former dry cleaners located 215 m to the west of the Phase One property (PCA #37 – Operation of Dry-Cleaning Equipment). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.
- PCA 26 – 390 Parkdale Avenue – Former service station located 235 m to the southwest of the Phase One property (PCA #28 – Gasoline and Associated Products Stored in Fixed Tanks). Based on the assumed northerly direction of groundwater flow and the intervening distance, this is not considered an APEC.

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

6.5.1 Areas of Potential Environmental Concern / Potential Contaminants of Concern

As per Ontario Regulation 153/04 (as amended), Potential Contaminating Activity (PCA) is defined as one of the 59 industrial operations set out in Table 2 of Schedule D that occurs or has occurred on the Phase Two property or within the Phase 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)	Contaminants of Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
1. AST Fuel storage tanks in basement 177 Armstrong Street	Southwest part	#28: Gasoline and Associated Products in Fixed Tanks	PHCs and BTEX	Soil and groundwater

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activity (PCA)	Contaminants of Concern	Media Potentially Impacted (Groundwater, Soil and/or Sediment)
2. AST Fuel storage tanks in basement 179 Armstrong Street	Southeast part	#28: Gasoline and Associated Products in Fixed Tanks	PHCs and BTEX	Soil and groundwater
3. AST Fuel storage tanks in basement 268 Carruthers Avenue	Northeast part	#28: Gasoline and Associated Products in Fixed Tanks	PHCs and BTEX	Soil and groundwater
4. Fill material in gravel parking lot	Entire property	#30: Importation of Fill Material of Unknown Quality	PHCs, PAH, metals, and BTEX	Soil
5. Former and active automotive repair garages at 1 Grant Street and 180 Armstrong Street	South part	#10: Commercial Autobody Shops	PHCs, metals, and VOC	Groundwater

6.5.2 Investigation and Remediation

The Phase Two ESA was conducted to assess the soil and groundwater quality at the Phase Two property. As indicated in the APEC and PCOC Table (above), the analytical program of the Phase Two ESA included testing of soil for PHC, PAH, and metals from the boreholes and VOC, PHC and metals in the groundwater from the monitoring wells on the Phase Two property. The monitoring well locations are shown on Figure 5 in Appendix B.

6.5.3 Contaminants of Concern (COC)

Soil

Based on the results of the investigation, there are one or more soil samples located in the fill material above the limestone bedrock that had one or more MECP Table 7 SCS exceedances of PHC F3, PHC F4, several PAHs, antimony, cadmium and lead.

A variety of physical, chemical and biochemical mechanisms affect the fate and transport of the potential COCs in soil, the contribution of which is dependent on the soil conditions and the chemical/physical properties of the COCs. Relevant fate and transport mechanisms are natural attenuation mechanisms, including advection mixing, mechanical dispersion/molecular diffusion, phase partitions (i.e. sorption and volatilization), and possibly abiotic or biotic chemical reactions, which effectively reduce COC concentrations.

Concentrations of the COCs in soil will be reduced by the effects of molecular diffusion and the creation of concentration gradients. As non-volatile chemical constituents PHC, PAH and metals may undergo abiotic or biotic chemical reactions associated with the soil mineral particles and the micro-organisms present in the overburden material.

As a result of the various natural attenuation mechanisms in the soil environment, the concentrations of any COCs in soil will be reduced at the Phase Two property. The soil impacts are shown on the geologic cross sections (Figures 9A to 10C).

The estimated volume of impacted soil is approximately 1,350 m^3. This is based on an area of 30 m x 45 m x 1.0 m deep.

Groundwater

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

6.5.4 Contaminant Fate and Transport

Human Health Receptors and Exposure Pathways

The Phase Two property is used for residential and commercial purposes and is occupied by two residences and a store. The Phase Two property will be redeveloped to medium density residential in the future. The potential on-Site human receptors currently comprise residents, long-term workers, short-term workers, property visitors (adult, teen, child, toddler and infant), and construction workers. The future potential residential land use on-Site human receptors comprise residents (adult, teen, child, toddler and infant) and short-term visitors (adult, teen, child, toddler and infant).

The potential on-site exposure pathways for the construction workers are inadvertent soil ingestion, soil particulate inhalation, soil dermal contact, and ambient vapour inhalation (sourced from soil, due to potential work conducted in a trench scenario).

The potential on-site exposure pathways for the short-term (outdoor) workers are soil particulate inhalation, soil dermal contact, and inadvertent soil ingestion.

The potential on-site exposure pathways for the long-term (indoor) workers, residents and property visitors indoor air inhalation (sourced from soil).

Ecological Receptors and Exposure Pathways

The Phase Two property is comprised of developed residential and commercial lands capable of supporting some terrestrial ecological receptors. Relevant terrestrial receptors are terrestrial vegetation, such as trees, grasses and weeds; soil invertebrates, such as earthworms, millipedes and beetles; terrestrial birds, such as pigeons, sparrows and robins; and small terrestrial mammals, such as moles, voles, and mice.

The potential on-site exposure pathways for terrestrial vegetation are root uptake (soil), and stem and foliar uptake of vapours (sourced from soil).

The potential on-site exposure pathways for soil invertebrates are soil particulate inhalation, soil dermal contact, soil ingestion, and vapour inhalation (sourced from soil).

The potential on-site exposure pathways for mammals and birds are soil particulate inhalation, soil dermal contact, soil ingestion, vapour inhalation (sourced from soil), and animal tissue ingestion (as a result of biotransformation of soil).

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7 Conclusions and Recommendations

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

- On June 11 and August 30, and September 3, 2019, a total of 8 boreholes (BH-1 to MW-8) were advanced at the Phase Two property and five were instrumented with a monitoring well.
- Based on the Phase Two ESA, A 35 mm layer of asphalt was observed in BH5 and MW-6. A 75 mm to 350 cm layer of granular fill was observed at the ground surface of several boreholes. Sand and gravel fill material was observed under the asphalt and granular fill to a maximum depth of 1.2 m. A layer of medium sand was observed below the sand and gravel fill in BH-4 at a depth of 0.8 m to 1.2 m. No petroleum odours were identified in the fill material. No native soil was observed in the boreholes.
- Limestone bedrock was encountered from 0.4 m to 1.2 m bgs. Groundwater was encountered at a depth of 4.18 m bgs in BH-1 to 5.66 m bgs in MW-7. No petroleum sheens were observed in the monitoring wells during the sampling event. Based on the groundwater elevations, the groundwater flow direction is to the northwest.
- Based on the results of the investigation, there are one or more soil samples located in the fill material above the limestone bedrock that had one or more MECP Table 7 SCS exceedances of PHC F3, PHC F4, several PAHs, antimony, cadmium and lead. The estimated volume of impacted soil is approximately 1,350 m^3. This is based on an area of 30 m x 45 m x 1.0 m deep.
- All of the groundwater samples had concentrations of VOC and PHC that were less than the 2011 MECP Table 7 SCS.

It is recommended that the impacted soil be removed from the Phase Two property. If the wells are no longer needed, they should be decommissioned in accordance with Ontario Regulation 903.

8 General Limitations

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

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

The environmental investigation was completed to address the intent of applicable provincial Regulations, Guidelines, Policies, Standards, Protocols and Objectives administered by the MECP. It should also be noted that current environmental Regulations, Guidelines, Policies, Standards, Protocols and Objectives are subject to change, and such changes, when put into effect, could alter the conclusions and recommendations noted throughout this report. Achieving the study objectives stated in this report has required us to arrive at conclusions based upon the best information presently known to us. No investigative method can completely eliminate the possibility of obtaining partially imprecise or incomplete information; it can only reduce the possibility to an acceptable level. Professional judgment was exercised in gathering and analyzing the information obtained and in the formulation of the conclusions. Like all professional persons rendering advice we do not act as absolute insurers of the conclusions we reach, but we commit ourselves to care and competence in reaching those conclusions. Our undertaking at EXP, therefore, is to perform our work within limits prescribed by our clients, with the usual thoroughness and competence of the engineering profession. It is intended that the outcome of this investigation assist in reducing the client's risk associated with environmental impairment. Our work should not be considered 'risk mitigation'. No other warranty or representation, either expressed or implied, is included or intended in this report.

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

9 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.
- EXP Services Inc., September 3, 2019. *Phase One Environmental Site Assessment, 177 Armstrong Street and 268 Carruthers Avenue, Ottawa, Ontario*.
- Ministry of the Environment [MOE] (1996) Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario. Ontario Ministry of the Environment, December 1996.
- MOE (2011) Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act. Ontario Ministry of the Environment, April 15, 2011.
- MOE (2011) Guide for Completing Phase Two Environmental Site Assessments under Ontario Regulation 153/04. Ontario Ministry of the Environment, June 2011.
- MOE (2011) Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act. Ontario Ministry of the Environment, March 2004, amended as of July 1, 2011.
- Ontario Regulation 153/04, made under the Environmental Protection Act, May 2004, last amended to O.Reg.333/13.
- Ontario Water Resources Act – R.R.O. 1990, Regulation 903, amended to O.Reg. 128/03, August 2003.
- Groundwater, Freeze and Cheery 1979. Prentice Hall.
- Singer, S.N., C.K. Cheng, M.G. Scafe. 2003. Hydrogeology of Southern Ontario. Hydrogeology of Ontario Series – Report 1. Prepared for Ministry of Environment.
- WESA. 2006. Watershed Characterization: Geologic Model and Conceptual Hydrogeological Model, Raisin Region CA and South Nation Conservation, Source Protection Plan Partnership.

Tables

Table 1

Characteristic	Description
Minimum Depth to Bedrock	0.3 m
Minimum Depth to Overburden Groundwater	4.7 (Sep. 19. 2019)
Shallow Soil Property	Yes
Proximity to water body or ANSI	1 km north
Soil pH	8.6
Soil Texture	Coarse
Current Property Use	Residential/Commercial
Future Property Use	Residential
Proposed Future Building	Over entire Site
Areas where soil has been brought to the Phase One Property	Fill material brought in to act as subbase for parking lot

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 177 Armstrong Street and 268 Carruthers 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), polycyclic aromatic hydrocarbons (PAH), and/or metals. The soil sampling media is to consist of the overburden materials. The soil sampling will be location-specific to assess for the potential presence of PHC, BTEX, PAH, and metals based on the identification of potential areas of potential environmental concern identified in a Phase One ESA completed by EXP in 2019. Vapour readings will also be taken in the field to determine samples to be submitted for laboratory analysis.

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

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 eight (8) boreholes are proposed to be advanced at the site, up to a maximum overburden depth of approximately 6 m below grade, to provide for the collection of samples of the surficial and overburden materials beneath the site. The borehole locations will be selected to delineate the extent and magnitude of PCOC related impacts to the soils and the groundwater.

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

3.2 Soil Sampling

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

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

3.3 Monitoring Well Installation

It is proposed that all three boreholes will be instrumented as a groundwater monitoring well installed with slotted screens intercepting either the native overburden material or the shallow bedrock, where the water table aquifer is expected, extending to depths of approximately 6 m below grade. The monitoring ells will be constructed using 37 mm diameter, Schedule 40, PVC riser pipe and number 10 slot size (0.25 mm) well screens. The base of the well screens will be sealed with threaded flush PVC end caps. All well pipe connections will be factory machined threaded flush couplings. The annular space around the well screens will be backfilled with silica sand, to an average height of 0.3 m above the top of the screen. Granular bentonite will be placed in the borehole annulus from the top of the sand pack to approximately 0.3 m below grade. The monitoring wells will be completed with a flush-mounted protective steel casing cemented into place.

3.4 Monitoring Well Development

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

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

3.5 Groundwater Level Measurements

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

3.6 Elevation Survey

An elevation survey will be conducted to obtain vertical control of all monitoring well locations. The top of casing and ground surface elevation of each monitoring well location will be surveyed against a known geodetic benchmark, or if unavailable, against a suitable arbitrary benchmark. Elevations measured against using a 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.

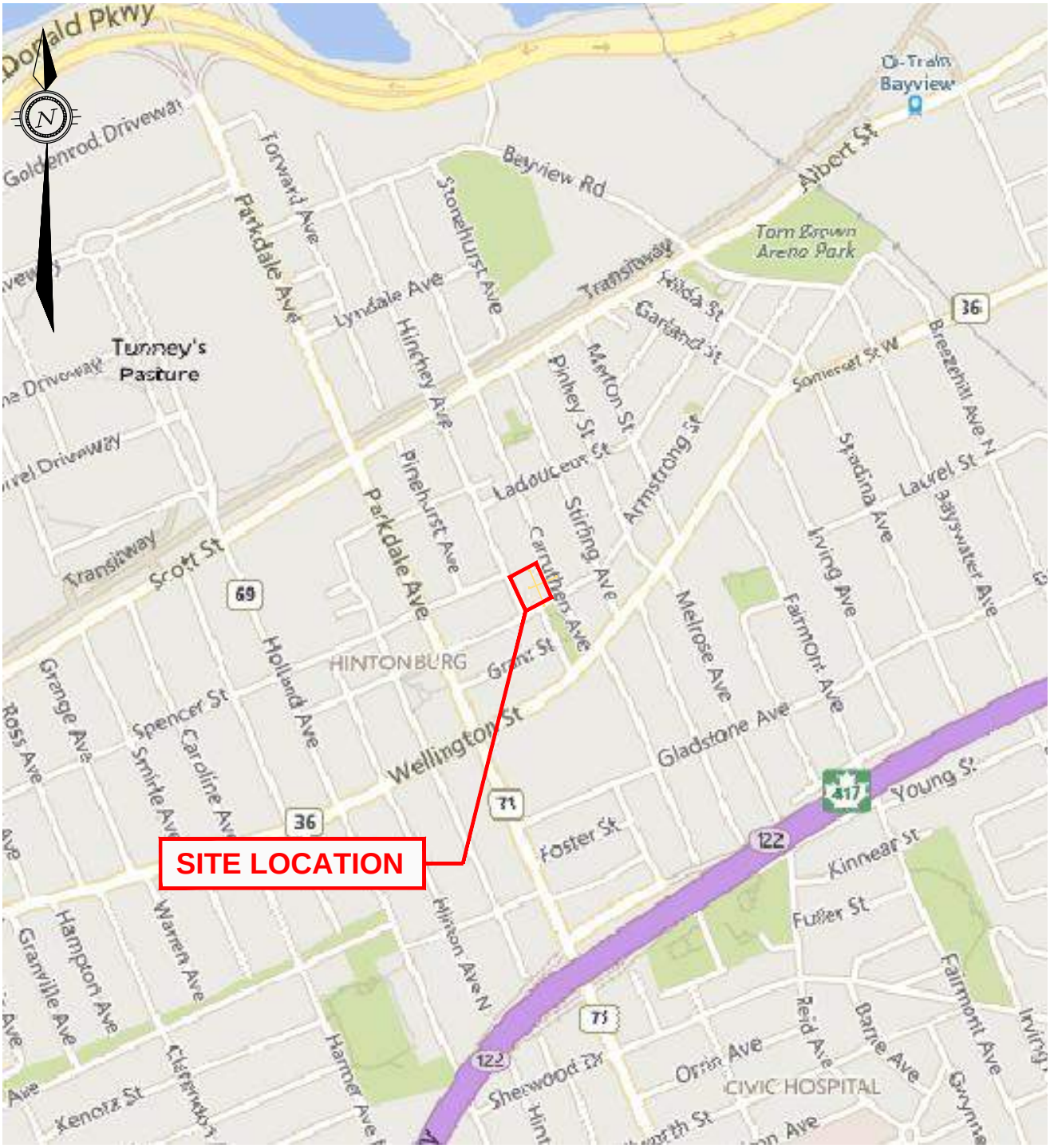
4.4 Sample Documentation

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



0 100m 200m 400m

HORIZONTAL 1:10,000

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DESIGN: M.M. / CHECKED: C.H.		scale: 1:10,000
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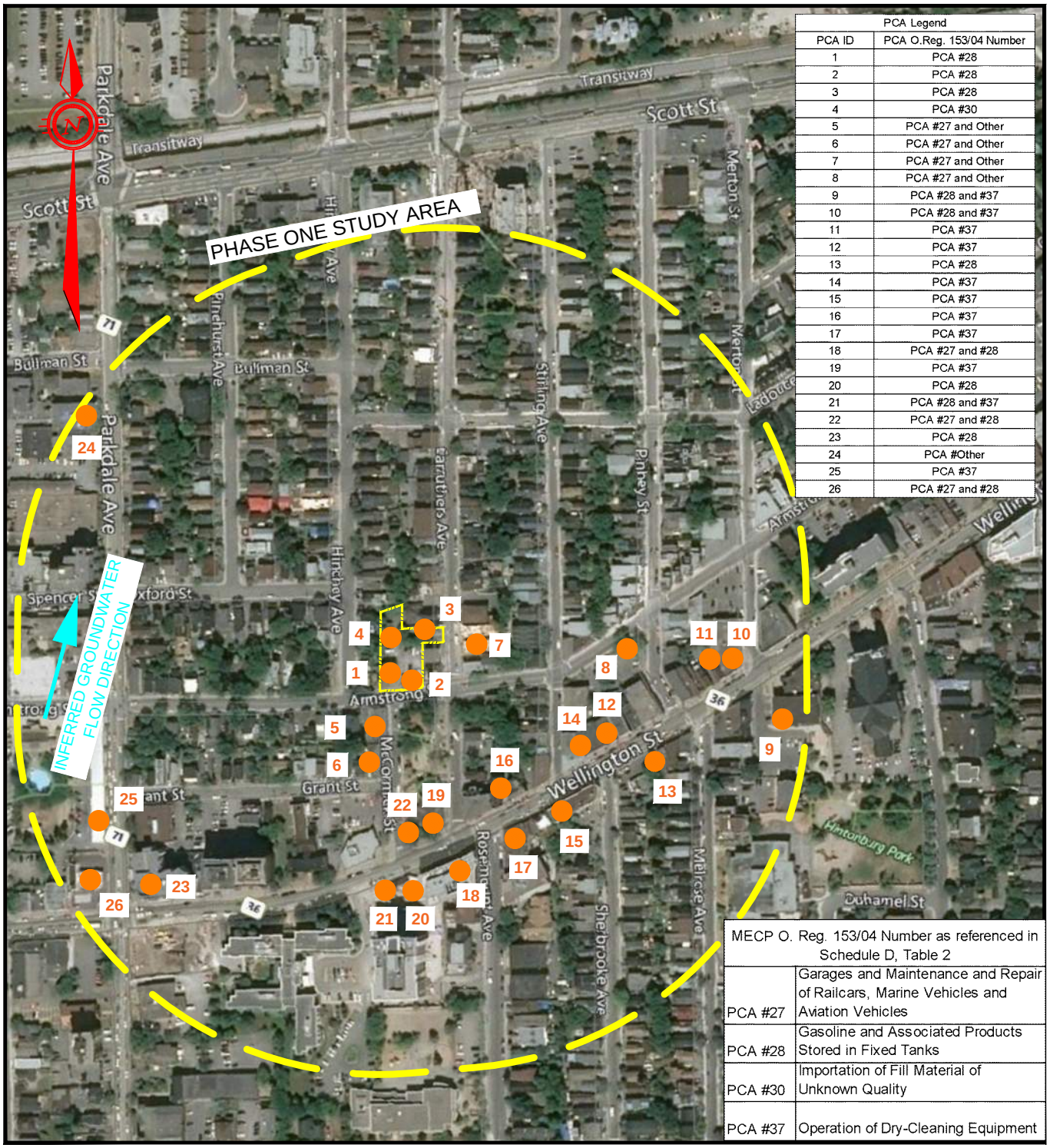

PCA Legend	
PCA ID	PCA O.Reg. 153/04 Number
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2	PCA #28
3	PCA #28
4	PCA #30
5	PCA #27 and Other
6	PCA #27 and Other
7	PCA #27 and Other
8	PCA #27 and Other
9	PCA #28 and #37
10	PCA #28 and #37
11	PCA #37
12	PCA #37
13	PCA #28
14	PCA #37
15	PCA #37
16	PCA #37
17	PCA #37
18	PCA #27 and #28
19	PCA #37
20	PCA #28
21	PCA #28 and #37
22	PCA #27 and #28
23	PCA #28
24	PCA #Other
25	PCA #37
26	PCA #27 and #28

MECP O. Reg. 153/04 Number as referenced in Schedule D, Table 2	
PCA #27	Garages and Maintenance and Repair of Railcars, Marine Vehicles and Aviation Vehicles
PCA #28	Gasoline and Associated Products Stored in Fixed Tanks
PCA #30	Importation of Fill Material of Unknown Quality
PCA #37	Operation of Dry-Cleaning Equipment

0 40m 80m 160m

HORIZONTAL 1:4000

LEGEND

- PROPERTY BOUNDARIES
- PHASE ONE ESA STUDY AREA
- PCA-1 PCA IDENTIFIER

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DESIGN: M.M. / CHECKED: C.H.	TITLE: PHASE TWO STUDY AREA AND PCAs 177 ARMSTRONG ST. & 268 CARRUTHERS AVE., OTTAWA, ON		scale 1:4000
DRAWN BY: MZG			FIG 2

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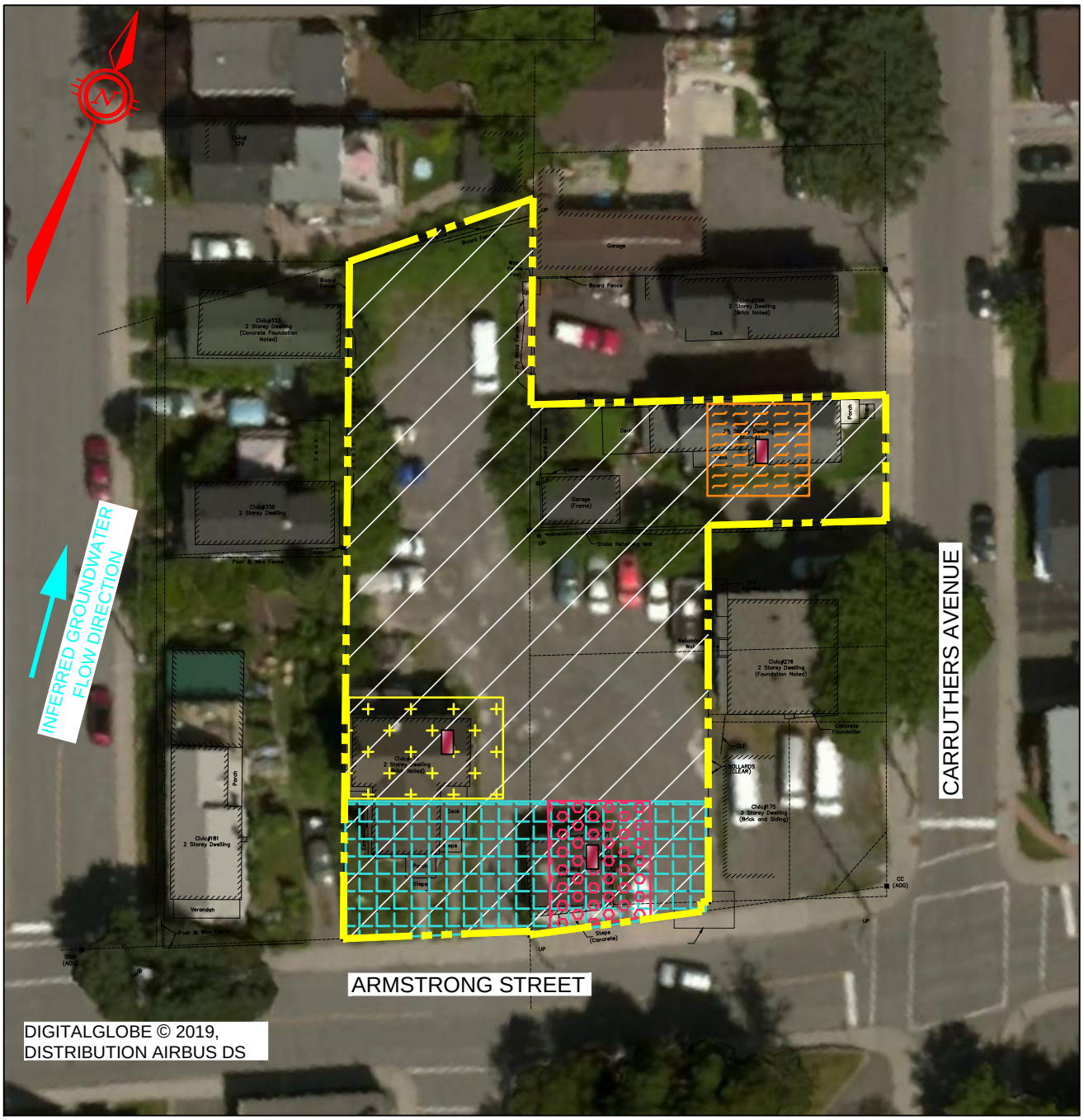

LEGEND

- FURNACE OIL AST
- APEC 1
- APEC 2
- APEC 3
- APEC 4
- APEC 5
- PROPERTY BOUNDARIES

0 5m 10m 20m

HORIZONTAL 1:500

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DESIGN: M.M. / CHECKED: C.H.	TITLE: PHASE TWO ESA - AREAS OF POTENTIAL ENVIRONMENTAL CONCERN 177 ARMSTRONG ST. & 268 CARRUTHERS AVE., OTTAWA, ON		scale 1:500
DRAWN BY: MZG			FIG 3

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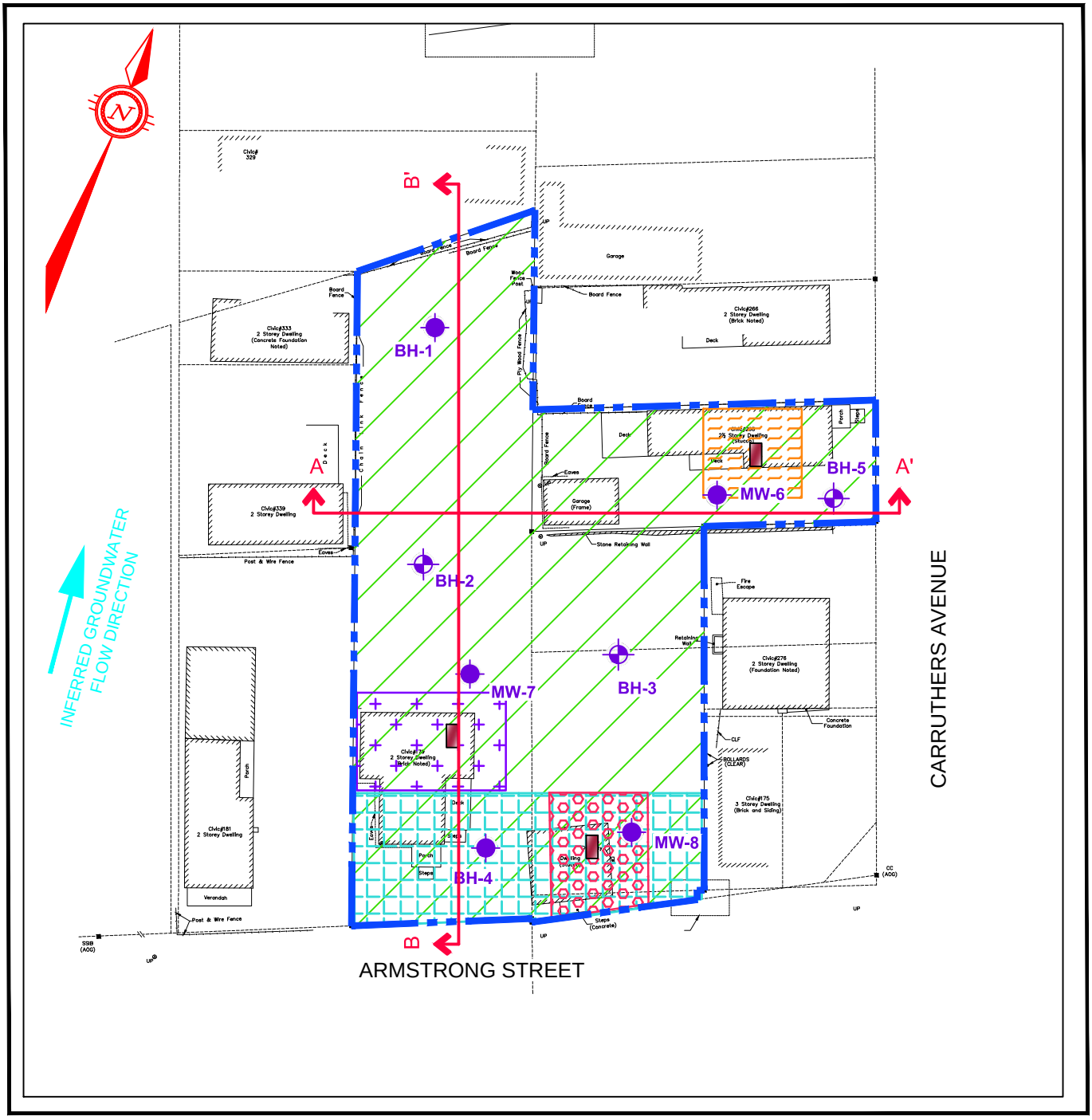

LEGEND

- FURNACE OIL AST
- APEC 1
- APEC 2
- APEC 3
- APEC 4
- APEC 5
- BH-1 — BOREHOLE NUMBER AND LOCATION
- MW-7 — MONITORING WELL / STANDPIPE NUMBER AND LOCATION
- PROPERTY BOUNDARIES

0 5m 10m 20m

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DESIGN: M.M. / CHECKED: C.H.	TITLE: PHASE TWO ESA - BOREHOLE LOCATION PLAN WITH APECS 177 ARMSTRONG ST. & 268 CARRUTHERS AVE., OTTAWA, ON	scale 1:500
DRAWN BY: MN		FIG 4

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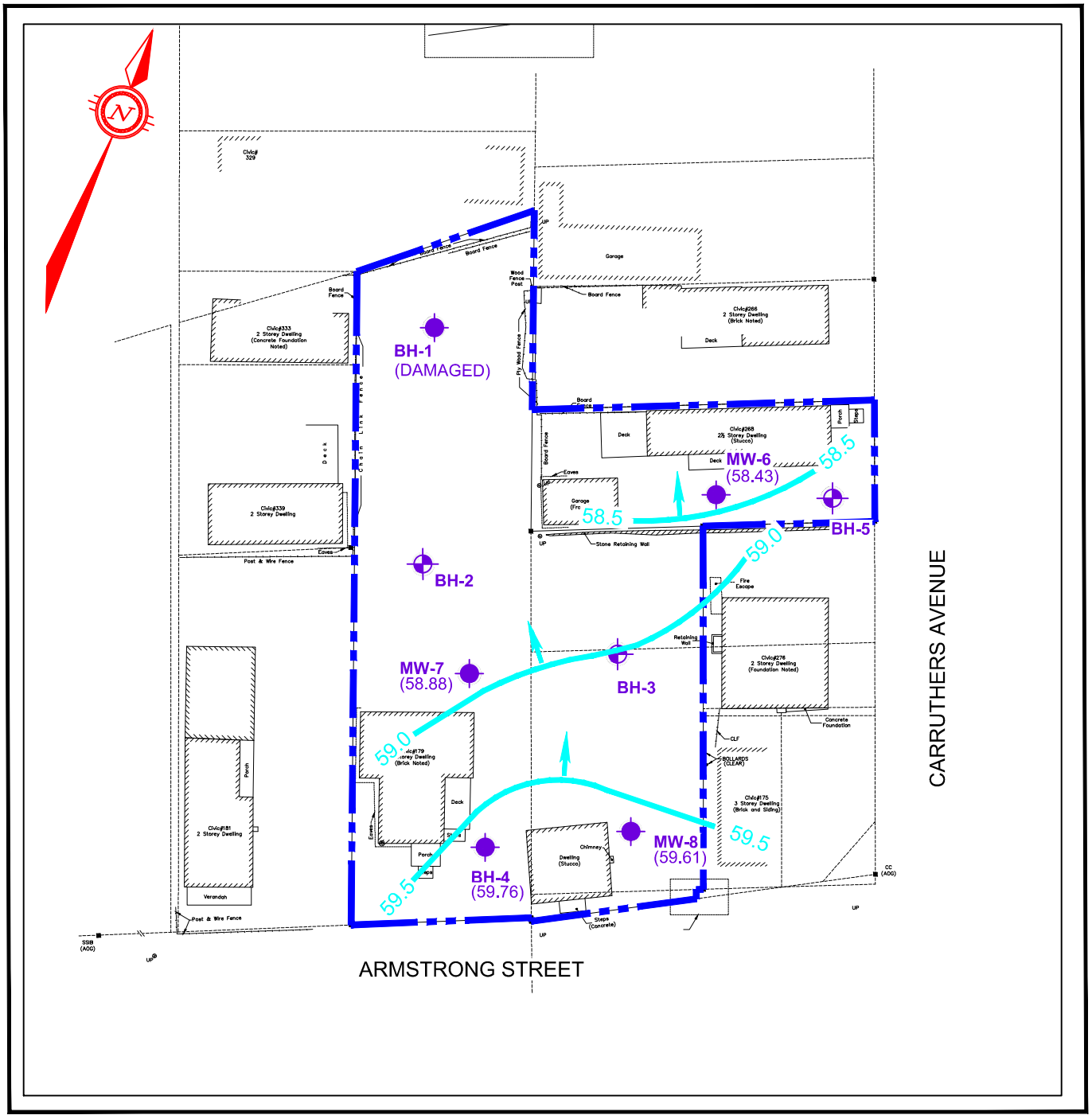

LEGEND

- BH-1 — BOREHOLE NUMBER AND LOCATION
- MW-7 — MONITORING WELL / STANDPIPE NUMBER AND LOCATION
- (58.88) — GROUNDWATER ELEVATION SEPT. 19, 2019
- PROPERTY BOUNDARIES

0 5m 10m 20m

HORIZONTAL 1:500

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DESIGN: M.M. / CHECKED: C.H.	TITLE: PHASE TWO ESA - GROUNDWATER CONTOUR PLAN 177 ARMSTRONG ST. & 268 CARRUTHERS AVE., OTTAWA, ON		scale 1:500
DRAWN BY: MN			FIG 5

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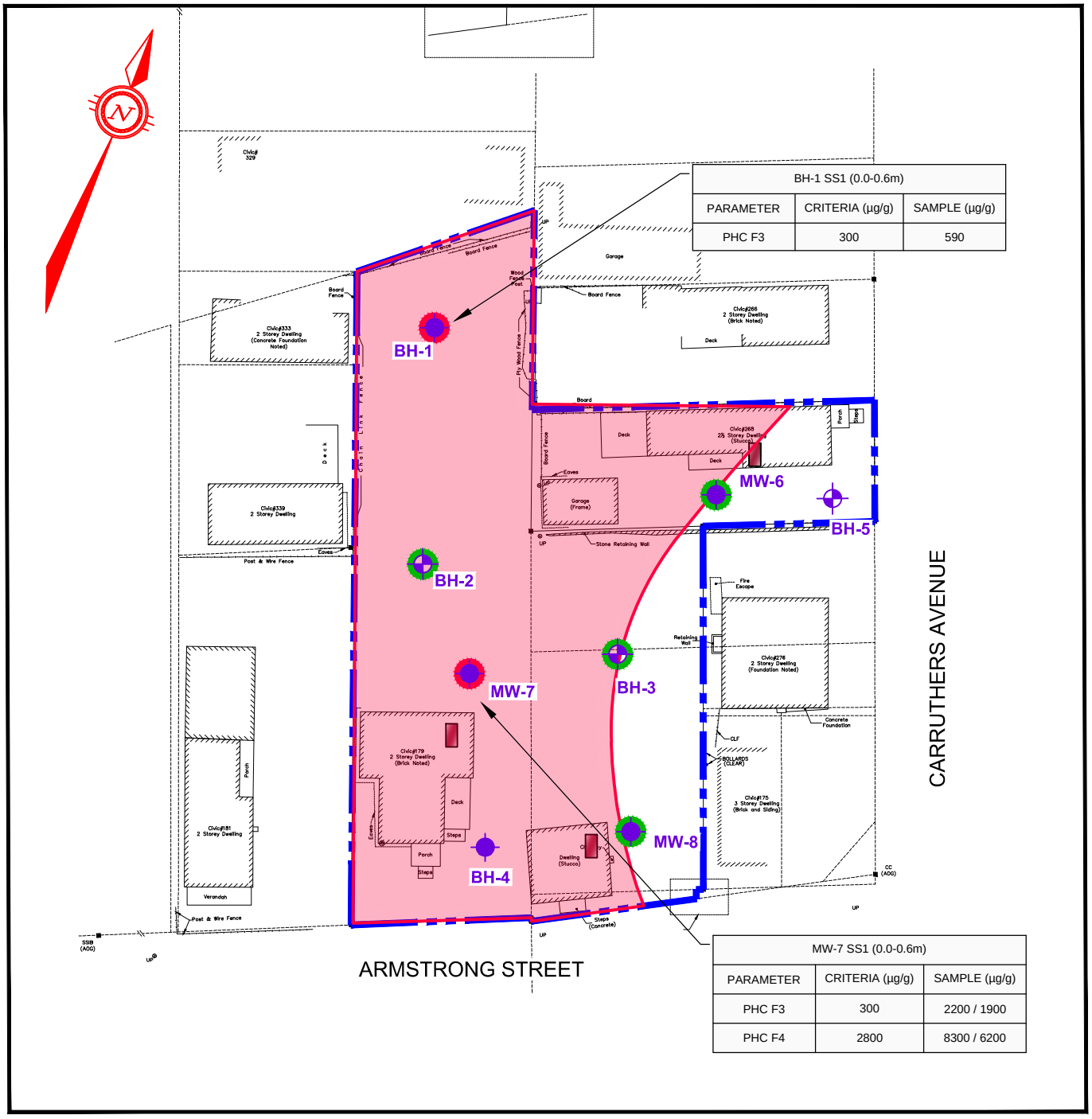

LEGEND

- BH-1 — BOREHOLE NUMBER AND LOCATION
- MW-7 — MONITORING WELL / STANDPIPE NUMBER AND LOCATION
- PROPERTY BOUNDARIES
- SOIL QUALITY MEETS MECP TABLE 7 SCS
- SOIL QUALITY EXCEEDS MECP TABLE 7 SCS
- ESTIMATED AREA OF PHC IMPACTED SOIL

0 5m 10m 20m

HORIZONTAL 1:500

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DRAWN BY: MN		FIG 6

Filename: p:\projects\environmental\250000s\252000\252997 phase one esa 177-179 armstrong\figures\phase 2\252997- fig 6.dwg
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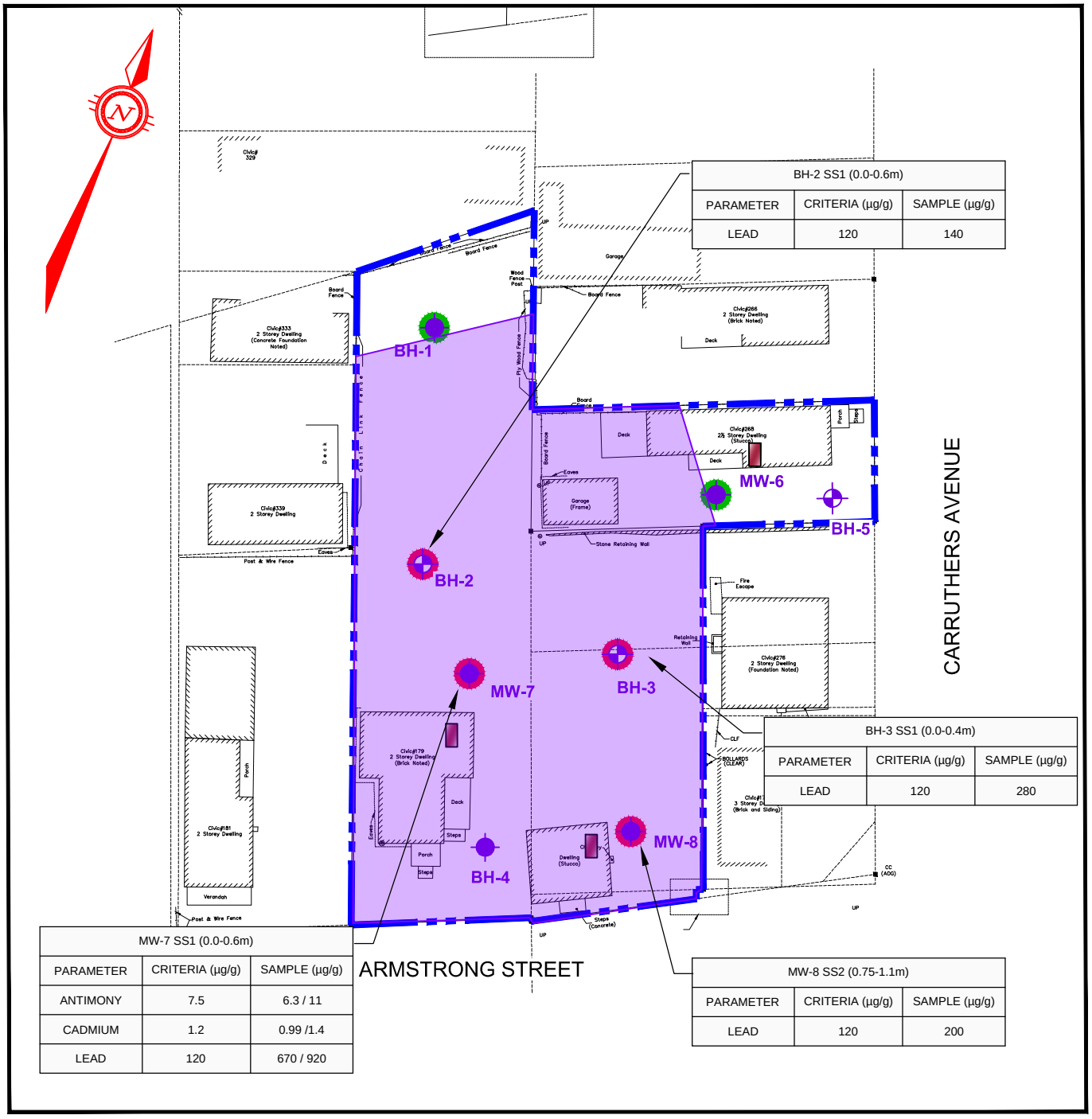

BH-2 SS1 (0.0-0.6m)		
PARAMETER	CRITERIA (µg/g)	SAMPLE (µg/g)
LEAD	120	140

BH-3 SS1 (0.0-0.4m)		
PARAMETER	CRITERIA (µg/g)	SAMPLE (µg/g)
LEAD	120	280

MW-7 SS1 (0.0-0.6m)		
PARAMETER	CRITERIA (µg/g)	SAMPLE (µg/g)
ANTIMONY	7.5	6.3 / 11
CADMIUM	1.2	0.99 /1.4
LEAD	120	670 / 920

MW-8 SS2 (0.75-1.1m)		
PARAMETER	CRITERIA (µg/g)	SAMPLE (µg/g)
LEAD	120	200

LEGEND

BH-1 BOREHOLE NUMBER AND LOCATION

MW-7 MONITORING WELL / STANDPIPE NUMBER AND LOCATION

PROPERTY BOUNDARIES

SOIL QUALITY MEETS MECP TABLE 7 SCS

SOIL QUALITY EXCEEDS MECP TABLE 7 SCS

ESTIMATED AREA OF METALS IMPACTED SOIL

0 5m 10m 20m

HORIZONTAL 1:500

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DESIGN: M.M. / CHECKED: C.H.	TITLE: PHASE TWO ESA - METALS IMPACTS IN SOIL 177 ARMSTRONG ST. & 268 CARRUTHERS AVE., OTTAWA, ON	scale 1:500
DRAWN BY: MN		FIG 7

Filename: p:\projects\environmental\250000s\252000\252997 phase one esa 177-179 armstrong\figures\phase 2\252997- fig 7.dwg
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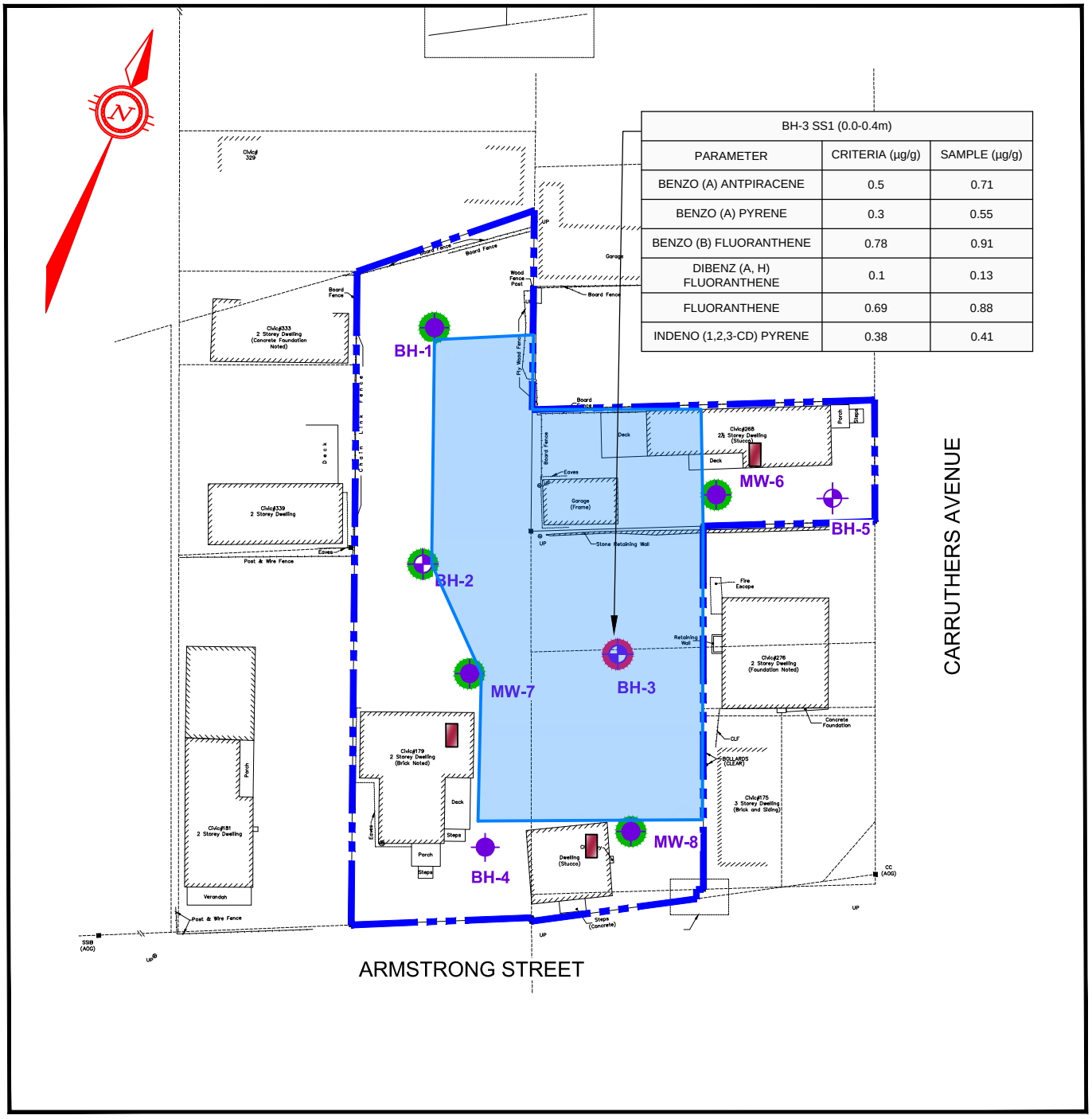
BH-3 SS1 (0.0-0.4m)		
PARAMETER	CRITERIA (µg/g)	SAMPLE (µg/g)
BENZO (A) ANTPIRACENE	0.5	0.71
BENZO (A) PYRENE	0.3	0.55
BENZO (B) FLUORANTHENE	0.78	0.91
DIBENZ (A, H) FLUORANTHENE	0.1	0.13
FLUORANTHENE	0.69	0.88
INDENO (1,2,3-CD) PYRENE	0.38	0.41



LEGEND

- BH-1 — BOREHOLE NUMBER AND LOCATION
- MW-7 — MONITORING WELL / STANDPIPE NUMBER AND LOCATION
- PROPERTY BOUNDARIES
- SOIL QUALITY MEETS MECP TABLE 7 SCS
- SOIL QUALITY EXCEEDS MECP TABLE 7 SCS
- ESTIMATED AREA OF PAH IMPACTED SOIL

0 5m 10m 20m

HORIZONTAL 1:500

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DESIGN: M.M. / CHECKED: C.H.	TITLE: PHASE TWO ESA - PAH IMPACTS IN SOIL 177 ARMSTRONG ST. & 268 CARRUTHERS AVE., OTTAWA, ON	scale 1:500
DRAWN BY: MN		FIG 8

Filename: p:\projects\environmental\250000s\252000\252997 phase one esa 177-179 armstrong\figures\phase 2\252997- fig 8.dwg
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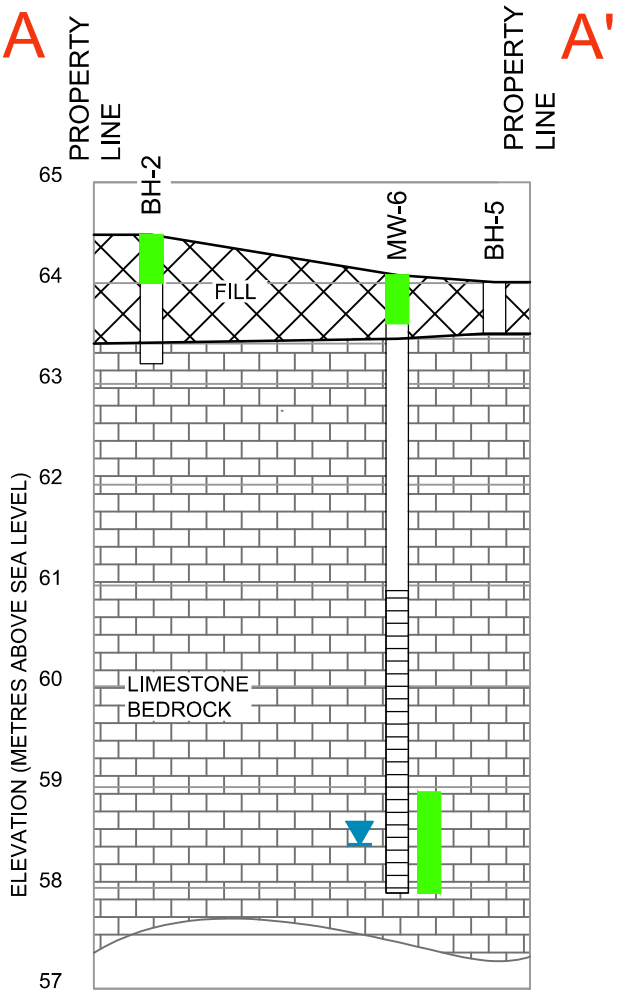


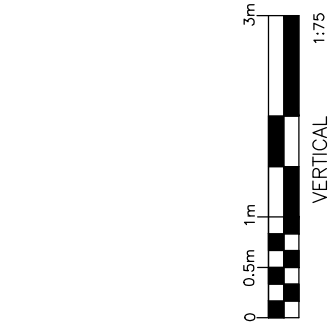
LEGEND

GROUNDWATER LEVEL SEPTEMBER 19, 2019

SOIL QUALITY MEETS MECP TABLE 7 SCS

SOIL QUALITY EXCEEDS MECP TABLE 7 SCS

ESTIMATED AREA OF PHC IMPACTED SOIL



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DATE: SEPT. 2019	CLIENT: Mc CORMICK PARK DEVELOPENTS INC. 177 ARMSTRONG ST. & 268 CARRUTHERS AVE., OTTAWA, ON	project no. OTT-00252997-B0
DESIGN: M.M. / CHECKED: C.H.		scale: HORZ. 1:750 VERT. 1:75
DRAWN BY: M.N.	TITLE: CROSS-SECTION A-A' PRE EXCAVATION WITH PHC IMPACTS IN SOIL	FIG 9A

Filename: p:\projects\environmental\250000s\252000\252997 phase one esa 177-179 armstrong\figures\phase 2\252997- figs 10 -.dwg
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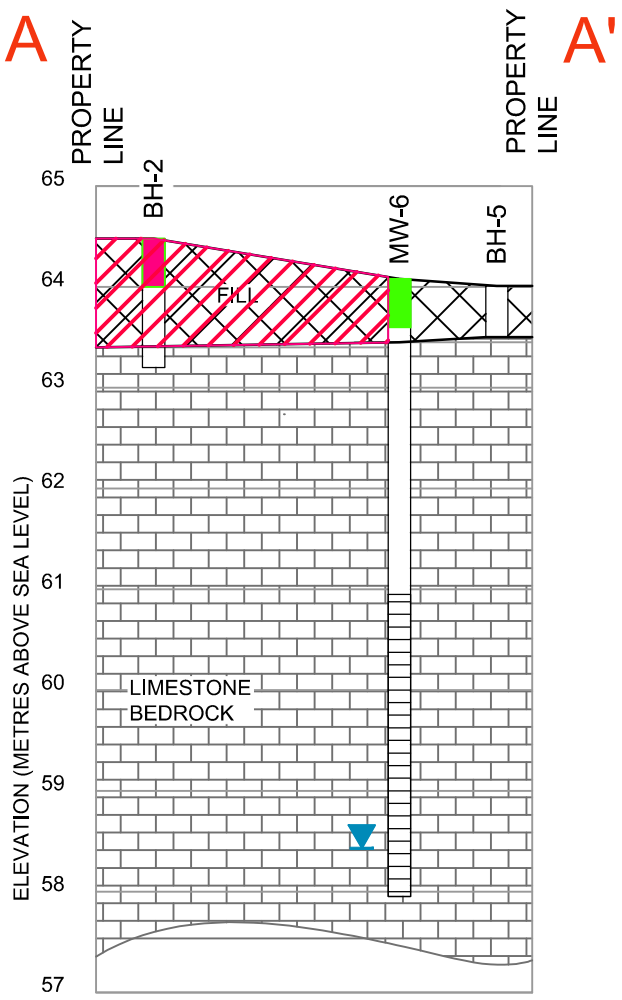
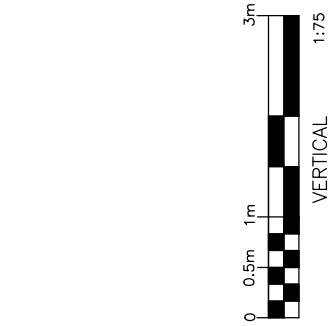
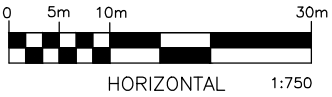


LEGEND

- GROUNDWATER LEVEL SEPTEMBER 19, 2019
- SOIL QUALITY MEETS MECP TABLE 7 SCS
- SOIL QUALITY EXCEEDS MECP TABLE 7 SCS
- ESTIMATED AREA OF METALS IMPACTED SOIL





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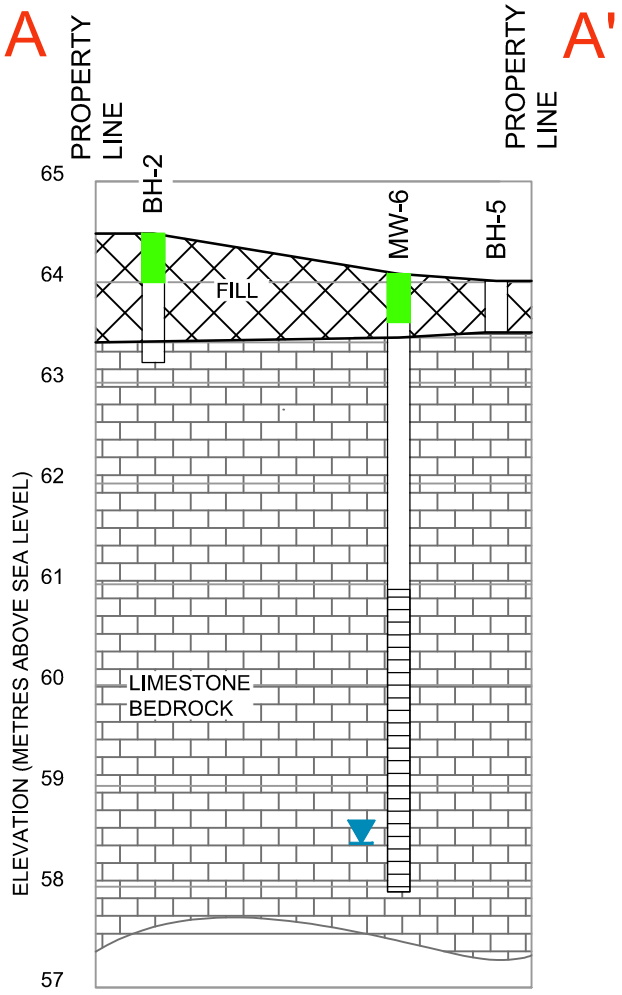
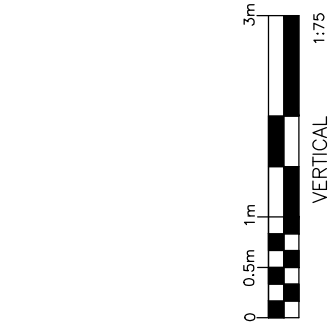
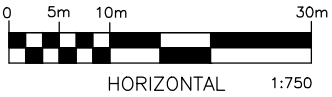
DATE: SEPT. 2019	CLIENT: Mc CORMICK PARK DEVELOPENTS INC. 177 ARMSTRONG ST. & 268 CARRUTHERS AVE., OTTAWA, ON	project no. OTT-00252997-B0
DESIGN: M.M. / CHECKED: C.H.		scale: HORZ. 1:750 VERT. 1:75
DRAWN BY: M.N.	TITLE: CROSS-SECTION A-A' PRE EXCAVATION WITH METALS IMPACTS IN SOIL	FIG 9B



LEGEND

- GROUNDWATER LEVEL SEPTEMBER 19, 2019
- SOIL QUALITY MEETS MECP TABLE 7 SCS
- SOIL QUALITY EXCEEDS MECP TABLE 7 SCS
- ESTIMATED AREA OF PAH IMPACTED SOIL





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DESIGN: M.M. / CHECKED: C.H.		scale: HORZ. 1:750 VERT. 1:75
DRAWN BY: M.N.	TITLE: CROSS-SECTION A-A' PRE EXCAVATION WITH PAH IMPACTS IN SOIL	FIG 9C

Filename: p:\projects\environmental\250000s\252000\252997 phase one esa 177-179 armstrong\figures\phase 2\252997- figs 10 -.dwg
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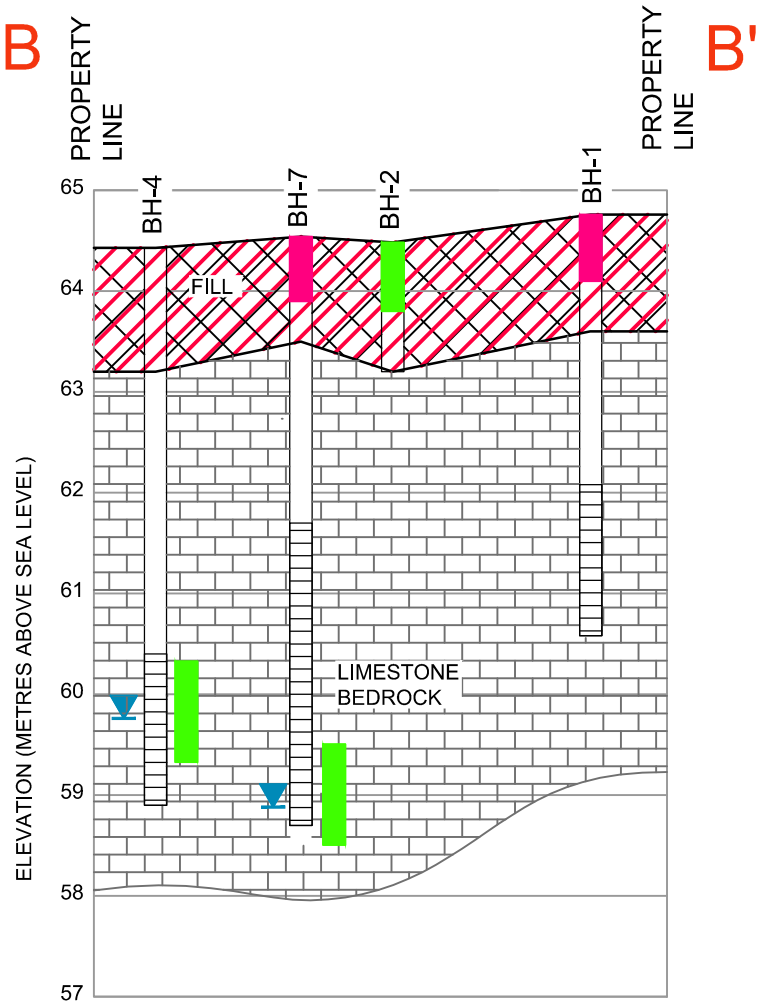
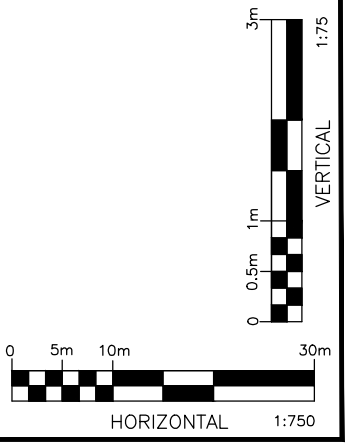


LEGEND

- GROUNDWATER LEVEL SEPTEMBER 19, 2019
- SOIL QUALITY MEETS MECP TABLE 7 SCS
- SOIL QUALITY EXCEEDS MECP TABLE 7 SCS
- ESTIMATED AREA OF PHC IMPACTED SOIL



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DESIGN: M.M. / CHECKED: C.H.		scale: HORZ. 1:750 VERT. 1:75
DRAWN BY: M.N.	TITLE: CROSS-SECTION B-B' PRE EXCAVATION WITH PHC IMPACTS IN SOIL	FIG 10A

Filename: p:\projects\environmental\250000s\252000\252997 phase one esa 177-179 armstrong\figures\phase 2\252997- figs 9 - 10.dwg
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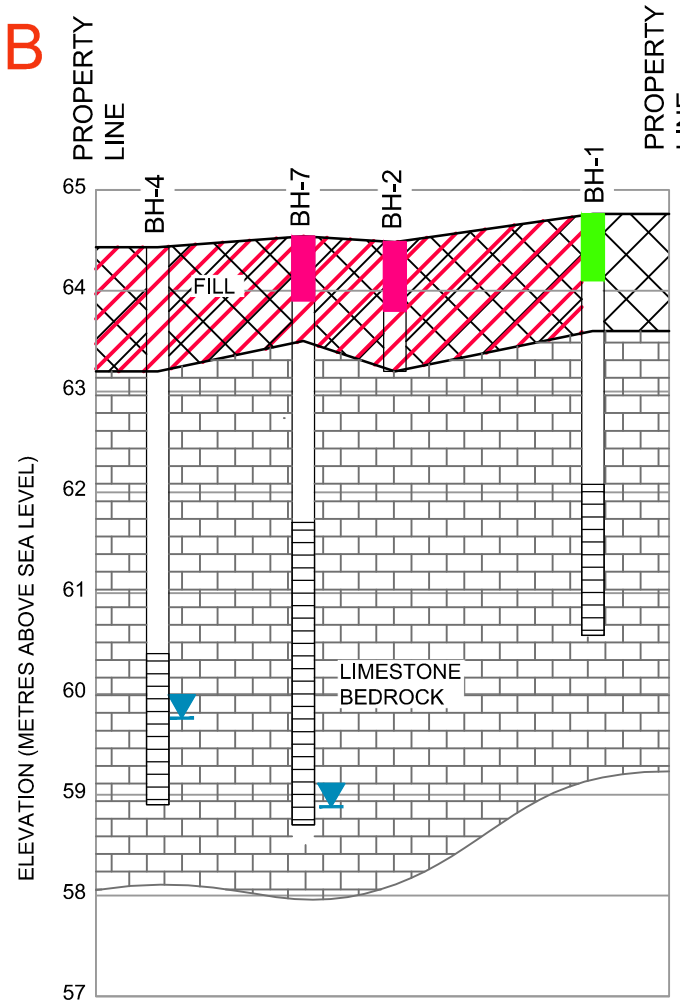
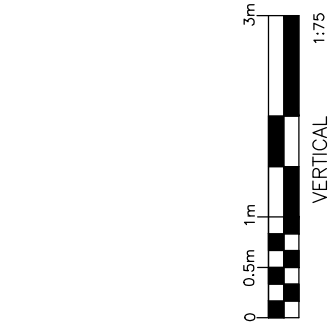
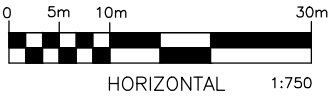


LEGEND

- GROUNDWATER LEVEL SEPTEMBER 19, 2019
- SOIL QUALITY MEETS MECP TABLE 7 SCS
- SOIL QUALITY EXCEEDS MECP TABLE 7 SCS
- ESTIMATED AREA OF METALS IMPACTED SOIL





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DESIGN: M.M. / CHECKED: C.H.		scale: HORZ. 1:750 VERT. 1:75
DRAWN BY: M.N.	TITLE: CROSS-SECTION B-B' PRE EXCAVATION WITH METALS IMPACTS IN SOIL	FIG 10B

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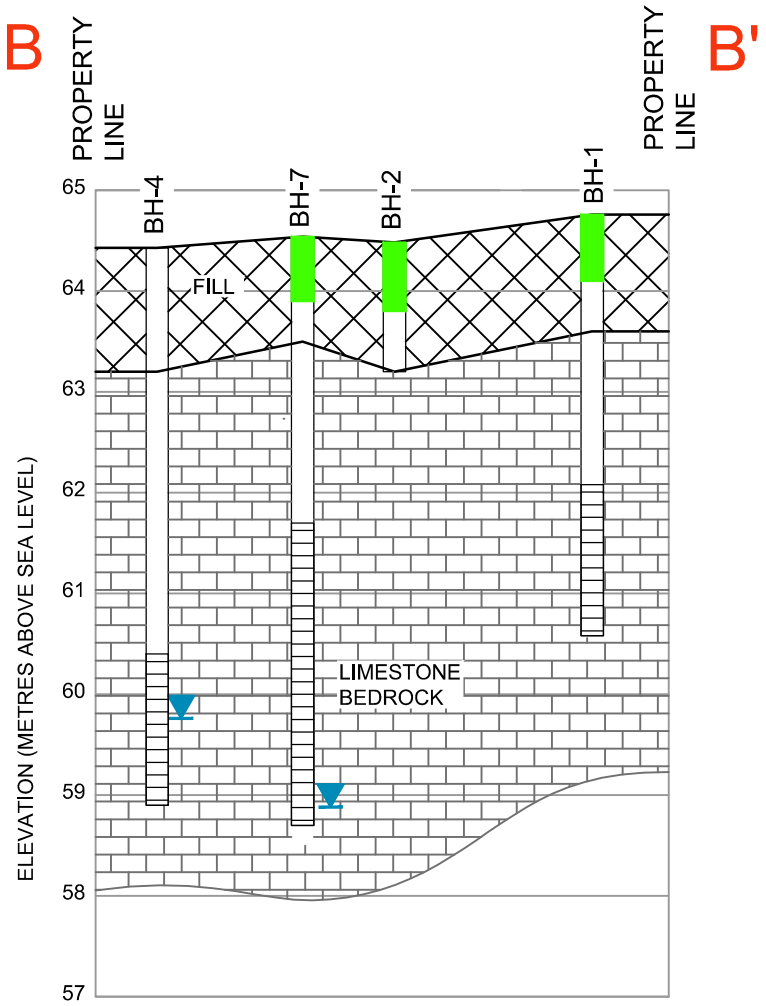
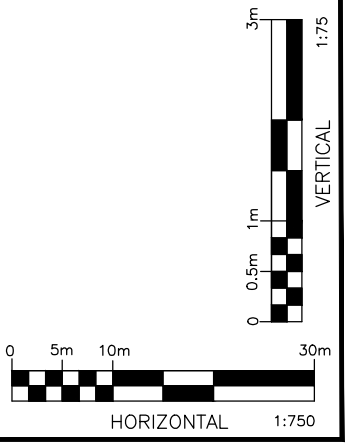


LEGEND

- GROUNDWATER LEVEL SEPTEMBER 19, 2019
- SOIL QUALITY MEETS MECP TABLE 7 SCS
- SOIL QUALITY EXCEEDS MECP TABLE 7 SCS
- ESTIMATED AREA OF PAH IMPACTED SOIL



EXP Services Inc. www.exp.com
t: +1.613.688.1899 | f: +1.613.225.7337
2650 Queensview Drive, Suite 100
Ottawa, ON K2B 8H6, Canada

DATE: SEPT. 2019	CLIENT: Mc CORMICK PARK DEVELOPENTS INC. 177 ARMSTRONG ST. & 268 CARRUTHERS AVE., OTTAWA, ON	project no. OTT-00252997-B0
DESIGN: M.M. / CHECKED: C.H.		scale: HORZ. 1:750 VERT. 1:75
DRAWN BY: M.N.	TITLE: CROSS-SECTION B-B' PRE EXCAVATION WITH PAH IMPACTS IN SOIL	FIG 10C

EXP Services Inc.
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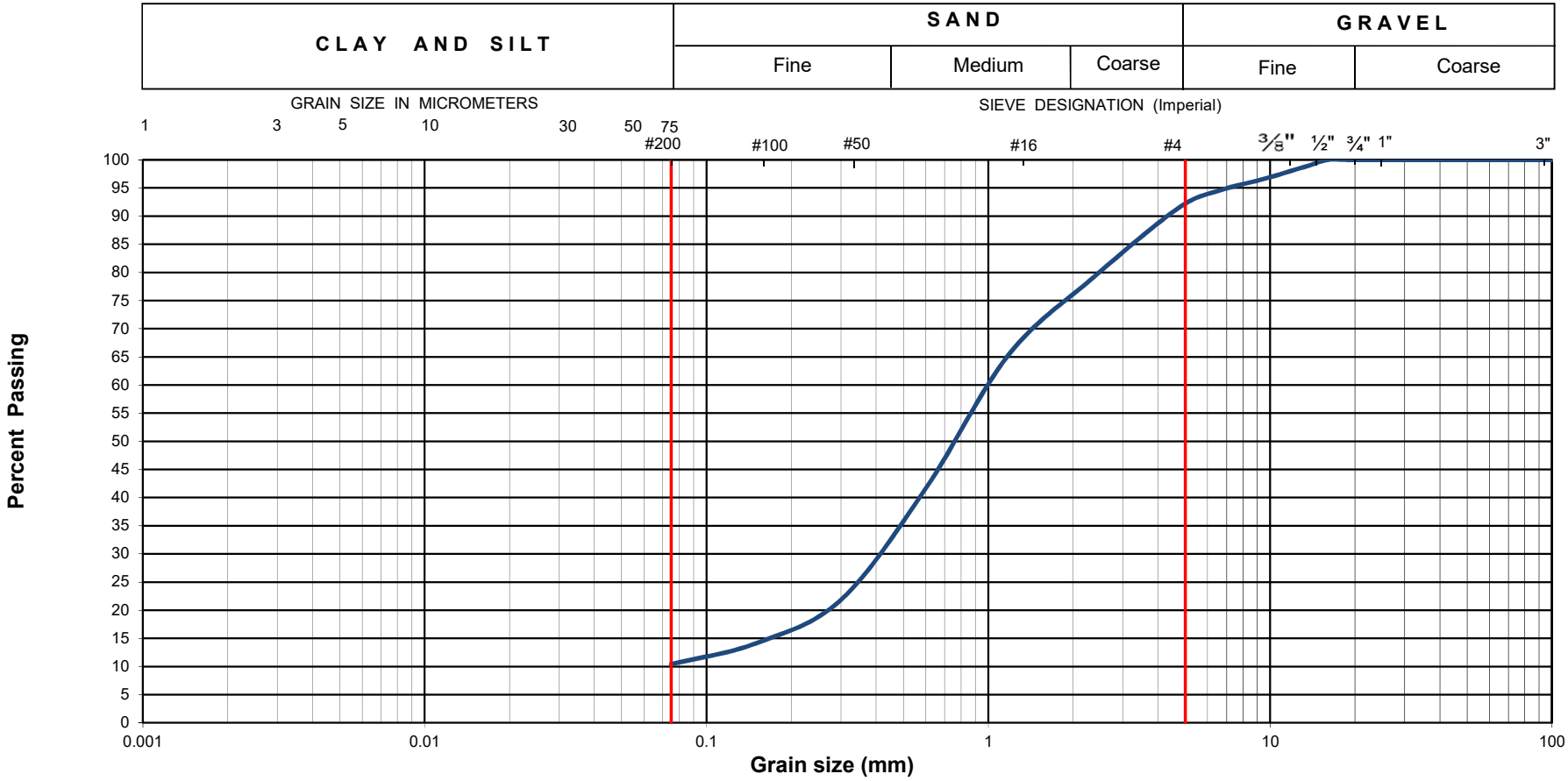
Ottawa, ON K2B 8H6

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

Unified Soil Classification System



EXP Project No.:	**OTT-00252997-B0**	**Project Name :**	**Proposed Residential Development**						
Client :	**McCormick Park Developments Inc.**	**Project Location :**	**177 Armstrong Street and 268 Carruthers Avenue, Ottawa, ON.**						
Date Sampled :	**June 11, 2019**	**Borehole No:**	**BH4**		**Sample:**	**SS2**		**Depth (m) :**	**0.8-1.2**
Sample Composition :		**Gravel (%)**	**8**	**Sand (%)**	**82**	**Silt & Clay (%)**	**10**	**Figure :**	**xxx**
Sample Description :		**FILL: Well Graded Sand with Silt (SW-SM)**							

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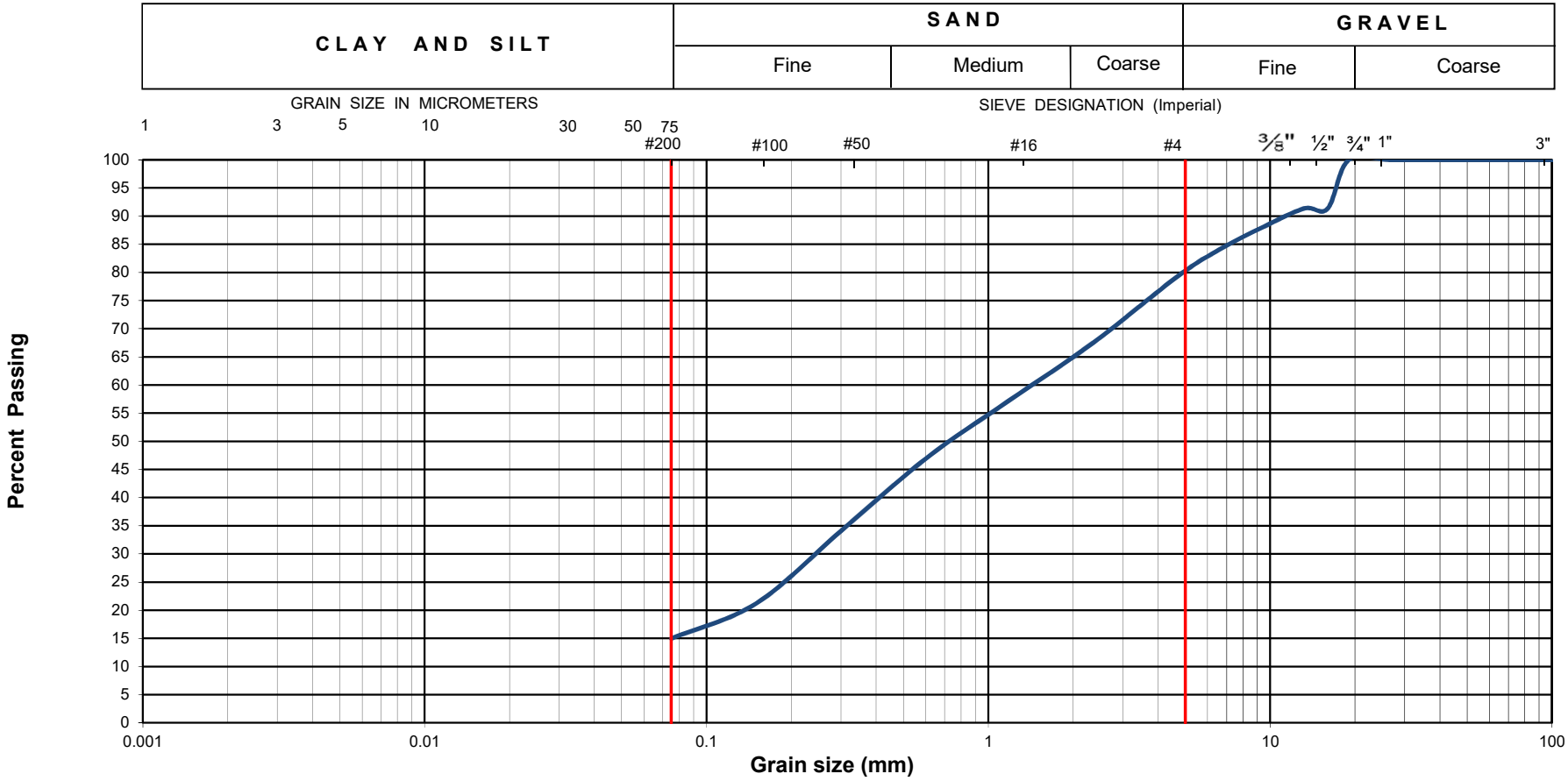
Grain-Size Distribution Curve
Method of Test For Sieve Analysis of Aggregate
ASTM C-136

Unified Soil Classification System



EXP Project No.:	**OTT-00252997-B0**	**Project Name :**	**Proposed Residential Development**						
Client :	**McCormick Park Developments Inc.**	**Project Location :**	**177 Armstrong Street and 268 Carruthers Avenue, Ottawa, ON.**						
Date Sampled :	**August 30, 2019**	**Borehole No:**	**MW7**		**Sample:**	**SS1**		**Depth (m) :**	**0-0.6**
Sample Composition :		**Gravel (%)**	**20**	**Sand (%)**	**65**	**Silt & Clay (%)**	**15**	**Figure :**	**xxx**
Sample Description :		**FILL: Silty Sand with Gravel (SM)**							

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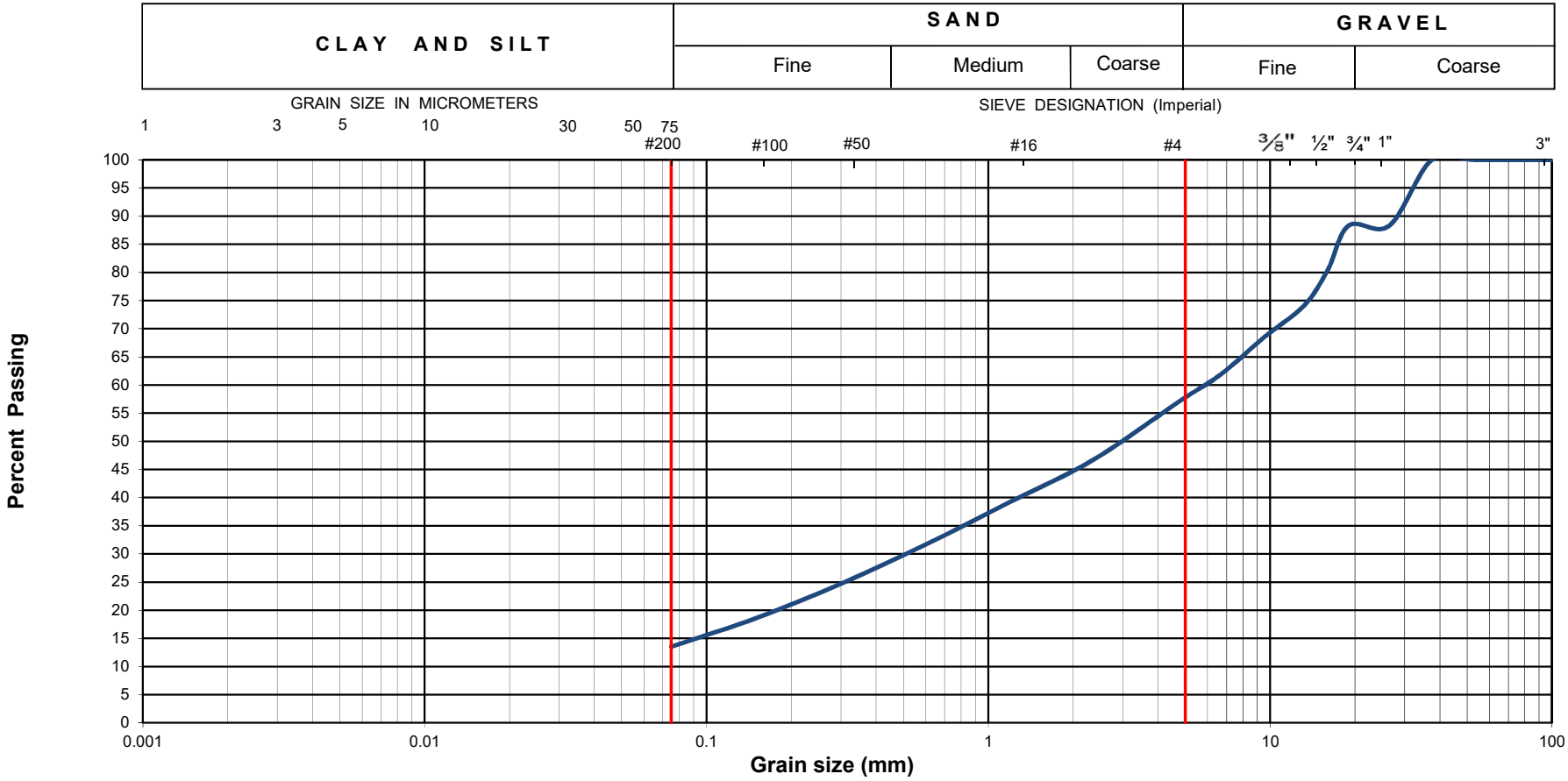
Grain-Size Distribution Curve
Method of Test For Sieve Analysis of Aggregate
ASTM C-136

Unified Soil Classification System



EXP Project No.:	**OTT-00252997-B0**	**Project Name :**	**Proposed Residential Development**						
Client :	**McCormick Park Developments Inc.**	**Project Location :**	**177 Armstrong Street and 268 Carruthers Avenue, Ottawa, ON.**						
Date Sampled :	**September 3, 2019**	**Borehole No:**	**MW8**	**Sample:**	**SS1**	**Depth (m) :**	**0-0.6**		
Sample Composition :		**Gravel (%)**	**43**	**Sand (%)**	**43**	**Silt & Clay (%)**	**14**	**Figure :**	**xxx**
Sample Description :		**FILL: Silty Sand with Gravel (SM)**							

Appendix C: Borehole Logs

Log of Borehole BH 1

Project No: OTT-00252997-B0

Project: Phase Two Environmental Site Assessment

Location: 177 Armstrong Street and 268 Carruthers Avenue, Ottawa, Ontario

Figure No. 3

Page. 1 of 1

Date Drilled: 'June 11, 2019

Drill Type: CME-75 Truck Mounted Drill Rig

Datum: Geodetic Elevation

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

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
		GRANULAR FILL ~ 100 mm Crushed gravel, grey, damp	64.76	0
		FILL Silty sand with gravel, brown and grey, damp to moist, (compact to dense)	64.7	
			63.5	1
		LIMESTONE BEDROCK Aphanitic to fine grained, grey, (very poor to fair quality)		
		Highly fractured from 1.3 m to 2.0 m depths		2
		200 mm thick weathered zone at 3.8 m depth		3
			60.7	4
		Borehole Terminated at 4.1 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

32 (SPT) 5 (CVR)
21 (SPT) 0 (CVR)

SAMPLES	Natural Unit Wt. kN/m³
SS1	
SS2	
Run 1	
Run 2	

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm diameter standpipe with slotted section 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-00252997-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	N/A	N/A
15 Days	Dry	-
100 Days	Dry	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	1.3 - 2.6	94	19
2	2.6 - 4.1	100	58

LOG OF BOREHOLE BOREHOLE LOGS 1 TO 8 OTT-00252997-B0.GPJ TROW OTTAWA.GDT 10/17/19

Log of Borehole BH 2

Project No: OTT-00252997-B0

Project: Phase Two Environmental Site Assessment

Location: 177 Armstrong Street and 268 Carruthers Avenue, Ottawa, Ontario

Figure No. 4

Page. 1 of 1

Date Drilled: 'June 11, 2019

Drill Type: CME-75 Truck Mounted Drill Rig

Datum: Geodetic Elevation

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

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		GRANULAR FILL ~ 100 mm Crushed gravel, grey, damp	64.48	0				
		FILL Silty sand with gravel, brick debris, brown and grey, moist, (compact)	64.4		13 ○	5 ◧ ×	SS1	
				1	50 for 75 mm ○	0 ◧ ×	SS2	
			63.2					
		Auger Refusal at 1.3 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

NOTES:
1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00252997-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	1.2

CORE DRILLING RECORD

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

LOG OF BOREHOLE BOREHOLE LOGS 1 TO 8 OTT-00252997-B0.GPJ TROW OTTAWA.GDT 10/17/19

Log of Borehole BH 3

Project No: OTT-00252997-B0

Project: Phase Two Environmental Site Assessment

Location: 177 Armstrong Street and 268 Carruthers Avenue, Ottawa, Ontario

Figure No. 5

Page. 1 of 1

Date Drilled: 'June 11, 2019

Drill Type: CME-75 Truck Mounted Drill Rig

Datum: Geodetic Elevation

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

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic 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
		GRANULAR FILL ~ 100 mm Crushed gravel, grey, damp	64.45 / 64.4	0	50 for 100 mm	0	SS1	
		FILL Silty sand with gravel, brown and black, damp to moist	64.0					
		LIMESTONE BEDROCK Aphanitic to fine grained, grey, (fair to good quality)		1			Run 1	
		Highly weathered from 0.6 m to 0.7 m depths						
		200 mm long diagonal fracture at 2.3 m depth		2			Run 2	
		Borehole Terminated at 2.5 m Depth	62.0					

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00252997-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	N/A	2.5

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	0.6 - 1.3	93	83
2	1.3 - 2.5	100	65

LOG OF BOREHOLE BOREHOLE LOGS 1 TO 8 OTT-00252997-B0.GPJ TROW OTTAWA.GDT 10/17/19

Log of Borehole BH 4

Project No: OTT-00252997-B0

Project: Phase Two Environmental Site Assessment

Location: 177 Armstrong Street and 268 Carruthers Avenue, Ottawa, Ontario

Figure No. 6

Page. 1 of 1

Date Drilled: 'June 11, 2019

Drill Type: CME-75 Truck Mounted Drill Rig

Datum: Geodetic Elevation

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

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		GRANULAR FILL ~ 250 mm Crushed gravel, grey, damp	64.43	0	16	×	SS1	
		FILL Silty sand with gravel, brown to black and grey, moist, (compact)	64.1					
		FILL Sand with silt, brown, moist, (compact)	63.7	1	14	×	SS2	
		INFERRED BOULDERS OR WEATHERED BEDROCK	63.2		50 for 25 mm		SS3	
		LIMESTONE BEDROCK Aphanitic to fine grained, grey, (very poor to fair quality) Highly weathered bedrock from 1.6 m to 1.8 m depths Highly fractured from 1.8 m to 2.3 m depths	62.8	2			Run 1	
				3			Run 2	
▼			59.76	4			Run 3	
				5				
		Borehole Terminated at 5.5 m Depth	58.9					

LOG OF BOREHOLE BOREHOLE LOGS 1 TO 8 OTT-00252997-B0.GPJ TROW OTTAWA.GDT 10/17/19

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 19 mm diameter standpipe with slotted section 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-00252997-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	N/A	N/A
15 Days	4.7	-
100 Days	4.7	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	1.6 - 2.3	85	0
2	2.3 - 4	97	65
3	4 - 5.5	100	71

Log of Borehole BH 5

Project No: OTT-00252997-B0

Project: Phase Two Environmental Site Assessment

Location: 177 Armstrong Street and 268 Carruthers Avenue, Ottawa, Ontario

Figure No. 7

Page. 1 of 1

Date Drilled: 'August 30, 2019

Drill Type: CME-75 Truck Mounted Drill Rig

Datum: Geodetic Elevation

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

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		ASPHALTIC CONCRETE ~25 mm	64.01	0	20 40 60 80 / 50 100 150 200 kPa	250 500 750 / 20 40 60		
		GRANULAR FILL ~ 375 mm	63.9		50 for 50 mm		SS1	
		Crushed gravel with sand, grey, damp	63.6	1				
		Auger Refusal at 0.4 m Depth		2				
				3				
				4				
				5				

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. Borehole backfilled upon completion of drilling.
3. Field work supervised by an EXP representative.
4. See Notes on Sample Descriptions
5. Log to be read with EXP Report OTT-00252997-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	0.2

CORE DRILLING RECORD

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

LOG OF BOREHOLE BOREHOLE LOGS 1 TO 8 OTT-00252997-B0.GPJ TROW OTTAWA.GDT 10/17/19

Log of Borehole MW 6

Project No: OTT-00252997-B0

Project: Phase Two Environmental Site Assessment

Location: 177 Armstrong Street and 268 Carruthers Avenue, Ottawa, Ontario

Figure No. 8

Page. 1 of 1

Date Drilled: 'August 30, 2019

Drill Type: CME-75 Truck Mounted Drill Rig

Datum: Geodetic Elevation

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

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
			64.08	0
		ASPHALTIC CONCRETE ~35 mm	64.0	
		GRANULAR FILL ~ 350 mm Crushed gravel, grey, damp, (loose)	63.7	
		FILL Silty sand with gravel and cobbles, brown and grey, moist	63.4	
		LIMESTONE BEDROCK Aphanitic to fine grained, occasional fractures, grey, (very poor to excellent quality)		1
		Highly fractured with voids from 0.7 m to 2.5 m depths		2
		Void from 1.5 m to 2.1 m depths		
▽			58.43	4
			58.0	6
		Borehole Terminated at 6.1 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

8 ○ 0 □

SAMPLES	Natural Unit Wt. kN/m³
SS1	
Run 1	
Run 2	
Run 3	
Run 4	
Run 5	
Run 6	

LOG OF BOREHOLE BOREHOLE LOGS 1 TO 8 OTT-00252997-B0.GPJ TROW OTTAWA.GDT 10/17/19

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 32 mm diameter monitoring well with screened section 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-00252997-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
20 Days	5.7	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	0.7 - 1.4	39	0
2	1.4 - 2.2	22	0
3	2.2 - 2.5	100	0
4	2.5 - 3.3	100	92
5	3.3 - 4.9	100	95
6	4.9 - 6.1	100	100

Log of Borehole MW 7

Project No: OTT-00252997-B0

Project: Phase Two Environmental Site Assessment

Location: 177 Armstrong Street and 268 Carruthers Avenue, Ottawa, Ontario

Figure No. 9

Page. 1 of 1

Date Drilled: 'August 30, 2019

Drill Type: CME-75 Truck Mounted Drill Rig

Datum: Geodetic Elevation

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

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth	Standard Penetration Test N Value / Shear Strength kPa	Combustible Vapour Reading (ppm) / Natural Moisture Content % / Atterberg Limits (% Dry Weight)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Silty sand with gravel, brown and grey, moist, (compact)	64.54	0	17 (○)	15 (□ ×)	SS1	
					50 / Refusal (○)	10 (□ ×)	SS2	
		INFERRED BOULDERS OR WEATHERED BEDROCK	63.6	1				
		LIMESTONE BEDROCK Aphanitic to fine grained, grey, (fair to excellent quality)	63.3				Run 1	
							Run 2	
		Highly weathered from 1.2 m to 1.3 m depths		2				
							Run 3	
		Occasional 25 mm thick voids from 1.8 m to 3.1 m depths		3				
							Run 4	
		A 150 mm thick rubble zone at 3.9 m depth		4				
				5			Run 5	
▼			58.88					
		Borehole Terminated at 5.8 m Depth	58.7					

LOG OF BOREHOLE BOREHOLE LOGS 1 TO 8 OTT-00252997-B0.GPJ TROW OTTAWA.GDT 10/17/19

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 32 mm diameter monitoring well with screened section 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-00252997-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
20 Days	5.7	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	1.2 - 1.5	90	50
2	1.5 - 1.8	100	100
3	1.8 - 3.1	84	63
4	3.1 - 4.2	96	83
5	4.2 - 5.8	97	60

Log of Borehole MW 8

Project No: OTT-00252997-B0

Project: Phase Two Environmental Site Assessment

Location: 177 Armstrong Street and 268 Carruthers Avenue, Ottawa, Ontario

Figure No. 10

Page. 1 of 1

Date Drilled: 'August 30, 2019

Drill Type: CME-75 Truck Mounted Drill Rig

Datum: Geodetic Elevation

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

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

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

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic Elevation m	Depth
		GRANULAR FILL ~ 75 mm Crushed gravel, grey, damp	64.33	0
		FILL Silty sand with gravel, topsoil, brown and grey, damp to moist (very dense)	64.2	
			63.2	1
		LIMESTONE BEDROCK Aphanitic to fine grained with fractures, grey, (very poor to fair quality)		
		Highly weathered from 1.1 m to 1.5 m depths		2
		Some fractures from 1.5 m to 4.1 m depths		
				3
		50 mm thick mud seam at 4.0 m depth		4
▼			59.61	
				5
			58.5	
		Borehole Terminated at 5.8 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

51 | 0

50 for 50 mm | 0

SAMPLES	Natural Unit Wt. kN/m³
SS1	
SS2	
Run 1	
Run 2	
Run 3	
Run 4	
Run 5	

NOTES:

1. Borehole data requires interpretation by EXP before use by others
2. A 32 mm diameter monitoring well with screened section 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-00252997-B0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
20 Days	4.7	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	1.1 - 1.5	81	0
2	1.5 - 2.5	95	60
3	2.5 - 4.1	100	75
4	4.1 - 4.5	89	56
5	4.5 - 5.8	94	53

LOG OF BOREHOLE BOREHOLE LOGS 1 TO 8 OTT-00252997-B0.GPJ TROW OTTAWA.GDT 10/17/19

Appendix D - Analytical Summary Tables

TABLE 1 SOIL ANALYTICAL RESULTS *(µg/g)*
Petroleum Hydrocarbons (PHCs) and BTEX
177 Armstrong Street and 268 Carruthers Avenue, Ottawa

Parameter	MECP Table 7[1]	BH-1 SS1	BH-2 SS1	BH-3 SS1	MW-6 SS1	MW-7 SS1	Dupe	MW-8 SS2
Sample Date (d/m/y)	Residential	30-Aug-19	3-Sep-19	3-Sep-19	30-Aug-19	30-Aug-19	Duplicate of	3-Sep-19
Sample Depth (mbsg)		0.0 - 0.6	0.0 - 0.6	0.0 - 0.4	0.0 - 0.6	0.0 - 0.6	BH7 SS1	0.75 - 1.1
BV Labs ID		KRR586	KRR583	KRR584	KRR580	KRR581	KRR582	KRR585
Date of Analysis		7-Sep-2019	7-Sep-2019	7-Sep-2019	7-Sep-2019	7-Sep-2019	7-Sep-2019	7-Sep-2019
Maxxam Certificate of Analysis		B9O6633	B9O6633	B9O6633	B9O6633	B9O6633	B9O6633	B9O6633
Benzene	0.21	<0.020	<0.020	0.029	<0.020	0.071	0.093	<0.020
Ethylbenzene	2	<0.020	<0.020	0.038	<0.020	0.032	0.058	<0.020
Toluene	2.3	<0.020	<0.020	0.12	<0.020	0.17	0.27	0.020
Total Xylenes	3.1	<0.040	<0.040	0.44	<0.040	0.22	0.38	<0.040
F1 (C6-C10) - BTEX	55	<10	<10	<10	<10	<10	<10	<10
F2 (C10-C16 Hydrocarbons)	98	50	<10	<10	20	31	32	17
F3 (C16-C34 Hydrocarbons)	300	590	53	120	160	2200	1900	100
F4 (C34-C50 Hydrocarbons)	2800	580	51	96	580	2300	1900	120
F4G (C34-C50 Hydrocarbons)	2800	2800	200	370	1900	8300	6200	350

NOTES:

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

TABLE 2 SOIL ANALYTICAL RESULTS *(µg/g)*
METALS
177 Armstrong Street and 268 Carruthers Avenue, Ottawa

Parameter	MECP Table 7[1]	BH-1 SS1	BH-2 SS1	BH-3 SS1	MW-6 SS1	MW-7 SS1	Dupe	MW-8 SS2
Sample Date (d/m/y)	Residential	30-Aug-19	3-Sep-19	3-Sep-19	30-Aug-19	30-Aug-19	Duplicate of	3-Sep-19
Sample Depth (mbsg)		0.0 - 0.6	0.0 - 0.6	0.0 - 0.4	0.0 - 0.6	0.0 - 0.6	BH7 SS1	0.75 - 1.1
BV Labs ID		KRR586	KRR583	KRR584	KRR580	KRR581	KRR582	KRR585
Date of Analysis		7-Sep-2019	7-Sep-2019	7-Sep-2019	7-Sep-2019	7-Sep-2019	7-Sep-2019	7-Sep-2019
Maxxam Certificate of Analysis		B9O6633	B9O6633	B9O6633	B9O6633	B9O6633	B9O6633	B9O6633
Antimony	7.5	0.48	0.52	2.9	0.43	6.3	11	0.83
Arsenic	18	2.3	2.3	7.7	4.8	4.8	5.9	15
Barium	390	130	180	150	350	190	230	230
Beryllium	4	0.37	0.26	0.54	0.31	0.32	0.39	0.94
Boron	120	9.1	9.4	9.2	10	10	9.1	19
Cadmium	1.2	0.23	0.80	0.85	<0.10	0.99	1.4	1.0
Chromium	160	20	14	19	7.9	14	13	39
Chromium VI	8	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Cobalt	22	5.8	4.6	7.3	4.4	5.0	5.1	8.6
Copper	140	19	14	43	18	44	45	70
Lead	120	41	140	280	37	670	920	200
Mercury	0.27	0.13	<0.050	0.089	<0.050	0.11	0.15	0.15
Molybdenum	6.9	1.0	1.0	3.2	1.1	1.3	1.5	3.3
Nickel	100	14	10	18	10	15	15	21
Selenium	2.4	<0.50	<0.50	0.93	<0.50	<0.50	<0.50	0.74
Silver	20	<0.20	<0.20	0.25	<0.20	0.22	0.37	0.34
Thallium	1	0.13	0.14	0.21	0.23	0.11	0.10	0.51
Uranium	23	0.51	0.50	0.49	0.32	0.37	0.42	0.90
Vanadium	86	28	22	26	8.3	35	27	41
Zinc	340	46	160	230	24	240	330	160

NOTES:

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

Shaded Concentration exceeds MECP Table 7 Residential SCS.

mbsg Metres below surface grade

TABLE 3 SOIL ANALYTICAL RESULTS *(µg/g)*
POLYCYCLIC AROMATIC HYDROCARBONS
177 Armstrong Street and 268 Carruthers Avenue, Ottawa

Parameter	MECP Table 7[1]	BH-1 SS1	BH-2 SS1	BH-3 SS1	MW-6 SS1	MW-7 SS1	Dupe	MW-8 SS2
Sample Date (d/m/y)	Residential	30-Aug-19	3-Sep-19	3-Sep-19	30-Aug-19	30-Aug-19	Duplicate of	3-Sep-19
Sample Depth (mbsg)		0.0 - 0.6	0.0 - 0.6	0.0 - 0.4	0.0 - 0.6	0.0 - 0.6	BH7 SS1	0.75 - 1.1
BV Labs ID		KRR586	KRR583	KRR584	KRR580	KRR581	KRR582	KRR585
Date of Analysis		7-Sep-2019	7-Sep-2019	7-Sep-2019	7-Sep-2019	7-Sep-2019	7-Sep-2019	7-Sep-2019
Maxxam Certificate of Analysis		B9O6633	B9O6633	B9O6633	B9O6633	B9O6633	B9O6633	B9O6633
Acenaphthene	7.9	<0.050	0.0082	0.013	<0.050	<0.050	<0.050	<0.050
Acenaphthylene	0.15	<0.050	0.083	0.082	<0.050	<0.050	<0.050	<0.050
Anthracene	0.67	<0.050	0.064	0.074	<0.050	0.068	0.074	<0.050
Benzo[a]anthracene	0.5	<0.050	0.25	**0.71**	<0.050	0.25	0.26	0.12
Benzo[a]pyrene	0.3	<0.050	0.25	**0.55**	<0.050	0.27	0.26	0.14
Benzo[b]fluoranthene	0.78	<0.050	0.41	**0.91**	0.073	0.35	0.35	0.20
Benzo[g,h,i]perylene	6.6	0.059	0.22	0.40	0.053	0.69	0.55	0.27
Benzo[k]fluoranthene	0.78	<0.050	0.15	0.32	<0.050	0.11	0.11	0.069
Chrysene	7	<0.050	0.27	0.58	<0.050	0.22	0.22	0.11
Dibenz[a,h]anthracene	0.1	<0.050	0.068	**0.13**	<0.050	0.080	0.073	<0.050
Fluoranthene	0.69	<0.050	0.66	**0.88**	0.066	0.48	0.49	0.24
Fluorene	62	<0.050	0.031	0.0087	<0.050	<0.050	<0.050	<0.050
Indeno[1,2,3-cd]pyrene	0.38	<0.050	0.23	**0.41**	<0.050	0.23	0.22	0.13
Methylnaphthalene, 2-(1-)	0.99	<0.071	0.035	0.46	<0.071	0.30	0.30	0.15
Naphthalene	0.6	<0.050	0.014	0.12	<0.050	0.077	0.074	<0.050
Phenanthrene	6.2	<0.050	0.42	0.29	<0.050	0.33	0.33	0.12
Pyrene	78	<0.050	0.47	0.78	0.067	0.39	0.41	0.21

NOTES:

1	MECP *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 7 Non-Potable Residential SCS, coarse grained soil.*
Shaded/ Bold	Concentration exceeds MECP Table 7 Residential SCS.
mbsg	Metres below surface grade

Table 4 - Maximum Concentrations in Soil

177 Armstrong Street and 268 Carruthers Avenue, Ottawa

OTT-00252997-B0

Parameter	Sample Location	Sample Depth (mbgs)	Sampling Date	Maximum Concentration	MECP Table 7
Petroleum Hydrocarbons					
F1 PHC (C6 - C10) - BTEX	BH1 SS1	0.0 - 0.6	30-Aug-19	<10	55
F2 PHC (C10-C16)	BH1 SS1	0.0 - 0.6	30-Aug-19	50	98
F3 PHC (C16-C34)	BH7 SS1	0.0 - 0.6	30-Aug-19	2200	300
F4 PHC (C34-C50)	BH7 SS1	0.0 - 0.6	30-Aug-19	8300	2800
Benzene	BH7 SS1	0.0 - 0.6	30-Aug-19	0.07	0.21
Ethylbenzene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.04	2
Toluene	BH7 SS1	0.0 - 0.6	30-Aug-19	0.27	2.3
Xylenes, total	BH3 SS1	0.0 - 0.4	30-Aug-19	0.44	3.1
Polycylic Aromatic Hydrocarbons					
Acenaphthene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.013	7.9
Acenaphthylene	BH2 SS1	0.0 - 0.6	3-Sep-19	0.083	0.15
Anthracene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.074	0.67
Benzo(a)anthracene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.71	0.5
Benzo(a)pyrene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.5500	0.3
Benzo(b/j)fluoranthene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.9100	0.78
Benzo(g,h,i)perylene	BH7 SS1	0.0 - 0.6	30-Aug-19	0.6900	6.6
Benzo(k)fluoranthene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.3200	0.78
Chrysene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.5800	7
Dibenz(a,h)anthracene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.1300	0.1
Fluoranthene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.88	0.69
Fluorene	BH2 SS1	0.0 - 0.6	3-Sep-19	0.0310	62
Indeno(1,2,3-cd)pyrene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.4100	0.38
Methylnaphthalene, 2-(1-)	BH3 SS1	0.0 - 0.4	3-Sep-19	0.4600	0.99
Naphthalene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.1200	0.6
Phenanthrene	BH2 SS1	0.0 - 0.6	3-Sep-19	0.4200	6.2
Pyrene	BH3 SS1	0.0 - 0.4	3-Sep-19	0.7800	78
Inorganic Parameters					
Antimony	BH7 SS1	0.0 - 0.6	30-Aug-19	6.3	7.5
Arsenic	BH8 SS2	0.75 - 1.1	3-Sep-19	15	18
Barium	BH6 SS1	0.0 - 0.6	30-Aug-19	350	390
Beryllium	BH8 SS2	0.75 - 1.1	3-Sep-19	0.94	4
Boron	BH8 SS2	0.75 - 1.1	3-Sep-19	19	120
Cadmium	BH8 SS2	0.75 - 1.1	3-Sep-19	1	1.2
Chromium	BH8 SS2	0.75 - 1.1	3-Sep-19	39	160
Chromium VI	BH6 SS1	0.0 - 0.6	30-Aug-19	<0.2	
Cobalt	BH8 SS2	0.75 - 1.1	3-Sep-19	8.6	22
Copper	BH8 SS2	0.75 - 1.1	3-Sep-19	70	140
Lead	BH7 SS1	0.0 - 0.6	30-Aug-19	670	120
Mercury	BH8 SS2	0.75 - 1.1	3-Sep-19	0.15	
Molybdenum	BH8 SS2	0.75 - 1.1	3-Sep-19	3.3	6.9
Nickel	BH8 SS2	0.75 - 1.1	3-Sep-19	21	100
Selenium	BH3 SS1	0.0 - 0.4	3-Sep-19	0.93	2.4
Silver	BH8 SS2	0.75 - 1.1	3-Sep-19	0.34	20
Thallium	BH8 SS2	0.75 - 1.1	3-Sep-19	0.51	1
Uranium	BH8 SS2	0.75 - 1.1	3-Sep-19	0.9	23
Vanadium	BH8 SS2	0.75 - 1.1	3-Sep-19	41	86
Zinc	BH7 SS1	0.0 - 0.6	30-Aug-19	240	340

NOTES:

Analysis by Bureau Veritas Limited

All results are in ppm on dry weight basis

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

Results were compared to Ontario Ministry of Environment, Conservation and Parks (MECP), Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011, Table 7 Full Depth Generic Site Condition Standards (SCS) in a Non- Potable Ground Water Condition for Residential/Parkland/Institutional property use and coarse textured soils.

Table 5 - Maximum Concentrations in Soil
177 Armstrong Street and 268 Carruthers Avenue, Ottawa
OTT-00252997-B0

Parameter	Sample Location	Sample Depth (mbgs)	Sampling Date	Maximum Concentration	MECP Table 7
Volatile Organic Compounds					
Acetone	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.50	16
Benzene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.020	0.21
Bromodichloromethane	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	13
Bromoform	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	5.4
Bromomethane	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.05
Carbon Tetrachloride	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.05
Chlorobenzene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	2.4
Chloroform	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	3.1
Dibromochloromethane	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	9.4
1,2-Dichlorobenzene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	3.4
1,3-Dichlorobenzene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	4.8
1,4-Dichlorobenzene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.083
Dichlorodifluoromethane	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	16
1,1-Dichloroethane	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	3.5
1,2-Dichloroethane	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.05
1,1-Dichloroethylene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.05
Cis-1,2-Dichloroethylene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	3.4
Trans-1,2-Dichloroethylene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.084
1,2-Dichloropropane	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.05
Cis-1,3-Dichloropropylene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.030	0.05
Trans-1,3-Dichloropropylene	BH1 SS6	3.8 - 4.4	5-Apr-19		
Ethylbenzene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.020	2.1
Ethylene Dibromide	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.05
Hexane	BH1 SS6	3.8 - 4.4	5-Apr-19	4.0	2.8
Methylene Chloride	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.1
Methyl Ethyl Ketone	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.50	16
Methyl Isobutyl Ketone	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.50	1.7
Methyl-t-Butyl Ether	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.75
Styrene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.7
1,1,1,2-Tetrachloroethane	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.058
1,1,2,2-Tetrachloroethane	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.05
Tetrachloroethylene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.28
Toluene	BH1 SS6	3.8 - 4.4	5-Apr-19	0.025	2.3
1,1,1-Trichloroethane	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.38
1,1,2-Trichloroethane	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.05
Trichloroethylene	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	0.05
Trichlorofluoromethane	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.050	4.0
Vinyl Chloride	BH1 SS6	3.8 - 4.4	5-Apr-19	<0.020	0.02
Total Xylenes	BH1 SS6	3.8 - 4.4	5-Apr-19	0.56	3.1

NOTES:

Analysis by Bureau Veritas Limited
All results are in ppm on dry weight basis
Non-detectable results are shown as "< (RDL)" where RDL represents the reporting detection limit.

Results were compared to Ontario Ministry of Environment, Conservation and Parks (MECP), Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011, Table 7 Full Depth Generic Site Condition Standards (SCS) in a Non- Potable Ground Water Condition for Residential/Parkland/Institutional property use and coarse textured soils.

TABLE 5 GROUNDWATER ANALYTICAL RESULTS *(µg/L)*
PETROLEUM HYDROCARBONS and BTEX
177 Armstrong Street and 268 Carruthers Avenue, Ottawa

Parameter	MECP Table 7[1]	BH-4	MW-10	MW-6	MW-7	MW-8
Sample Date (d/m/y)		19-Sep-19	Duplicate of	19-Sep-19	19-Sep-19	19-Sep-19
Screened Interval (mbsg)		4.0 - 5.5	BH-4	3.1 - 6.1	2.8 - 5.8	2.8 - 5.8
BV Labs ID		KVG986	KVG985	KVG982	KVG983	KVG984
Date of Analysis		24-Sep-2019	24-Apr-2019	24-Apr-2019	24-Apr-2019	24-Apr-2019
Maxxam Certificate of Analysis		B9Q3808	B9Q3808	B9Q3808	B9Q3808	B9Q3808
Benzene	0.5	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	320	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylbenzene	54	<0.20	<0.20	<0.20	<0.20	<0.20
Total Xylenes	72	<0.20	<0.20	<0.20	<0.20	<0.20
PHC F1	420	<25	<25	<25	<25	<25
PHC F2	150	<100	<100	<100	<100	<100
PHC F3	500	<200	<200	<200	<200	<200
PHC F4	500	<200	<200	<200	<200	<200

NOTES:

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

Shaded Concentration exceeds MECP Table 7 Residential SCS.

NA Not Analyzed

NV No Value

mbsg Metres below surface grade

TABLE 6 GROUNDWATER ANALYTICAL RESULTS *(µg/L)*
VOLATILE ORGANIC COMPOUNDS
177 Armstrong Street and 268 Carruthers Avenue, Ottawa

Parameter	MECP Table 7[1]	BH-4	MW-10	MW-6	MW-7	MW-8	TRIP BLANK
Sample Date (d/m/y)		19-Sep-19	Duplicate of	19-Sep-19	19-Sep-19	19-Sep-19	19-Sep-19
Screened Interval		4.0 - 5.5	BH-4	3.1 - 6.1	2.8 - 5.8	2.8 - 5.8	NA
BV Labs ID		KVG986	KVG985	KVG982	KVG983	KVG984	KVG987
Date of Analysis		25-Sep-2019	25-Apr-2019	25-Apr-2019	25-Apr-2019	25-Apr-2019	25-Apr-2019
Maxxam Certificate of Analysis		B9Q3808	B9Q3808	B9Q3808	B9Q3808	B9Q3808	B9Q3808
Acetone	100000	<10	<10	<10	11	<10	<10
Benzene	0.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Bromodichloromethane	67000	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Bromoform	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Bromomethane	0.89	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Carbon Tetrachloride	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chlorobenzene	140	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Chloroform	2	<0.20	<0.20	<0.20	<0.20	0.27	<0.20
Dibromochloromethane	65000	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichlorobenzene	150	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,3-Dichlorobenzene	7600	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,4-Dichlorobenzene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Dichlorodifluoromethane	3500	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	11	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,2-Dichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1-Dichloroethylene	0.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Cis-1,2-Dichloroethylene	1.6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trans-1,2-Dichloroethylene	1.6	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,2-Dichloropropane	0.58	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Cis-1,3-Dichloropropylene Trans-1,3-Dichloropropylene	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Ethylbenzene	54	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Ethylene Dibromide	0.2	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Hexane	5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene Chloride	26	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Methyl Ethyl Ketone	21000	<10	<10	<10	<10	<10	<10
Methyl Isobutyl Ketone	5200	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl-t-Butyl Ether	15	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Styrene	43	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,1,2-Tetrachloroethane	1.1	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
1,1,2,2-Tetrachloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Tetrachloroethylene	0.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Toluene	320	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,1-Trichloroethane	23	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
1,1,2-Trichloroethane	0.5	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Trichloroethylene	0.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Trichlorofluoromethane	2000	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
Vinyl Chloride	0.5	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20
Total Xylenes	72	<0.20	<0.20	<0.20	<0.20	<0.20	<0.20

NOTES:

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

Shaded Concentration exceeds MECP Table 7 Residential SCS.

mbsg Metres below surface grade

Table 7 - Maximum Concentrations in Groundwater
177 Armstrong Street and 268 Carruthers Avenue, Ottawa
OTT-00252997-B0

Parameter	Sample Location	Screen Interval (mbgs)	Sampling Date	Maximum Concentration	MECP Table 7
Petroleum Hydrocarbons					
F1 PHC (C6 - C10) - BTEX	All Locations	2.8 - 5.8	19-Sep-19	<25	750
F2 PHC (C10-C16)	All Locations	2.8 - 5.8	19-Sep-19	<100	150
F3 PHC (C16-C34)	All Locations	2.8 - 5.8	19-Sep-19	<200	500
F4 PHC (C34-C50)	All Locations	2.8 - 5.8	19-Sep-19	<200	500
Volatile Organic Compounds					
Acetone	MW-7	2.8 - 5.8	19-Sep-19	11	100000
Benzene	All Locations	2.8 - 5.8	19-Sep-19	<0.20	0.5
Bromodichloromethane	All Locations	2.8 - 5.8	19-Sep-19	<0.50	67000
Bromoform	All Locations	2.8 - 5.8	19-Sep-19	<1.0	5
Bromomethane	All Locations	2.8 - 5.8	19-Sep-19	<0.50	0.89
Carbon Tetrachloride	All Locations	2.8 - 5.8	19-Sep-19	<0.20	0.2
Chlorobenzene	All Locations	2.8 - 5.8	19-Sep-19	<0.20	140
Chloroform	MW-8	2.8 - 5.8	19-Sep-19	0.27	2
Dibromochloromethane	All Locations	2.8 - 5.8	19-Sep-19	<0.50	65000
1,2-Dichlorobenzene	All Locations	2.8 - 5.8	19-Sep-19	<0.50	150
1,3-Dichlorobenzene	All Locations	2.8 - 5.8	19-Sep-19	<0.50	7600
1,4-Dichlorobenzene	All Locations	2.8 - 5.8	19-Sep-19	<0.50	0.5
Dichlorodifluoromethane	All Locations	2.8 - 5.8	19-Sep-19	<1.0	3500
1,1-Dichloroethane	All Locations	2.8 - 5.8	19-Sep-19	<0.20	11
1,2-Dichloroethane	All Locations	2.8 - 5.8	19-Sep-19	<0.50	0.5
1,1-Dichloroethylene	All Locations	2.8 - 5.8	19-Sep-19	<0.20	0.5
Cis-1,2-Dichloroethylene	All Locations	2.8 - 5.8	19-Sep-19	<0.50	1.6
Trans-1,2-Dichloroethylene	All Locations	2.8 - 5.8	19-Sep-19	<0.50	1.6
1,2-Dichloropropane	All Locations	2.8 - 5.8	19-Sep-19	<0.20	0.58
Cis-1,3-Dichloropropylene	All Locations	2.8 - 5.8	19-Sep-19	<0.30	0.5
Trans-1,3-Dichloropropylene	All Locations	2.8 - 5.8	19-Sep-19	<0.40	
Ethylbenzene	All Locations	2.8 - 5.8	19-Sep-19	<0.20	54
Ethylene Dibromide	All Locations	2.8 - 5.8	19-Sep-19	<0.20	0.2
Hexane	All Locations	2.8 - 5.8	19-Sep-19	<1.0	5
Methylene Chloride	All Locations	2.8 - 5.8	19-Sep-19	<2.0	26
Methyl Ethyl Ketone	All Locations	2.8 - 5.8	19-Sep-19	<10	21000
Methyl Isobutyl Ketone	All Locations	2.8 - 5.8	19-Sep-19	<5.0	5200
Methyl-t-Butyl Ether	All Locations	2.8 - 5.8	19-Sep-19	<0.50	15
Styrene	All Locations	2.8 - 5.8	19-Sep-19	<0.50	43
1,1,1,2-Tetrachloroethane	All Locations	2.8 - 5.8	19-Sep-19	<0.50	1.1
1,1,2,2-Tetrachloroethane	All Locations	2.8 - 5.8	19-Sep-19	<0.50	0.5
Tetrachloroethylene	All Locations	2.8 - 5.8	19-Sep-19	<0.20	0.5
Toluene	All Locations	2.8 - 5.8	19-Sep-19	<0.20	320
1,1,1-Trichloroethane	All Locations	2.8 - 5.8	19-Sep-19	<0.20	23
1,1,2-Trichloroethane	All Locations	2.8 - 5.8	19-Sep-19	<0.50	0.5
Trichloroethylene	All Locations	2.8 - 5.8	19-Sep-19	<0.20	0.5
Trichlorofluoromethane	All Locations	2.8 - 5.8	19-Sep-19	<0.50	2000
Vinyl Chloride	All Locations	2.8 - 5.8	19-Sep-19	<0.20	0.5
Total Xylenes	All Locations	6.1 - 9.1	19-Sep-19	<0.20	26

NOTES:

Analysis by Bureau Veritas Limited

All results are in ppb

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

Results were compared to Ontario Ministry of Environment, Conservation and Parks (MECP), Soil, Groundwater and Sediment Standards for use under Part XV.1 of the Environmental Protection Act, April 2011, Table 7 Full Depth Generic Site Condition Standards (SCS) in a Non- Potable Ground Water Condition for all types of property use and coarse

TABLE 8 RELATIVE PERCENT DIFFERENCES
PETROLEUM HYDROCARBONS - SOIL
177 Armstrong Street and 268 Carruthers Avenue, Ottawa

Parameter	Units	RDL	MW-7 SS1	Dupe	RPD (%)	Alert Limit (%)
			30-Aug-19	5-Apr-19		
Petroleum Hydrocarbons						
PHC F_1 (>C_6-C10)	ug/g	10	<10	<10	nc	60
PHC F_2 (>C_{10}-C_{16})	ug/g	10	31	32	3	60
PHC F_3 (>C_{16}-C_{34})	ug/g	50	2200	1900	15	60
PHC F_4 (>C_{34}-C_{50})	ug/g	50	8300	6200	29	60
Volatiles						
Benzene	ug/g	0.020	0.071	0.093	27	100
Ethylbenzene	ug/g	0.020	0.032	0.058	58	100
Toluene	ug/g	0.020	0.17	0.27	45	100
Total Xylenes	ug/g	0.020	0.22	0.38	53	100

NOTES:

Analysis by Maxxam Analytics
All results on dry weight basis; <RDL means not detected at reporting detection limit (RDL)
- means "not analysed"
nc means "not calculable" - one (or both) of the results are <5x RDL
Exceedances of alert limits are shown in **bold**
Alert Limit- since laboratory duplicate measures laboratory precision while field duplicates measures laboratory and field precision, the alert limits for field duplicates are two times the laboratory RPD .

TABLE 9 RELATIVE PERCENT DIFFERENCES
METALS - SOIL
177 Armstrong Street and 268 Carruthers Avenue, Ottawa

Parameter	Units	RDL	MW-7 SS1	Dupe	RPD (%)	Alert Limit (%)
			30-Aug-19	5-Apr-19		
Inorganic Parameters						
Antimony	ug/g	0.20	6.3	11	54	60
Arsenic	ug/g	1.0	4.8	5.9	21	60
Barium	ug/g	0.50	190	230	19	60
Beryllium	ug/g	0.20	0.32	0.39	20	60
Boron	ug/g	5.0	10	9.1	9	60
Cadmium	ug/g	0.10	0.99	1.4	34	60
Chromium	ug/g	1.0	14	13	7	60
Chromium VI	ug/g	0.2	<0.2	<0.2	nc	60
Cobalt	ug/g	0.10	5.0	5.1	2	60
Copper	ug/g	0.50	44	45	2	60
Lead	ug/g	1.0	670	920	31	60
Mercury	ug/g	0.1	0.11	0.15	31	60
Molybdenum	ug/g	0.50	1.3	1.5	14	60
Nickel	ug/g	0.50	15	15	0	60
Selenium	ug/g	0.50	<0.50	<0.50	nc	60
Silver	ug/g	0.20	0.22	0.37	51	60
Thallium	ug/g	0.050	0.11	0.10	10	60
Uranium	ug/g	0.050	0.37	0.42	13	60
Vanadium	ug/g	5.0	35	27	26	60
Zinc	ug/g	5.0	240	330	32	60

NOTES:

Analysis by Maxxam Analytics

All results on dry weight basis; <RDL means not detected at reporting detection limit (RDL)

- means "not analysed"

nc means "not calculable" - one (or both) of the results are <5x RDL

Exceedances of alert limits are shown in **bold**

Alert Limit- since laboratory duplicate measures laboratory precision while field duplicates measures laboratory and field precision, the alert limits for field duplicates are two times the laboratory RPD .

TABLE 10 RELATIVE PERCENT DIFFERENCES
POLYCYCLIC AROMATIC HYDROCARBONS - SOIL
177 Armstrong Street and 268 Carruthers Avenue, Ottawa

Parameter	Units	RDL	MW-7 SS1	Dupe	RPD (%)	Alert Limit (%)
			30-Aug-19	5-Apr-19		
Polycyclic Aromatic Hydrocarbons						
Acenaphthene	ug/g	0.0050	<0.050	<0.050	nc	80
Acenaphthylene	ug/g	0.0050	<0.050	<0.050	nc	80
Anthracene	ug/g	0.0050	0.068	0.074	8	80
Benzo(a)anthracene	ug/g	0.0050	0.25	0.26	4	80
Benzo(a)pyrene	ug/g	0.0050	0.27	0.26	4	80
Benzo(b/j)fluoranthene	ug/g	0.0050	0.35	0.35	0	80
Benzo(ghi)perylene	ug/g	0.0050	0.69	0.55	23	80
Benzo(k)fluoranthene	ug/g	0.0050	0.11	0.11	0	80
Chrysene	ug/g	0.0050	0.22	0.22	0	80
Dibenz(a,h)anthracene	ug/g	0.0050	0.080	0.073	9	80
Fluoranthene	ug/g	0.0050	0.48	0.49	2	80
Fluorene	ug/g	0.0050	<0.050	<0.050	nc	80
Indeno(1,2,3-cd)pyrene	ug/g	0.0050	0.23	0.22	4	80
Methylnaphthalene, 2-(1-)	ug/g	0.0050	0.30	0.30	0	80
Naphthalene	ug/g	0.0050	0.077	0.074	4	80
Phenanthrene	ug/g	0.0050	0.33	0.33	0	80
Pyrene	ug/g	0.0050	0.39	0.41	5	80

NOTES:

Analysis by Maxxam Analytics

All results on dry weight basis; <RDL means not detected at reporting detection limit (RDL)

- means "not analysed"

nc means "not calculable" - one (or both) of the results are <5x RDL

Exceedances of alert limits are shown in **bold**

Alert Limit- since laboratory duplicate measures laboratory precision while field duplicates measures laboratory and field precision, the alert limits for field duplicates are two times the laboratory RPD .

TABLE 11 RELATIVE PERCENT DIFFERENCES
PETROLEUM HYDROCARBONS - GROUNDWATER
177 Armstrong Street and 268 Carruthers Avenue, Ottawa

Parameter	Units	RDL	BH-4	MW-10	RPD (%)	Alert Limit (%)
			19-Sep-19	19-Sep-19		
Petroleum Hydrocarbons						
PHC F_1 (>C_6-C10)	ug/L	25	<25	<25	nc	60
PHC F_2 (>C_{10}-C_{16})	ug/L	100	<100	<100	nc	60
PHC F_3 (>C_{16}-C_{34})	ug/L	100	<200	<200	nc	60
PHC F_4 (>C_{34}-C_{50})	ug/L	100	<200	<200	nc	60
Volatiles						
Benzene	ug/L	0.20	<0.20	<0.20	nc	60
Ethylbenzene	ug/L	0.20	<0.20	<0.20	nc	60
Toluene	ug/L	0.20	<0.20	<0.20	nc	60
Total Xylenes	ug/L	0.20	<0.20	<0.20	nc	60

NOTES:

Analysis by Maxxam Analytics

<RDL means not detected at reporting detection limit (RDL)

- means "not analysed"

nc means "not calculable" - one (or both) of the results are <5x RDL

Exceedances of alert limits are shown in **bold**

Alert Limit- since laboratory duplicate measures laboratory precision while field duplicates measures laboratory and field precision, the alert limits for field duplicates are two times the laboratory RPD .

TABLE 12 RELATIVE PERCENT DIFFERENCES
VOLATILE ORGANIC COMPOUNDS - GROUNDWATER
177 Armstrong Street and 268 Carruthers Avenue, Ottawa

Parameter	Units	RDL	BH-4	MW-10	RPD (%)	Alert Limit (%)
			19-Sep-19	19-Sep-19		
Volatiles						
Acetone	ug/L	10	<10	<10	nc	60
Benzene	ug/L	0.20	<0.20	<0.20	nc	60
Bromodichloromethane	ug/L	0.50	<0.50	<0.50	nc	60
Bromoform	ug/L	1.0	<1.0	<1.0	nc	60
Bromomethane	ug/L	0.50	<0.50	<0.50	nc	60
Carbon Tetrachloride	ug/L	0.20	<0.20	<0.20	nc	60
Chlorobenzene	ug/L	0.20	<0.20	<0.20	nc	60
Chloroform	ug/L	0.20	<0.20	<0.20	nc	60
Dibromochloromethane	ug/L	0.50	<0.50	<0.50	nc	60
1,2-Dichlorobenzene	ug/L	0.50	<0.50	<0.50	nc	60
1,3-Dichlorobenzene	ug/L	0.50	<0.50	<0.50	nc	60
1,4-Dichlorobenzene	ug/L	0.50	<0.50	<0.50	nc	60
Dichlorodifluoromethane	ug/L	1.0	<1.0	<1.0	nc	60
1,1-Dichloroethane	ug/L	0.20	<0.20	<0.20	nc	60
1,2-Dichloroethane	ug/L	0.50	<0.50	<0.50	nc	60
1,1-Dichloroethylene	ug/L	0.20	<0.20	<0.20	nc	60
Cis-1,2-Dichloroethylene	ug/L	0.50	<0.50	<0.50	nc	60
Trans-1,2-Dichloroethylene	ug/L	0.50	<0.50	<0.50	nc	60
1,2-Dichloropropane	ug/L	0.20	<0.20	<0.20	nc	60
Cis-1,3-Dichloropropylene	ug/L	0.30	<0.50	<0.50	nc	60
Trans-1,3-Dichloropropylene	ug/L	0.40			nc	60
Ethylbenzene	ug/L	0.20	<0.20	<0.20	nc	60
Ethylene Dibromide	ug/L	0.20	<0.20	<0.20	nc	60
Hexane(n)	ug/L	1.0	<1.0	<1.0	nc	60
Methylene Chloride	ug/L	2.0	<2.0	<2.0	nc	60
Methyl Ethyl Ketone	ug/L	10	<10	<10	nc	60
Methyl Isobutyl Ketone	ug/L	5.0	<5.0	<5.0	nc	60
Methyl-t-Butyl Ether	ug/L	0.50	<0.50	<0.50	nc	60
Styrene	ug/L	0.50	<0.50	<0.50	nc	60
1,1,1,2-Tetrachloroethane	ug/L	0.50	<0.50	<0.50	nc	60
1,1,2,2-Tetrachloroethane	ug/L	0.20	<0.50	<0.50	nc	60
Tetrachloroethylene	ug/L	0.20	<0.20	<0.20	nc	60
Toluene	ug/L	0.20	<0.20	<0.20	nc	60
1,1,1-Trichloroethane	ug/L	0.20	<0.20	<0.20	nc	60
1,1,2-Trichloroethane	ug/L	0.50	<0.50	<0.50	nc	60
Trichloroethylene	ug/L	0.20	<0.20	<0.20	nc	60
Trichlorofluoromethane	ug/L	0.50	<0.50	<0.50	nc	60
Vinyl Chloride	ug/L	0.20	<0.20	<0.20	nc	60
Total Xylenes	ug/L	0.20	<0.20	<0.20	nc	60

NOTES:

Analysis by Maxxam Analytics

<RDL means not detected at reporting detection limit (RDL)

- means "not analysed"

nc means "not calculable" - one (or both) of the results are <5x RDL

Exceedances of alert limits are shown in **bold**

Alert Limit- since laboratory duplicate measures laboratory precision while field duplicates measures laboratory and field precision, the alert limits for field duplicates are two times the laboratory RPD .

Appendix E – Laboratory Certificates of Analysis

Your Project #: OTT-00252997-B0
Your C.O.C. #: 732795-01-01

Attention: Mark McCalla

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

Report Date: 2019/09/11
Report #: R5875573
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9O6633
Received: 2019/09/04, 15:10

Sample Matrix: Soil
Samples Received: 7

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
Methylnaphthalene Sum (1)	7	N/A	2019/09/10	CAM SOP-00301	EPA 8270D m
Hot Water Extractable Boron (1)	7	2019/09/07	2019/09/09	CAM SOP-00408	R153 Ana. Prot. 2011
Hexavalent Chromium in Soil by IC (1, 2)	7	2019/09/06	2019/09/10	CAM SOP-00436	EPA 3060/7199 m
Petroleum Hydro. CCME F1 & BTEX in Soil (1, 3)	4	N/A	2019/09/07	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydro. CCME F1 & BTEX in Soil (1, 3)	3	N/A	2019/09/09	CAM SOP-00315	CCME PHC-CWS m
Petroleum Hydrocarbons F2-F4 in Soil (1, 4)	7	2019/09/07	2019/09/10	CAM SOP-00316	CCME CWS m
F4G (CCME Hydrocarbons Gravimetric) (1)	7	2019/09/11	2019/09/11	CAM SOP-00316	CCME PHC-CWS m
Strong Acid Leachable Metals by ICPMS (1)	5	2019/09/07	2019/09/09	CAM SOP-00447	EPA 6020B m
Strong Acid Leachable Metals by ICPMS (1)	2	2019/09/07	2019/09/10	CAM SOP-00447	EPA 6020B m
Moisture (1)	7	N/A	2019/09/07	CAM SOP-00445	Carter 2nd ed 51.2 m
PAH Compounds in Soil by GC/MS (SIM) (1)	7	2019/09/07	2019/09/08	CAM SOP-00318	EPA 8270D m

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Laboratories Mississauga

Your Project #: OTT-00252997-B0
Your C.O.C. #: 732795-01-01

Attention: Mark McCalla

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

Report Date: 2019/09/11
Report #: R5875573
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9O6633

Received: 2019/09/04, 15:10

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

Encryption Key

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

==========

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

O.REG 153 METALS PACKAGE (SOIL)

BV Labs ID		KRR586		KRR583		KRR584		
Sampling Date		2019/08/30 15:00		2019/09/03 08:00		2019/09/03 09:00		
COC Number		732795-01-01		732795-01-01		732795-01-01		
	UNITS	**BH1-SS1**	**QC Batch**	**BH2-SS1**	**QC Batch**	**BH3-SS1**	**RDL**	**QC Batch**
Inorganics								
Chromium (VI)	ug/g	<0.2	6319525	<0.2	6319525	<0.2	0.2	6319525
Metals								
Hot Water Ext. Boron (B)	ug/g	0.43	6320745	0.52	6320586	0.77	0.050	6320745
Acid Extractable Antimony (Sb)	ug/g	0.48	6320513	0.52	6320513	2.9	0.20	6320625
Acid Extractable Arsenic (As)	ug/g	2.3	6320513	2.3	6320513	7.7	1.0	6320625
Acid Extractable Barium (Ba)	ug/g	130	6320513	180	6320513	150	0.50	6320625
Acid Extractable Beryllium (Be)	ug/g	0.37	6320513	0.26	6320513	0.54	0.20	6320625
Acid Extractable Boron (B)	ug/g	9.1	6320513	9.4	6320513	9.2	5.0	6320625
Acid Extractable Cadmium (Cd)	ug/g	0.23	6320513	0.80	6320513	0.85	0.10	6320625
Acid Extractable Chromium (Cr)	ug/g	20	6320513	14	6320513	19	1.0	6320625
Acid Extractable Cobalt (Co)	ug/g	5.8	6320513	4.6	6320513	7.3	0.10	6320625
Acid Extractable Copper (Cu)	ug/g	19	6320513	14	6320513	43	0.50	6320625
Acid Extractable Lead (Pb)	ug/g	41	6320513	140	6320513	280	1.0	6320625
Acid Extractable Molybdenum (Mo)	ug/g	1.0	6320513	1.0	6320513	3.2	0.50	6320625
Acid Extractable Nickel (Ni)	ug/g	14	6320513	10	6320513	18	0.50	6320625
Acid Extractable Selenium (Se)	ug/g	<0.50	6320513	<0.50	6320513	0.93	0.50	6320625
Acid Extractable Silver (Ag)	ug/g	<0.20	6320513	<0.20	6320513	0.25	0.20	6320625
Acid Extractable Thallium (Tl)	ug/g	0.13	6320513	0.14	6320513	0.21	0.050	6320625
Acid Extractable Uranium (U)	ug/g	0.51	6320513	0.50	6320513	0.49	0.050	6320625
Acid Extractable Vanadium (V)	ug/g	28	6320513	22	6320513	26	5.0	6320625
Acid Extractable Zinc (Zn)	ug/g	46	6320513	160	6320513	230	5.0	6320625
Acid Extractable Mercury (Hg)	ug/g	0.13	6320513	<0.050	6320513	0.089	0.050	6320625

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 METALS PACKAGE (SOIL)

BV Labs ID		KRR580	KRR581			KRR581		
Sampling Date		2019/08/30 08:00	2019/08/30 12:00			2019/08/30 12:00		
COC Number		732795-01-01	732795-01-01			732795-01-01		
	UNITS	**BH6-SS1**	**BH7-SS1**	**RDL**	**QC Batch**	**BH7-SS1 Lab-Dup**	**RDL**	**QC Batch**
Inorganics								
Chromium (VI)	ug/g	<0.2	<0.2	0.2	6319525			
Metals								
Hot Water Ext. Boron (B)	ug/g	0.50	0.49	0.050	6320745	0.49	0.050	6320745
Acid Extractable Antimony (Sb)	ug/g	0.43	6.3	0.20	6320513			
Acid Extractable Arsenic (As)	ug/g	4.8	4.8	1.0	6320513			
Acid Extractable Barium (Ba)	ug/g	350	190	0.50	6320513			
Acid Extractable Beryllium (Be)	ug/g	0.31	0.32	0.20	6320513			
Acid Extractable Boron (B)	ug/g	10	10	5.0	6320513			
Acid Extractable Cadmium (Cd)	ug/g	<0.10	0.99	0.10	6320513			
Acid Extractable Chromium (Cr)	ug/g	7.9	14	1.0	6320513			
Acid Extractable Cobalt (Co)	ug/g	4.4	5.0	0.10	6320513			
Acid Extractable Copper (Cu)	ug/g	18	44	0.50	6320513			
Acid Extractable Lead (Pb)	ug/g	37	670	1.0	6320513			
Acid Extractable Molybdenum (Mo)	ug/g	1.1	1.3	0.50	6320513			
Acid Extractable Nickel (Ni)	ug/g	10	15	0.50	6320513			
Acid Extractable Selenium (Se)	ug/g	<0.50	<0.50	0.50	6320513			
Acid Extractable Silver (Ag)	ug/g	<0.20	0.22	0.20	6320513			
Acid Extractable Thallium (Tl)	ug/g	0.23	0.11	0.050	6320513			
Acid Extractable Uranium (U)	ug/g	0.32	0.37	0.050	6320513			
Acid Extractable Vanadium (V)	ug/g	8.3	35	5.0	6320513			
Acid Extractable Zinc (Zn)	ug/g	24	240	5.0	6320513			
Acid Extractable Mercury (Hg)	ug/g	<0.050	0.11	0.050	6320513			

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

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O.REG 153 METALS PACKAGE (SOIL)

BV Labs ID		KRR585		KRR582		
Sampling Date		2019/09/03 10:00		2019/08/30 12:00		
COC Number		732795-01-01		732795-01-01		
	UNITS	**BH8-SS2**	**QC Batch**	**DUPE**	**RDL**	**QC Batch**
Inorganics						
Chromium (VI)	ug/g	<0.2	6319525	<0.2	0.2	6319525
Metals						
Hot Water Ext. Boron (B)	ug/g	1.8	6320745	0.43	0.050	6320745
Acid Extractable Antimony (Sb)	ug/g	0.83	6320513	11	0.20	6320625
Acid Extractable Arsenic (As)	ug/g	15	6320513	5.9	1.0	6320625
Acid Extractable Barium (Ba)	ug/g	230	6320513	230	0.50	6320625
Acid Extractable Beryllium (Be)	ug/g	0.94	6320513	0.39	0.20	6320625
Acid Extractable Boron (B)	ug/g	19	6320513	9.1	5.0	6320625
Acid Extractable Cadmium (Cd)	ug/g	1.0	6320513	1.4	0.10	6320625
Acid Extractable Chromium (Cr)	ug/g	39	6320513	13	1.0	6320625
Acid Extractable Cobalt (Co)	ug/g	8.6	6320513	5.1	0.10	6320625
Acid Extractable Copper (Cu)	ug/g	70	6320513	45	0.50	6320625
Acid Extractable Lead (Pb)	ug/g	200	6320513	920	1.0	6320625
Acid Extractable Molybdenum (Mo)	ug/g	3.3	6320513	1.5	0.50	6320625
Acid Extractable Nickel (Ni)	ug/g	21	6320513	15	0.50	6320625
Acid Extractable Selenium (Se)	ug/g	0.74	6320513	<0.50	0.50	6320625
Acid Extractable Silver (Ag)	ug/g	0.34	6320513	0.37	0.20	6320625
Acid Extractable Thallium (Tl)	ug/g	0.51	6320513	0.10	0.050	6320625
Acid Extractable Uranium (U)	ug/g	0.90	6320513	0.42	0.050	6320625
Acid Extractable Vanadium (V)	ug/g	41	6320513	27	5.0	6320625
Acid Extractable Zinc (Zn)	ug/g	160	6320513	330	5.0	6320625
Acid Extractable Mercury (Hg)	ug/g	0.15	6320513	0.15	0.050	6320625

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 PAHS (SOIL)

BV Labs ID		KRR586		KRR583	KRR584		KRR580	KRR581		
Sampling Date		2019/08/30 15:00		2019/09/03 08:00	2019/09/03 09:00		2019/08/30 08:00	2019/08/30 12:00		
COC Number		732795-01-01		732795-01-01	732795-01-01		732795-01-01	732795-01-01		
	UNITS	**BH1-SS1**	**RDL**	**BH2-SS1**	**BH3-SS1**	**RDL**	**BH6-SS1**	**BH7-SS1**	**RDL**	**QC Batch**
Calculated Parameters										
Methylnaphthalene, 2-(1-)	ug/g	<0.071	0.071	0.035	0.46	0.0071	<0.071	0.30	0.071	6318430
Polyaromatic Hydrocarbons										
Acenaphthene	ug/g	<0.050	0.050	0.0082	0.013	0.0050	<0.050	<0.050	0.050	6320498
Acenaphthylene	ug/g	<0.050	0.050	0.083	0.082	0.0050	<0.050	<0.050	0.050	6320498
Anthracene	ug/g	<0.050	0.050	0.064	0.074	0.0050	<0.050	0.068	0.050	6320498
Benzo(a)anthracene	ug/g	<0.050	0.050	0.25	0.71	0.0050	<0.050	0.25	0.050	6320498
Benzo(a)pyrene	ug/g	<0.050	0.050	0.25	0.55	0.0050	<0.050	0.27	0.050	6320498
Benzo(b/j)fluoranthene	ug/g	<0.050	0.050	0.41	0.91	0.0050	0.073	0.35	0.050	6320498
Benzo(g,h,i)perylene	ug/g	0.059	0.050	0.22	0.40	0.0050	0.053	0.69	0.050	6320498
Benzo(k)fluoranthene	ug/g	<0.050	0.050	0.15	0.32	0.0050	<0.050	0.11	0.050	6320498
Chrysene	ug/g	<0.050	0.050	0.27	0.58	0.0050	<0.050	0.22	0.050	6320498
Dibenz(a,h)anthracene	ug/g	<0.050	0.050	0.068	0.13	0.0050	<0.050	0.080	0.050	6320498
Fluoranthene	ug/g	<0.050	0.050	0.66	0.88	0.0050	0.066	0.48	0.050	6320498
Fluorene	ug/g	<0.050	0.050	0.031	0.0087	0.0050	<0.050	<0.050	0.050	6320498
Indeno(1,2,3-cd)pyrene	ug/g	<0.050	0.050	0.23	0.41	0.0050	<0.050	0.23	0.050	6320498
1-Methylnaphthalene	ug/g	<0.050	0.050	0.017	0.23	0.0050	<0.050	0.13	0.050	6320498
2-Methylnaphthalene	ug/g	<0.050	0.050	0.018	0.23	0.0050	<0.050	0.17	0.050	6320498
Naphthalene	ug/g	<0.050	0.050	0.014	0.12	0.0050	<0.050	0.077	0.050	6320498
Phenanthrene	ug/g	<0.050	0.050	0.42	0.29	0.0050	<0.050	0.33	0.050	6320498
Pyrene	ug/g	<0.050	0.050	0.47	0.78	0.0050	0.067	0.39	0.050	6320498
Surrogate Recovery (%)										
D10-Anthracene	%	102		101	89		107	102		6320498
D14-Terphenyl (FS)	%	109		124	111		115	112		6320498
D8-Acenaphthylene	%	94		102	93		101	98		6320498

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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O.REG 153 PAHS (SOIL)

BV Labs ID		KRR585	KRR582		
Sampling Date		2019/09/03 10:00	2019/08/30 12:00		
COC Number		732795-01-01	732795-01-01		
	UNITS	**BH8-SS2**	**DUPE**	**RDL**	**QC Batch**
Calculated Parameters					
Methylnaphthalene, 2-(1-)	ug/g	0.15	0.30	0.071	6318430
Polyaromatic Hydrocarbons					
Acenaphthene	ug/g	<0.050	<0.050	0.050	6320498
Acenaphthylene	ug/g	<0.050	<0.050	0.050	6320498
Anthracene	ug/g	<0.050	0.074	0.050	6320498
Benzo(a)anthracene	ug/g	0.12	0.26	0.050	6320498
Benzo(a)pyrene	ug/g	0.14	0.26	0.050	6320498
Benzo(b/j)fluoranthene	ug/g	0.20	0.35	0.050	6320498
Benzo(g,h,i)perylene	ug/g	0.27	0.55	0.050	6320498
Benzo(k)fluoranthene	ug/g	0.069	0.11	0.050	6320498
Chrysene	ug/g	0.11	0.22	0.050	6320498
Dibenz(a,h)anthracene	ug/g	<0.050	0.073	0.050	6320498
Fluoranthene	ug/g	0.24	0.49	0.050	6320498
Fluorene	ug/g	<0.050	<0.050	0.050	6320498
Indeno(1,2,3-cd)pyrene	ug/g	0.13	0.22	0.050	6320498
1-Methylnaphthalene	ug/g	0.062	0.13	0.050	6320498
2-Methylnaphthalene	ug/g	0.092	0.17	0.050	6320498
Naphthalene	ug/g	<0.050	0.074	0.050	6320498
Phenanthrene	ug/g	0.12	0.33	0.050	6320498
Pyrene	ug/g	0.21	0.41	0.050	6320498
Surrogate Recovery (%)					
D10-Anthracene	%	102	96		6320498
D14-Terphenyl (FS)	%	108	102		6320498
D8-Acenaphthylene	%	93	90		6320498

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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

BV Labs ID		KRR586	KRR583	KRR584	KRR580	KRR581	KRR585		
Sampling Date		2019/08/30 15:00	2019/09/03 08:00	2019/09/03 09:00	2019/08/30 08:00	2019/08/30 12:00	2019/09/03 10:00		
COC Number		732795-01-01	732795-01-01	732795-01-01	732795-01-01	732795-01-01	732795-01-01		
	UNITS	**BH1-SS1**	**BH2-SS1**	**BH3-SS1**	**BH6-SS1**	**BH7-SS1**	**BH8-SS2**	**RDL**	**QC Batch**
Inorganics									
Moisture	%	6.4	5.6	6.0	5.1	9.0	26	1.0	6320461
BTEX & F1 Hydrocarbons									
Benzene	ug/g	<0.020	<0.020	0.029	<0.020	0.071	<0.020	0.020	6320488
Toluene	ug/g	<0.020	<0.020	0.12	<0.020	0.17	0.020	0.020	6320488
Ethylbenzene	ug/g	<0.020	<0.020	0.038	<0.020	0.032	<0.020	0.020	6320488
o-Xylene	ug/g	<0.020	<0.020	0.21	<0.020	0.096	0.022	0.020	6320488
p+m-Xylene	ug/g	<0.040	<0.040	0.23	<0.040	0.12	<0.040	0.040	6320488
Total Xylenes	ug/g	<0.040	<0.040	0.44	<0.040	0.22	<0.040	0.040	6320488
F1 (C6-C10)	ug/g	<10	<10	<10	<10	<10	<10	10	6320488
F1 (C6-C10) - BTEX	ug/g	<10	<10	<10	<10	<10	<10	10	6320488
F2-F4 Hydrocarbons									
F2 (C10-C16 Hydrocarbons)	ug/g	50	<10	<10	20	31	17	10	6320491
F3 (C16-C34 Hydrocarbons)	ug/g	590	53	120	160	2200	100	50	6320491
F4 (C34-C50 Hydrocarbons)	ug/g	580	51	96	580	2300	120	50	6320491
Reached Baseline at C50	ug/g	No	No	No	No	No	No		6320491
Surrogate Recovery (%)									
1,4-Difluorobenzene	%	100	100	102	100	102	100		6320488
4-Bromofluorobenzene	%	100	101	103	99	100	101		6320488
D10-Ethylbenzene	%	109	103	96	103	98	103		6320488
D4-1,2-Dichloroethane	%	99	96	98	96	102	96		6320488
o-Terphenyl	%	100	97	94	97	93	96		6320491

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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

BV Labs ID		KRR582		
Sampling Date		2019/08/30 12:00		
COC Number		732795-01-01		
	UNITS	**DUPE**	**RDL**	**QC Batch**
Inorganics				
Moisture	%	9.7	1.0	6320461
BTEX & F1 Hydrocarbons				
Benzene	ug/g	0.093	0.020	6320488
Toluene	ug/g	0.27	0.020	6320488
Ethylbenzene	ug/g	0.058	0.020	6320488
o-Xylene	ug/g	0.17	0.020	6320488
p+m-Xylene	ug/g	0.21	0.040	6320488
Total Xylenes	ug/g	0.38	0.040	6320488
F1 (C6-C10)	ug/g	<10	10	6320488
F1 (C6-C10) - BTEX	ug/g	<10	10	6320488
F2-F4 Hydrocarbons				
F2 (C10-C16 Hydrocarbons)	ug/g	32	10	6320491
F3 (C16-C34 Hydrocarbons)	ug/g	1900	50	6320491
F4 (C34-C50 Hydrocarbons)	ug/g	1900	50	6320491
Reached Baseline at C50	ug/g	No		6320491
Surrogate Recovery (%)				
1,4-Difluorobenzene	%	101		6320488
4-Bromofluorobenzene	%	99		6320488
D10-Ethylbenzene	%	103		6320488
D4-1,2-Dichloroethane	%	100		6320488
o-Terphenyl	%	91		6320491

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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PETROLEUM HYDROCARBONS (CCME)

BV Labs ID		KRR586	KRR583	KRR584	KRR580	KRR581	KRR585		
Sampling Date		2019/08/30 15:00	2019/09/03 08:00	2019/09/03 09:00	2019/08/30 08:00	2019/08/30 12:00	2019/09/03 10:00		
COC Number		732795-01-01	732795-01-01	732795-01-01	732795-01-01	732795-01-01	732795-01-01		
	UNITS	**BH1-SS1**	**BH2-SS1**	**BH3-SS1**	**BH6-SS1**	**BH7-SS1**	**BH8-SS2**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons									
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	2800	200	370	1900	8300	350	100	6325709
RDL = Reportable Detection Limit QC Batch = Quality Control Batch									

BV Labs ID		KRR582		
Sampling Date		2019/08/30 12:00		
COC Number		732795-01-01		
	UNITS	**DUPE**	**RDL**	**QC Batch**
F2-F4 Hydrocarbons				
F4G-sg (Grav. Heavy Hydrocarbons)	ug/g	6200	100	6325709
RDL = Reportable Detection Limit QC Batch = Quality Control Batch				

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TEST SUMMARY

BV Labs ID: KRR580
Sample ID: BH6-SS1
Matrix: Soil

Collected: 2019/08/30
Shipped:
Received: 2019/09/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6318430	N/A	2019/09/10	Automated Statchk
Hot Water Extractable Boron	ICP	6320745	2019/09/07	2019/09/09	Jolly John
Hexavalent Chromium in Soil by IC	IC/SPEC	6319525	2019/09/06	2019/09/10	Sally Norouz Coughlin
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6320488	N/A	2019/09/07	Haibin Wu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6320491	2019/09/07	2019/09/10	Prabhjot Gulati
F4G (CCME Hydrocarbons Gravimetric)	BAL	6325709	2019/09/11	2019/09/11	Rashmi Dubey
Strong Acid Leachable Metals by ICPMS	ICP/MS	6320513	2019/09/07	2019/09/09	Viviana Canzonieri
Moisture	BAL	6320461	N/A	2019/09/07	Mithunaa Sasitheepan
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6320498	2019/09/07	2019/09/08	Lingyun Feng

BV Labs ID: KRR581
Sample ID: BH7-SS1
Matrix: Soil

Collected: 2019/08/30
Shipped:
Received: 2019/09/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6318430	N/A	2019/09/10	Automated Statchk
Hot Water Extractable Boron	ICP	6320745	2019/09/07	2019/09/09	Jolly John
Hexavalent Chromium in Soil by IC	IC/SPEC	6319525	2019/09/06	2019/09/10	Sally Norouz Coughlin
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6320488	N/A	2019/09/09	Haibin Wu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6320491	2019/09/07	2019/09/10	Prabhjot Gulati
F4G (CCME Hydrocarbons Gravimetric)	BAL	6325709	2019/09/11	2019/09/11	Rashmi Dubey
Strong Acid Leachable Metals by ICPMS	ICP/MS	6320513	2019/09/07	2019/09/09	Viviana Canzonieri
Moisture	BAL	6320461	N/A	2019/09/07	Mithunaa Sasitheepan
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6320498	2019/09/07	2019/09/08	Lingyun Feng

BV Labs ID: KRR581 Dup
Sample ID: BH7-SS1
Matrix: Soil

Collected: 2019/08/30
Shipped:
Received: 2019/09/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6320745	2019/09/07	2019/09/09	Jolly John

BV Labs ID: KRR582
Sample ID: DUPE
Matrix: Soil

Collected: 2019/08/30
Shipped:
Received: 2019/09/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6318430	N/A	2019/09/10	Automated Statchk
Hot Water Extractable Boron	ICP	6320745	2019/09/07	2019/09/09	Jolly John
Hexavalent Chromium in Soil by IC	IC/SPEC	6319525	2019/09/06	2019/09/10	Sally Norouz Coughlin
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6320488	N/A	2019/09/09	Haibin Wu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6320491	2019/09/07	2019/09/10	Prabhjot Gulati
F4G (CCME Hydrocarbons Gravimetric)	BAL	6325709	2019/09/11	2019/09/11	Rashmi Dubey
Strong Acid Leachable Metals by ICPMS	ICP/MS	6320625	2019/09/07	2019/09/10	Daniel Teclu
Moisture	BAL	6320461	N/A	2019/09/07	Mithunaa Sasitheepan
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6320498	2019/09/07	2019/09/08	Lingyun Feng

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TEST SUMMARY

BV Labs ID: KRR583
Sample ID: BH2-SS1
Matrix: Soil

Collected: 2019/09/03
Shipped:
Received: 2019/09/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6318430	N/A	2019/09/10	Automated Statchk
Hot Water Extractable Boron	ICP	6320586	2019/09/07	2019/09/09	Jolly John
Hexavalent Chromium in Soil by IC	IC/SPEC	6319525	2019/09/06	2019/09/10	Sally Norouz Coughlin
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6320488	N/A	2019/09/07	Haibin Wu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6320491	2019/09/07	2019/09/10	Prabhjot Gulati
F4G (CCME Hydrocarbons Gravimetric)	BAL	6325709	2019/09/11	2019/09/11	Rashmi Dubey
Strong Acid Leachable Metals by ICPMS	ICP/MS	6320513	2019/09/07	2019/09/09	Viviana Canzonieri
Moisture	BAL	6320461	N/A	2019/09/07	Mithunaa Sasitheepan
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6320498	2019/09/07	2019/09/08	Lingyun Feng

BV Labs ID: KRR584
Sample ID: BH3-SS1
Matrix: Soil

Collected: 2019/09/03
Shipped:
Received: 2019/09/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6318430	N/A	2019/09/10	Automated Statchk
Hot Water Extractable Boron	ICP	6320745	2019/09/07	2019/09/09	Jolly John
Hexavalent Chromium in Soil by IC	IC/SPEC	6319525	2019/09/06	2019/09/10	Sally Norouz Coughlin
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6320488	N/A	2019/09/07	Haibin Wu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6320491	2019/09/07	2019/09/10	Prabhjot Gulati
F4G (CCME Hydrocarbons Gravimetric)	BAL	6325709	2019/09/11	2019/09/11	Rashmi Dubey
Strong Acid Leachable Metals by ICPMS	ICP/MS	6320625	2019/09/07	2019/09/10	Daniel Teclu
Moisture	BAL	6320461	N/A	2019/09/07	Mithunaa Sasitheepan
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6320498	2019/09/07	2019/09/08	Lingyun Feng

BV Labs ID: KRR585
Sample ID: BH8-SS2
Matrix: Soil

Collected: 2019/09/03
Shipped:
Received: 2019/09/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6318430	N/A	2019/09/10	Automated Statchk
Hot Water Extractable Boron	ICP	6320745	2019/09/07	2019/09/09	Jolly John
Hexavalent Chromium in Soil by IC	IC/SPEC	6319525	2019/09/06	2019/09/10	Sally Norouz Coughlin
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6320488	N/A	2019/09/07	Haibin Wu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6320491	2019/09/07	2019/09/10	Prabhjot Gulati
F4G (CCME Hydrocarbons Gravimetric)	BAL	6325709	2019/09/11	2019/09/11	Rashmi Dubey
Strong Acid Leachable Metals by ICPMS	ICP/MS	6320513	2019/09/07	2019/09/09	Viviana Canzonieri
Moisture	BAL	6320461	N/A	2019/09/07	Mithunaa Sasitheepan
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6320498	2019/09/07	2019/09/08	Lingyun Feng

BV Labs ID: KRR586
Sample ID: BH1-SS1
Matrix: Soil

Collected: 2019/08/30
Shipped:
Received: 2019/09/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Methylnaphthalene Sum	CALC	6318430	N/A	2019/09/10	Automated Statchk

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BV Labs Job #: B9O6633
Report Date: 2019/09/11

exp Services Inc
Client Project #: OTT-00252997-B0
Sampler Initials: MM

TEST SUMMARY

BV Labs ID: KRR586
Sample ID: BH1-SS1
Matrix: Soil

Collected: 2019/08/30
Shipped:
Received: 2019/09/04

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
Hot Water Extractable Boron	ICP	6320745	2019/09/07	2019/09/09	Jolly John
Hexavalent Chromium in Soil by IC	IC/SPEC	6319525	2019/09/06	2019/09/10	Sally Norouz Coughlin
Petroleum Hydro. CCME F1 & BTEX in Soil	HSGC/MSFD	6320488	N/A	2019/09/09	Haibin Wu
Petroleum Hydrocarbons F2-F4 in Soil	GC/FID	6320491	2019/09/07	2019/09/10	Prabhjot Gulati
F4G (CCME Hydrocarbons Gravimetric)	BAL	6325709	2019/09/11	2019/09/11	Rashmi Dubey
Strong Acid Leachable Metals by ICPMS	ICP/MS	6320513	2019/09/07	2019/09/09	Viviana Canzonieri
Moisture	BAL	6320461	N/A	2019/09/07	Mithunaa Sasitheepan
PAH Compounds in Soil by GC/MS (SIM)	GC/MS	6320498	2019/09/07	2019/09/08	Lingyun Feng

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GENERAL COMMENTS

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

Package 1	13.7°C

Sample KRR580 [BH6-SS1] : PAH analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample KRR581 [BH7-SS1] : PAH analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample KRR582 [DUPE] : PAH analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample KRR585 [BH8-SS2] : PAH analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Sample KRR586 [BH1-SS1] : PAH analysis: Due to the sample matrix, sample required dilution. Detection limits were adjusted accordingly.

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6320488	1,4-Difluorobenzene	2019/09/07	100	60 - 140	98	60 - 140	103	%		
6320488	4-Bromofluorobenzene	2019/09/07	103	60 - 140	105	60 - 140	103	%		
6320488	D10-Ethylbenzene	2019/09/07	115	60 - 140	96	60 - 140	100	%		
6320488	D4-1,2-Dichloroethane	2019/09/07	95	60 - 140	102	60 - 140	100	%		
6320491	o-Terphenyl	2019/09/10	104	60 - 130	96	60 - 130	100	%		
6320498	D10-Anthracene	2019/09/08	101	50 - 130	95	50 - 130	100	%		
6320498	D14-Terphenyl (FS)	2019/09/08	121	50 - 130	115	50 - 130	119	%		
6320498	D8-Acenaphthylene	2019/09/08	99	50 - 130	94	50 - 130	97	%		
6319525	Chromium (VI)	2019/09/10	59 (1)	70 - 130	93	80 - 120	<0.2	ug/g	NC	35
6320461	Moisture	2019/09/07							4.3	20
6320488	Benzene	2019/09/07	87	60 - 140	96	60 - 140	<0.020	ug/g	NC	50
6320488	Ethylbenzene	2019/09/07	99	60 - 140	92	60 - 140	<0.020	ug/g	19	50
6320488	F1 (C6-C10) - BTEX	2019/09/07					<10	ug/g	2.5	30
6320488	F1 (C6-C10)	2019/09/07	NC	60 - 140	103	80 - 120	<10	ug/g	2.5	30
6320488	o-Xylene	2019/09/07	97	60 - 140	90	60 - 140	<0.020	ug/g	39	50
6320488	p+m-Xylene	2019/09/07	99	60 - 140	92	60 - 140	<0.040	ug/g	20	50
6320488	Toluene	2019/09/07	93	60 - 140	92	60 - 140	<0.020	ug/g	NC	50
6320488	Total Xylenes	2019/09/07					<0.040	ug/g	41	50
6320491	F2 (C10-C16 Hydrocarbons)	2019/09/10	105	50 - 130	92	80 - 120	<10	ug/g	NC	30
6320491	F3 (C16-C34 Hydrocarbons)	2019/09/10	107	50 - 130	97	80 - 120	<50	ug/g	NC	30
6320491	F4 (C34-C50 Hydrocarbons)	2019/09/10	101	50 - 130	95	80 - 120	<50	ug/g	NC	30
6320498	1-Methylnaphthalene	2019/09/08	117	50 - 130	111	50 - 130	<0.0050	ug/g	NC	40
6320498	2-Methylnaphthalene	2019/09/08	111	50 - 130	105	50 - 130	<0.0050	ug/g	NC	40
6320498	Acenaphthene	2019/09/08	101	50 - 130	96	50 - 130	<0.0050	ug/g	NC	40
6320498	Acenaphthylene	2019/09/08	99	50 - 130	94	50 - 130	<0.0050	ug/g	NC	40
6320498	Anthracene	2019/09/08	93	50 - 130	91	50 - 130	<0.0050	ug/g	NC	40
6320498	Benzo(a)anthracene	2019/09/08	106	50 - 130	101	50 - 130	<0.0050	ug/g	NC	40
6320498	Benzo(a)pyrene	2019/09/08	101	50 - 130	99	50 - 130	<0.0050	ug/g	NC	40
6320498	Benzo(b/j)fluoranthene	2019/09/08	98	50 - 130	99	50 - 130	<0.0050	ug/g	12	40
6320498	Benzo(g,h,i)perylene	2019/09/08	110	50 - 130	108	50 - 130	<0.0050	ug/g	NC	40
6320498	Benzo(k)fluoranthene	2019/09/08	103	50 - 130	103	50 - 130	<0.0050	ug/g	NC	40
6320498	Chrysene	2019/09/08	91	50 - 130	87	50 - 130	<0.0050	ug/g	NC	40

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6320498	Dibenz(a,h)anthracene	2019/09/08	129	50 - 130	121	50 - 130	<0.0050	ug/g	NC	40
6320498	Fluoranthene	2019/09/08	109	50 - 130	107	50 - 130	<0.0050	ug/g	NC	40
6320498	Fluorene	2019/09/08	105	50 - 130	100	50 - 130	<0.0050	ug/g	NC	40
6320498	Indeno(1,2,3-cd)pyrene	2019/09/08	113	50 - 130	111	50 - 130	<0.0050	ug/g	NC	40
6320498	Naphthalene	2019/09/08	97	50 - 130	93	50 - 130	<0.0050	ug/g	NC	40
6320498	Phenanthrene	2019/09/08	98	50 - 130	95	50 - 130	<0.0050	ug/g	29	40
6320498	Pyrene	2019/09/08	106	50 - 130	104	50 - 130	<0.0050	ug/g	NC	40
6320513	Acid Extractable Antimony (Sb)	2019/09/09	90	75 - 125	100	80 - 120	<0.20	ug/g		
6320513	Acid Extractable Arsenic (As)	2019/09/09	100	75 - 125	104	80 - 120	<1.0	ug/g		
6320513	Acid Extractable Barium (Ba)	2019/09/09	NC	75 - 125	97	80 - 120	<0.50	ug/g		
6320513	Acid Extractable Beryllium (Be)	2019/09/09	103	75 - 125	97	80 - 120	<0.20	ug/g		
6320513	Acid Extractable Boron (B)	2019/09/09	100	75 - 125	97	80 - 120	<5.0	ug/g		
6320513	Acid Extractable Cadmium (Cd)	2019/09/09	102	75 - 125	100	80 - 120	<0.10	ug/g		
6320513	Acid Extractable Chromium (Cr)	2019/09/09	NC	75 - 125	98	80 - 120	<1.0	ug/g		
6320513	Acid Extractable Cobalt (Co)	2019/09/09	99	75 - 125	99	80 - 120	<0.10	ug/g		
6320513	Acid Extractable Copper (Cu)	2019/09/09	NC	75 - 125	99	80 - 120	<0.50	ug/g		
6320513	Acid Extractable Lead (Pb)	2019/09/09	NC	75 - 125	100	80 - 120	<1.0	ug/g		
6320513	Acid Extractable Mercury (Hg)	2019/09/09	98	75 - 125	98	80 - 120	<0.050	ug/g	0.15	30
6320513	Acid Extractable Molybdenum (Mo)	2019/09/09	101	75 - 125	98	80 - 120	<0.50	ug/g		
6320513	Acid Extractable Nickel (Ni)	2019/09/09	NC	75 - 125	101	80 - 120	<0.50	ug/g		
6320513	Acid Extractable Selenium (Se)	2019/09/09	106	75 - 125	102	80 - 120	<0.50	ug/g		
6320513	Acid Extractable Silver (Ag)	2019/09/09	103	75 - 125	102	80 - 120	<0.20	ug/g		
6320513	Acid Extractable Thallium (Tl)	2019/09/09	100	75 - 125	100	80 - 120	<0.050	ug/g		
6320513	Acid Extractable Uranium (U)	2019/09/09	100	75 - 125	98	80 - 120	<0.050	ug/g		
6320513	Acid Extractable Vanadium (V)	2019/09/09	NC	75 - 125	100	80 - 120	<5.0	ug/g		
6320513	Acid Extractable Zinc (Zn)	2019/09/09	NC	75 - 125	98	80 - 120	<5.0	ug/g		
6320586	Hot Water Ext. Boron (B)	2019/09/09	110	75 - 125	101	75 - 125	<0.050	ug/g	NC	40
6320625	Acid Extractable Antimony (Sb)	2019/09/10	105	75 - 125	99	80 - 120	<0.20	ug/g	NC	30
6320625	Acid Extractable Arsenic (As)	2019/09/10	102	75 - 125	98	80 - 120	<1.0	ug/g	15	30
6320625	Acid Extractable Barium (Ba)	2019/09/10	NC	75 - 125	97	80 - 120	<0.50	ug/g	8.2	30
6320625	Acid Extractable Beryllium (Be)	2019/09/10	99	75 - 125	100	80 - 120	<0.20	ug/g	NC	30
6320625	Acid Extractable Boron (B)	2019/09/10	97	75 - 125	100	80 - 120	<5.0	ug/g	2.6	30

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6320625	Acid Extractable Cadmium (Cd)	2019/09/10	101	75 - 125	97	80 - 120	<0.10	ug/g	2.2	30
6320625	Acid Extractable Chromium (Cr)	2019/09/10	102	75 - 125	98	80 - 120	<1.0	ug/g	18	30
6320625	Acid Extractable Cobalt (Co)	2019/09/10	100	75 - 125	99	80 - 120	<0.10	ug/g	1.7	30
6320625	Acid Extractable Copper (Cu)	2019/09/10	97	75 - 125	98	80 - 120	<0.50	ug/g	8.9	30
6320625	Acid Extractable Lead (Pb)	2019/09/10	99	75 - 125	101	80 - 120	<1.0	ug/g	3.8	30
6320625	Acid Extractable Mercury (Hg)	2019/09/10	92	75 - 125	99	80 - 120	<0.050	ug/g	2.3	30
6320625	Acid Extractable Molybdenum (Mo)	2019/09/10	106	75 - 125	98	80 - 120	<0.50	ug/g	5.0	30
6320625	Acid Extractable Nickel (Ni)	2019/09/10	98	75 - 125	99	80 - 120	<0.50	ug/g	1.6	30
6320625	Acid Extractable Selenium (Se)	2019/09/10	107	75 - 125	106	80 - 120	<0.50	ug/g	NC	30
6320625	Acid Extractable Silver (Ag)	2019/09/10	101	75 - 125	97	80 - 120	<0.20	ug/g	NC	30
6320625	Acid Extractable Thallium (Tl)	2019/09/10	99	75 - 125	103	80 - 120	<0.050	ug/g	5.1	30
6320625	Acid Extractable Uranium (U)	2019/09/10	105	75 - 125	105	80 - 120	<0.050	ug/g	5.8	30
6320625	Acid Extractable Vanadium (V)	2019/09/10	104	75 - 125	96	80 - 120	<5.0	ug/g	NC	30
6320625	Acid Extractable Zinc (Zn)	2019/09/10	NC	75 - 125	100	80 - 120	<5.0	ug/g	15	30
6320745	Hot Water Ext. Boron (B)	2019/09/09	110	75 - 125	100	75 - 125	<0.050	ug/g	0.80	40
6325709	F4G-sg (Grav. Heavy Hydrocarbons)	2019/09/11	NC	65 - 135	100	65 - 135	<100	ug/g	0	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).

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

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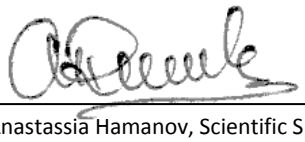
VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist

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

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Please list in order with Dupe at bottom.

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

04-Sep-19 15:10 CH Alisha Williamson

B9O6633

Page of

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#17498 exp Services Inc	Company Name:		Quotation #:	B91718 - Stream 3.
Attention:	Accounts Payable	Attention:	Mark McCalla	P.O. #:	
Address:	100-2650 Queensview Drive, Ottawa ON K2B 8H6	Address:		Project:	OTT-00252997-A0 BO
Tel:	(613) 688-1899 Fax: (613) 225-7337	Tel:	Fax:	Project Name:	
Email:	accounting.ottawa@exp.com; Karen.Burke@exp.com;	Email:	mark.mccalla@exp.com	Site #:	
				Sampled By:	

J L ENV-803

Turnaround Time (TAT) Required:

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

Regulation 153 (2011): ☐ Table 1 ☒ Res/Park ☐ Medium/Fine ☐ Table 2 ☐ Ind/Comm ☒ Coarse ☐ Table 3 ☐ Agri/Other ☐ For RSC ☒ Table 7

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

Special Instructions

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

Please provide advance notice for rush projects

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

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Field Filtered (please circle): Metals / Hg / Cr VI	O.Reg 153 PAHs (Soil)	O.Reg 153 ICPMS Metals (Soil)	O.Reg 153 Metals Package (Soil)	O.Reg 153 Petroleum Hydrocarbons (Soil)	# of Bottles	Comments
1	BH6-SS1	~~BH6-SS1~~	Aug 30	8am	Soil		✓	✓	✓	✓	4	
2	BH7-SS1	~~BH7-SS1~~	Aug 30	12pm			✓	✓	✓	✓	4	
3	Dupe		Aug 30	12pm			✓	✓	✓	✓	4	Please sort
4	BH2~~6~~-SS1		Sep 3	8am			✓	✓	✓	✓	4	the samples in
5	BH3~~7~~-SS1		Sep 3	9am			✓	✓	✓	✓	4	order with Dupe
6	BH8-SS2		Sep 3	10am			✓	✓	✓	✓	4	at the bottom.
7	BH1~~8~~-SS1		~~Sep~~ Aug 30	3pm			✓	✓	✓	✓	4	
8												
9												on ice
10												RECEIVED IN OTTAWA

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time
Mark McCalla	2019/09/04	3:10	Serge Leger	19/09/04	15:10
			Ivy L	2019/09/05	08:20

jars used and not submitted

Laboratory Use Only: Time Sensitive; Temperature (°C) on Recei 14, 14, 13; Custody Seal Present ☒ Intact ☒ (Yes / No)

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS. 7/8/8

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

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

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

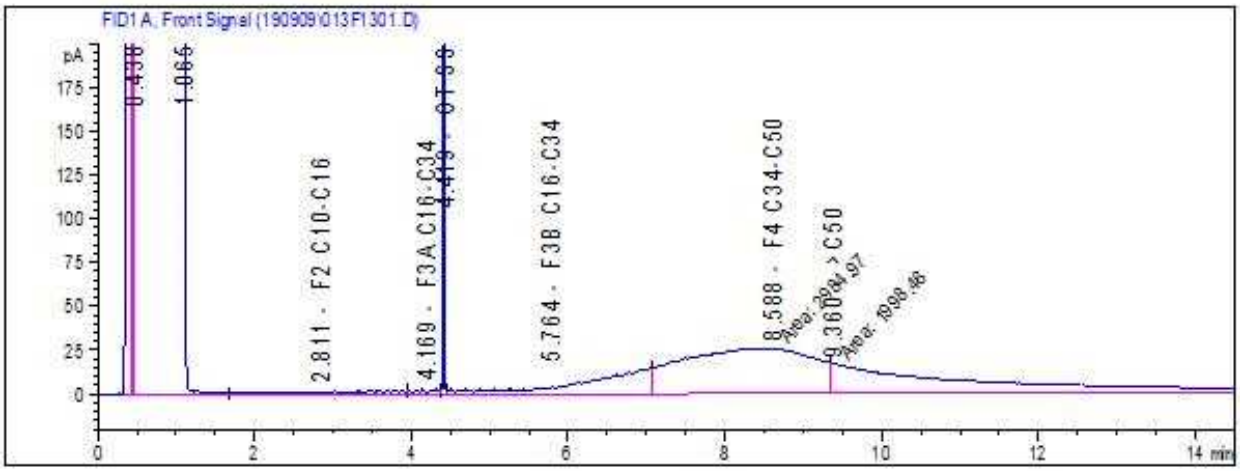
White: BV Labs Yellow: Client

Bureau Veritas Canada (2019) Inc.

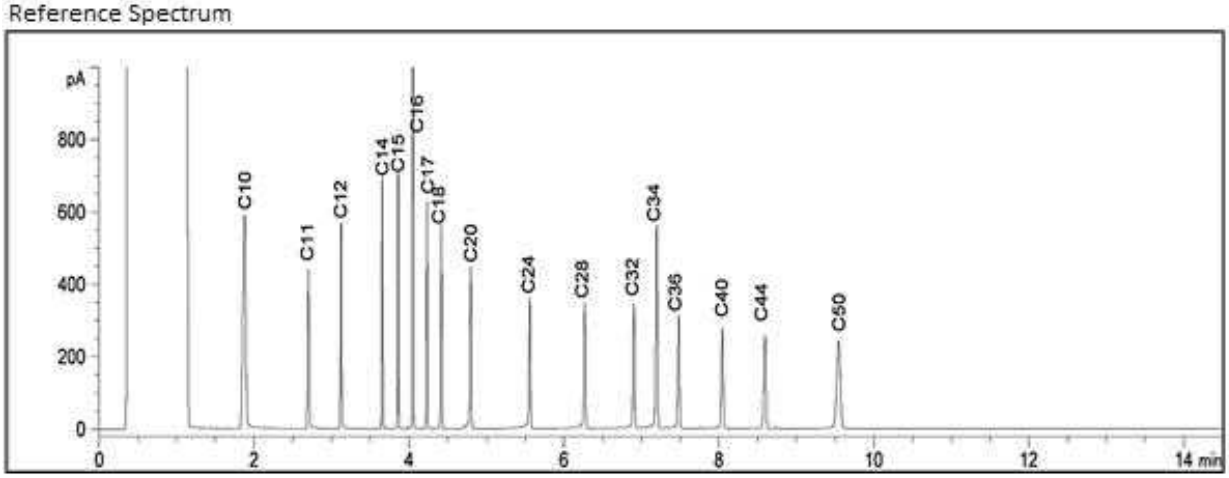
BV Labs Job #: B9O6633
Report Date: 2019/09/11
BV Labs Sample: KRR580

exp Services Inc
Client Project #: OTT-00252997-B0
Client ID: BH6-SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

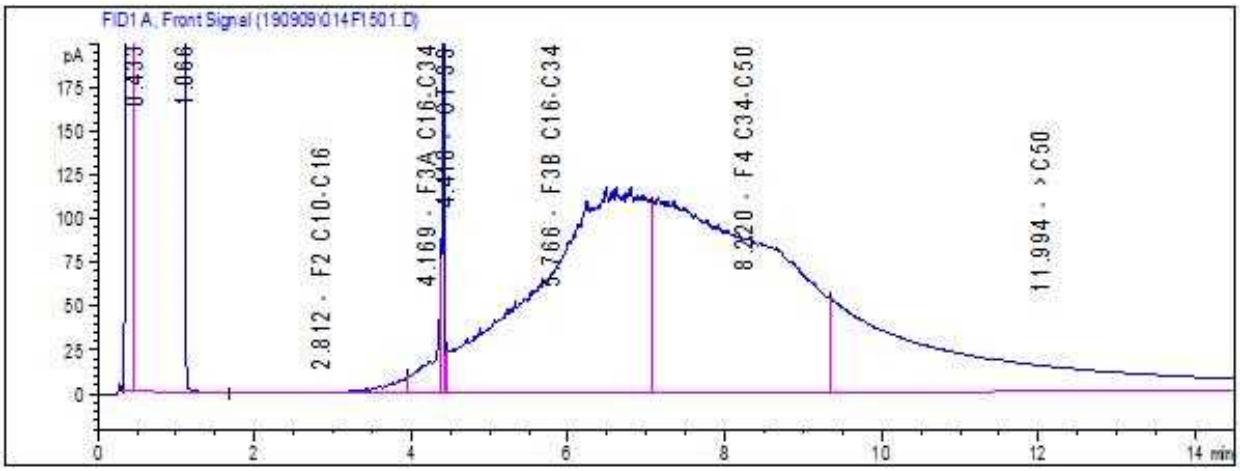
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

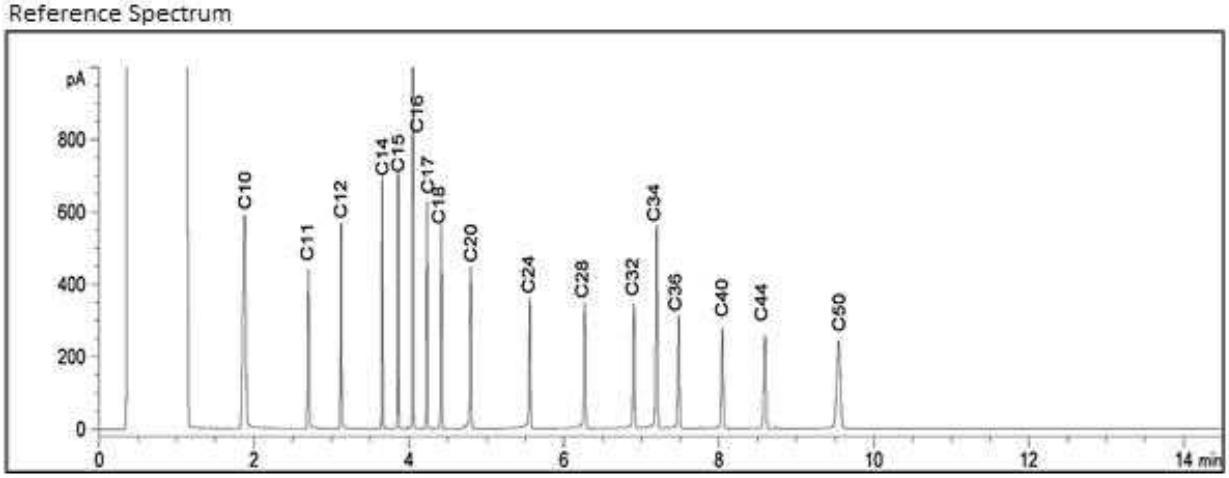
BV Labs Job #: B9O6633
Report Date: 2019/09/11
BV Labs Sample: KRR581

exp Services Inc
Client Project #: OTT-00252997-B0
Client ID: BH7-SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

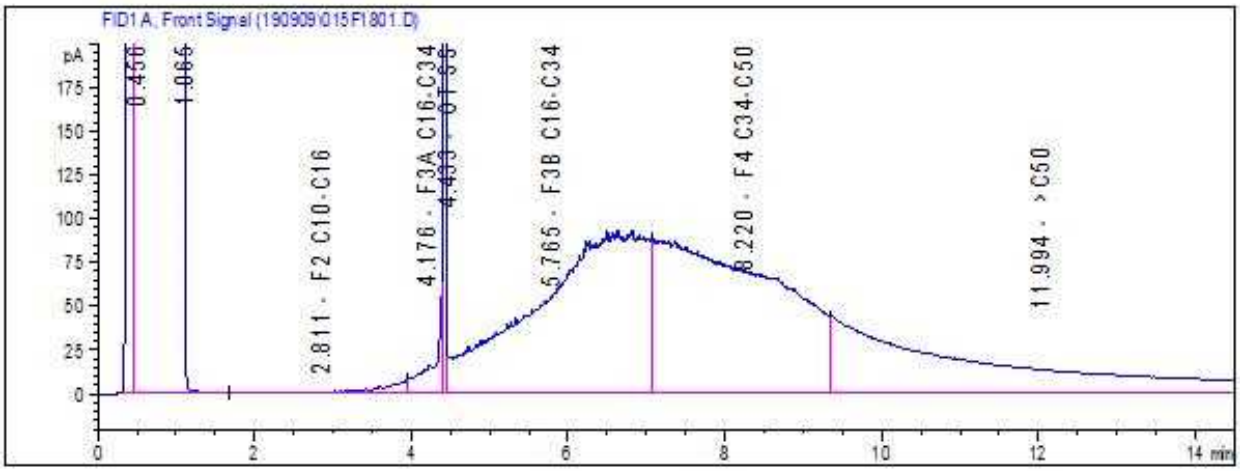
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

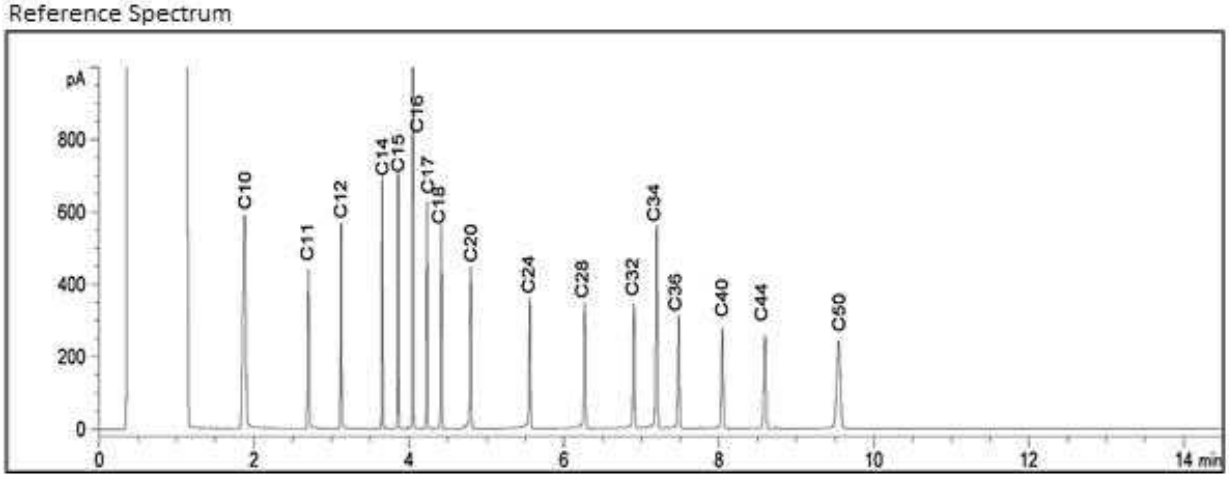
BV Labs Job #: B9O6633
Report Date: 2019/09/11
BV Labs Sample: KRR582

exp Services Inc
Client Project #: OTT-00252997-B0
Client ID: DUPE

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Reference Spectrum

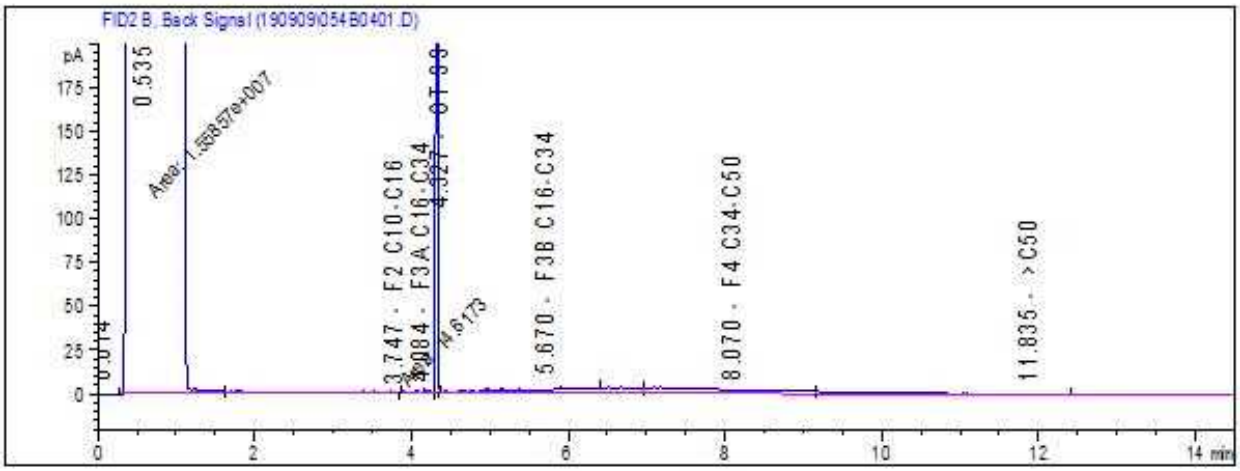


TYPICAL PRODUCT CARBON NUMBER RANGES

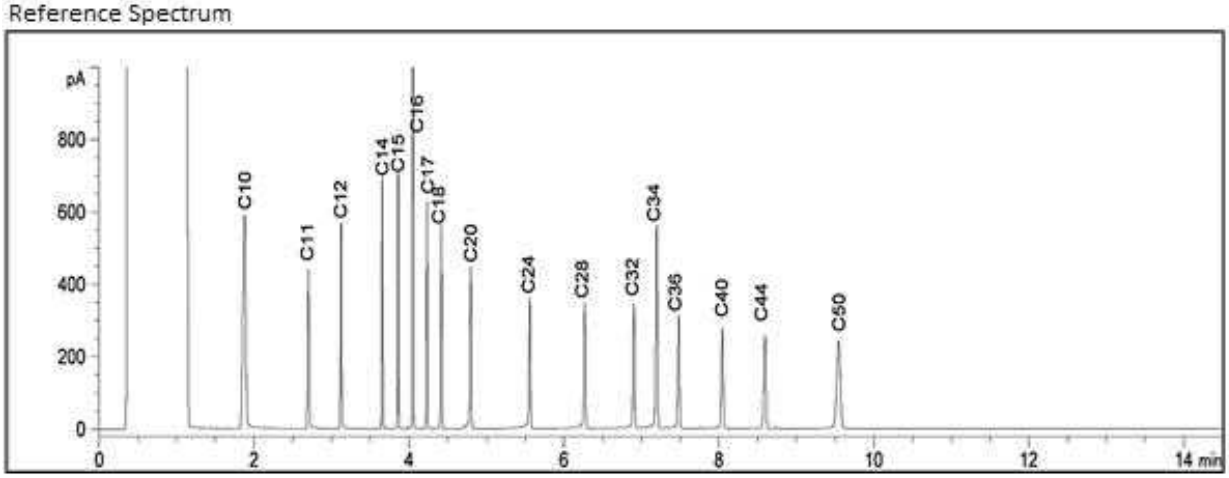
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

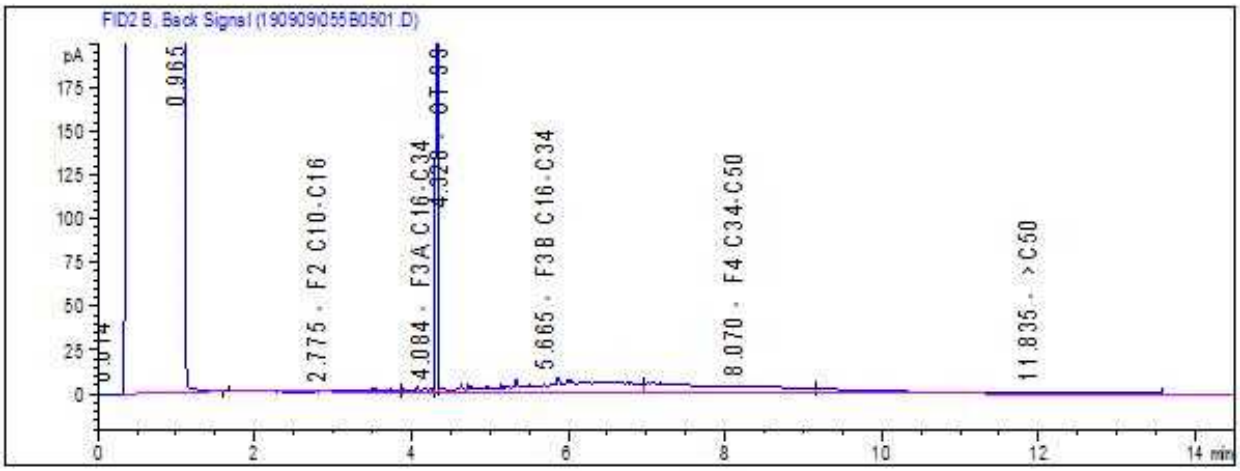
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

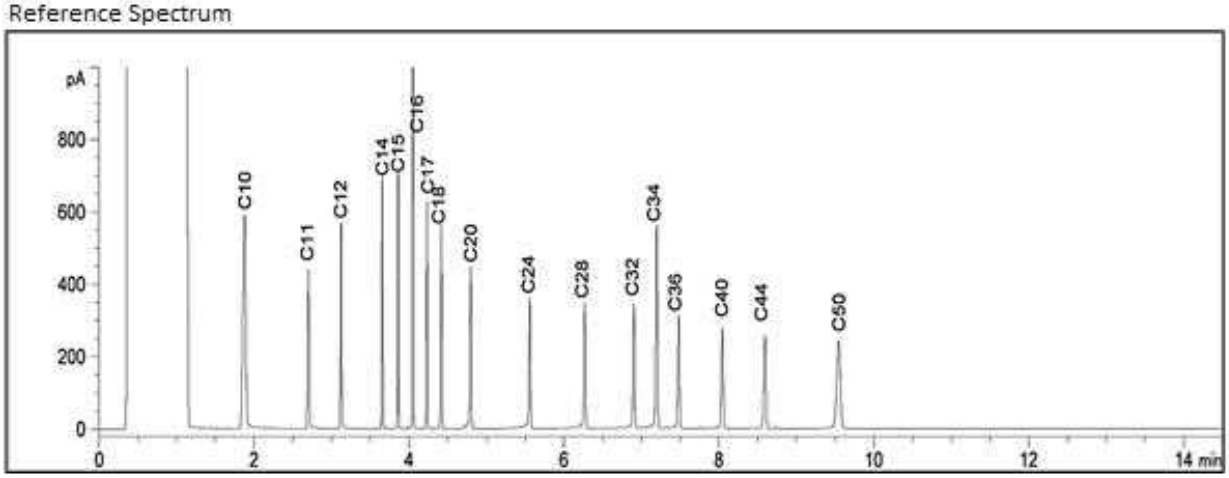
BV Labs Job #: B9O6633
Report Date: 2019/09/11
BV Labs Sample: KRR584

exp Services Inc
Client Project #: OTT-00252997-B0
Client ID: BH3-SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Reference Spectrum

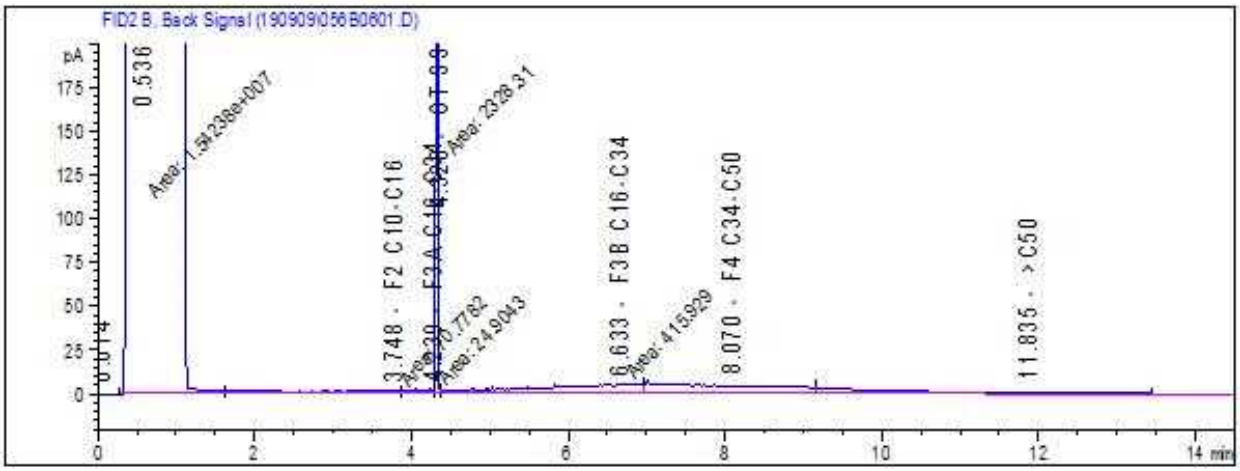


TYPICAL PRODUCT CARBON NUMBER RANGES

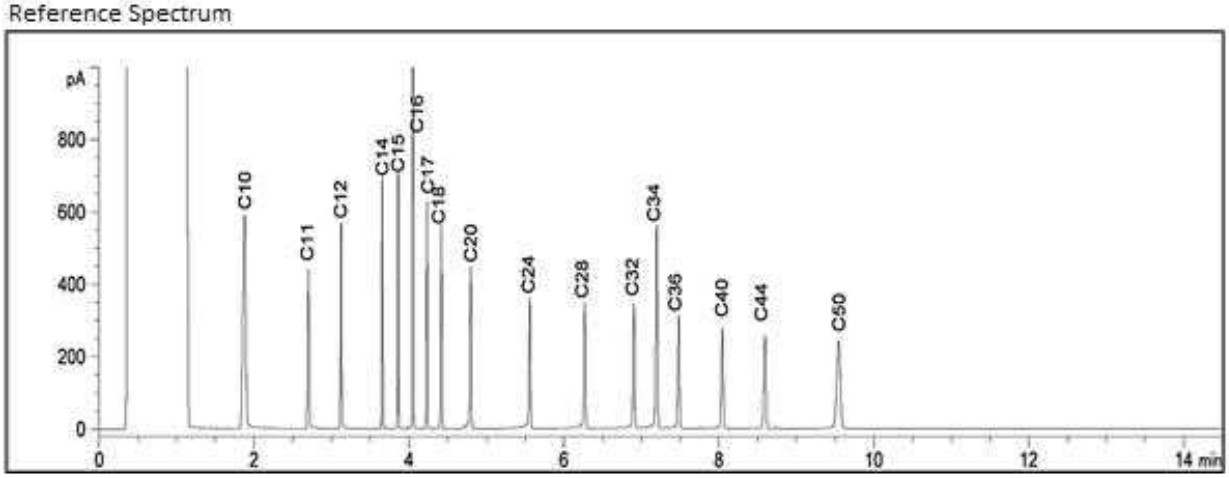
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

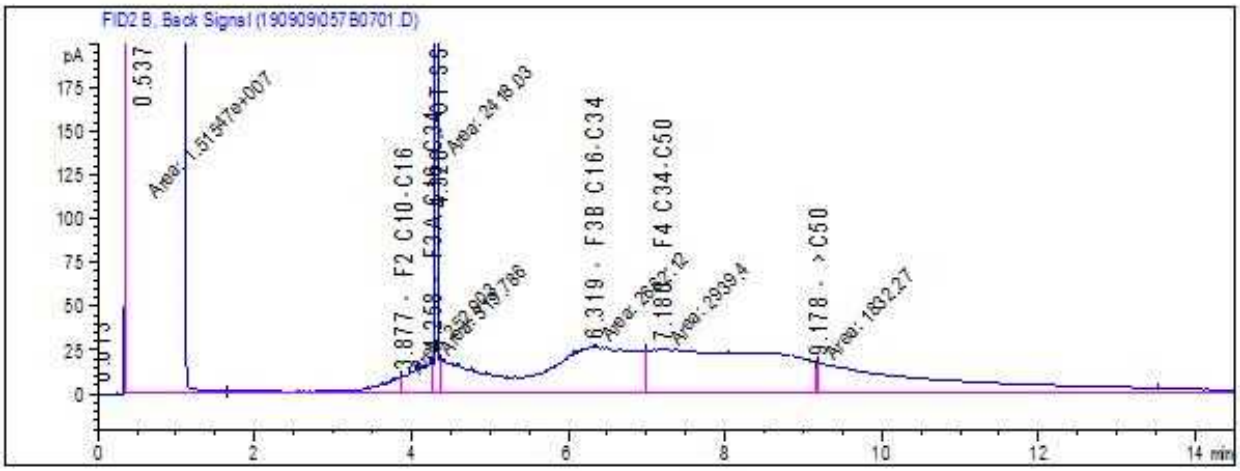
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

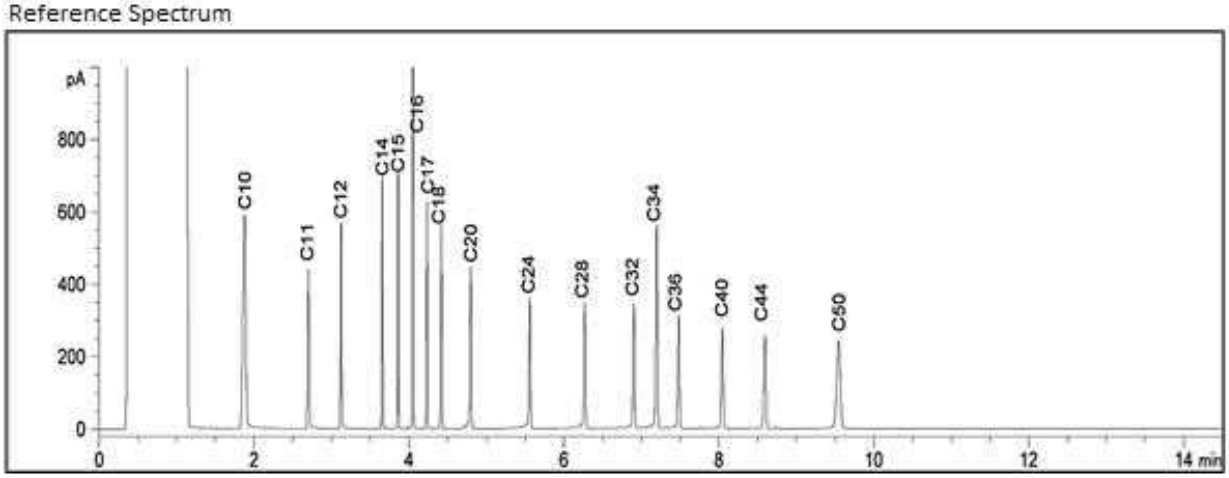
BV Labs Job #: B9O6633
Report Date: 2019/09/11
BV Labs Sample: KRR586

exp Services Inc
Client Project #: OTT-00252997-B0
Client ID: BH1-SS1

Petroleum Hydrocarbons F2-F4 in Soil Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

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

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

Your Project #: OTT-00252997-B0
Your C.O.C. #: 737545-01-01

Attention: Mark McCalla

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

Report Date: 2019/09/26
Report #: R5896382
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9Q3808
Received: 2019/09/19, 14:53

Sample Matrix: Water
Samples Received: 6

Analyses	Quantity	Date Extracted	Date Analyzed	Laboratory Method	Reference
1,3-Dichloropropene Sum (1)	1	N/A	2019/09/24		EPA 8260C m
1,3-Dichloropropene Sum (1)	5	N/A	2019/09/25		EPA 8260C m
Petroleum Hydrocarbons F2-F4 in Water (1, 2)	5	2019/09/23	2019/09/24	CAM SOP-00316	CCME PHC-CWS m
Volatile Organic Compounds and F1 PHCs (1)	5	N/A	2019/09/25	CAM SOP-00230	EPA 8260C m
Volatile Organic Compounds in Water (1)	1	N/A	2019/09/23	CAM SOP-00228	EPA 8260C m

Remarks:

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

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

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

Solid sample results, except biota, are based on dry weight unless otherwise indicated. Organic analyses are not recovery corrected except for isotope dilution methods.
Results relate to samples tested. When sampling is not conducted by BV Labs, results relate to the supplied samples tested.

Reference Method suffix “m” indicates test methods incorporate validated modifications from specific reference methods to improve performance.
* RPDs calculated using raw data. The rounding of final results may result in the apparent difference.
(1) This test was performed by Bureau Veritas Laboratories Mississauga
(2) All CCME PHC results met required criteria unless otherwise stated in the report. The CWS PHC methods employed by Bureau Veritas Laboratories conform to all prescribed elements of the reference method and performance based elements have been validated. All modifications have been validated and proven equivalent following “Alberta Environment’s Interpretation of the Reference Method for the Canada-Wide Standard for Petroleum Hydrocarbons in Soil Validation of Performance-Based Alternative Methods September 2003”. Documentation is available upon request. Modifications from Reference Method for the Canada-wide Standard for Petroleum Hydrocarbons in Soil-Tier 1 Method: F2/F3/F4 data reported using validated cold solvent extraction instead of Soxhlet extraction.

Your Project #: OTT-00252997-B0
Your C.O.C. #: 737545-01-01

Attention: Mark McCalla

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

Report Date: 2019/09/26
Report #: R5896382
Version: 1 - Final

CERTIFICATE OF ANALYSIS

BV LABS JOB #: B9Q3808
Received: 2019/09/19, 14:53

Encryption Key

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

BV Labs Job #: B9Q3808
Report Date: 2019/09/26

exp Services Inc
Client Project #: OTT-00252997-B0
Sampler Initials: PO

O.REG 153 VOCS BY HS & F1-F4 (WATER)

BV Labs ID		KVG982	KVG983	KVG984	KVG985	KVG986		
Sampling Date		2019/09/19 09:35	2019/09/19 10:25	2019/09/19 11:15	2019/09/19 12:00	2019/09/19 12:35		
COC Number		737545-01-01	737545-01-01	737545-01-01	737545-01-01	737545-01-01		
	UNITS	**MW6**	**MW7**	**MW8**	**MW10**	**BH4**	**RDL**	**QC Batch**
Calculated Parameters								
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343928
Volatile Organics								
Acetone (2-Propanone)	ug/L	<10	11	<10	<10	<10	10	6343754
Benzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
Bromodichloromethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
Bromoform	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6343754
Bromomethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
Carbon Tetrachloride	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
Chlorobenzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
Chloroform	ug/L	<0.20	<0.20	0.27	<0.20	<0.20	0.20	6343754
Dibromochloromethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
1,2-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
1,3-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
1,4-Dichlorobenzene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6343754
1,1-Dichloroethane	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
1,2-Dichloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
1,1-Dichloroethylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
cis-1,2-Dichloroethylene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
trans-1,2-Dichloroethylene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
1,2-Dichloropropane	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
cis-1,3-Dichloropropene	ug/L	<0.30	<0.30	<0.30	<0.30	<0.30	0.30	6343754
trans-1,3-Dichloropropene	ug/L	<0.40	<0.40	<0.40	<0.40	<0.40	0.40	6343754
Ethylbenzene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
Ethylene Dibromide	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
Hexane	ug/L	<1.0	<1.0	<1.0	<1.0	<1.0	1.0	6343754
Methylene Chloride(Dichloromethane)	ug/L	<2.0	<2.0	<2.0	<2.0	<2.0	2.0	6343754
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	<10	<10	<10	<10	10	6343754
Methyl Isobutyl Ketone	ug/L	<5.0	<5.0	<5.0	<5.0	<5.0	5.0	6343754
Methyl t-butyl ether (MTBE)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
Styrene	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
1,1,1,2-Tetrachloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
1,1,2,2-Tetrachloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
Tetrachloroethylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
Toluene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.bvlabs.com

BV Labs Job #: B9Q3808
Report Date: 2019/09/26

exp Services Inc
Client Project #: OTT-00252997-B0
Sampler Initials: PO

O.REG 153 VOCS BY HS & F1-F4 (WATER)

BV Labs ID		KVG982	KVG983	KVG984	KVG985	KVG986		
Sampling Date		2019/09/19 09:35	2019/09/19 10:25	2019/09/19 11:15	2019/09/19 12:00	2019/09/19 12:35		
COC Number		737545-01-01	737545-01-01	737545-01-01	737545-01-01	737545-01-01		
	UNITS	**MW6**	**MW7**	**MW8**	**MW10**	**BH4**	**RDL**	**QC Batch**
1,1,1-Trichloroethane	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
1,1,2-Trichloroethane	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
Trichloroethylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	<0.50	<0.50	<0.50	<0.50	0.50	6343754
Vinyl Chloride	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
p+m-Xylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
o-Xylene	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
Total Xylenes	ug/L	<0.20	<0.20	<0.20	<0.20	<0.20	0.20	6343754
F1 (C6-C10)	ug/L	<25	<25	<25	<25	<25	25	6343754
F1 (C6-C10) - BTEX	ug/L	<25	<25	<25	<25	<25	25	6343754
F2-F4 Hydrocarbons								
F2 (C10-C16 Hydrocarbons)	ug/L	<100	<100	<100	<100	<100	100	6347800
F3 (C16-C34 Hydrocarbons)	ug/L	<200	<200	<200	<200	<200	200	6347800
F4 (C34-C50 Hydrocarbons)	ug/L	<200	<200	<200	<200	<200	200	6347800
Reached Baseline at C50	ug/L	Yes	Yes	Yes	Yes	Yes		6347800
Surrogate Recovery (%)								
o-Terphenyl	%	102	92	92	92	89		6347800
4-Bromofluorobenzene	%	98	99	101	99	98		6343754
D4-1,2-Dichloroethane	%	117	117	116	116	117		6343754
D8-Toluene	%	97	98	97	97	96		6343754

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.bvlabs.com

O.REG 153 VOCS BY HS (WATER)

BV Labs ID		KVG987		
Sampling Date		2019/09/19		
COC Number		737545-01-01		
	UNITS	**TRIP BLANK LOT # 3640**	**RDL**	**QC Batch**
Calculated Parameters				
1,3-Dichloropropene (cis+trans)	ug/L	<0.50	0.50	6343928
Volatile Organics				
Acetone (2-Propanone)	ug/L	<10	10	6341797
Benzene	ug/L	<0.20	0.20	6341797
Bromodichloromethane	ug/L	<0.50	0.50	6341797
Bromoform	ug/L	<1.0	1.0	6341797
Bromomethane	ug/L	<0.50	0.50	6341797
Carbon Tetrachloride	ug/L	<0.20	0.20	6341797
Chlorobenzene	ug/L	<0.20	0.20	6341797
Chloroform	ug/L	<0.20	0.20	6341797
Dibromochloromethane	ug/L	<0.50	0.50	6341797
1,2-Dichlorobenzene	ug/L	<0.50	0.50	6341797
1,3-Dichlorobenzene	ug/L	<0.50	0.50	6341797
1,4-Dichlorobenzene	ug/L	<0.50	0.50	6341797
Dichlorodifluoromethane (FREON 12)	ug/L	<1.0	1.0	6341797
1,1-Dichloroethane	ug/L	<0.20	0.20	6341797
1,2-Dichloroethane	ug/L	<0.50	0.50	6341797
1,1-Dichloroethylene	ug/L	<0.20	0.20	6341797
cis-1,2-Dichloroethylene	ug/L	<0.50	0.50	6341797
trans-1,2-Dichloroethylene	ug/L	<0.50	0.50	6341797
1,2-Dichloropropane	ug/L	<0.20	0.20	6341797
cis-1,3-Dichloropropene	ug/L	<0.30	0.30	6341797
trans-1,3-Dichloropropene	ug/L	<0.40	0.40	6341797
Ethylbenzene	ug/L	<0.20	0.20	6341797
Ethylene Dibromide	ug/L	<0.20	0.20	6341797
Hexane	ug/L	<1.0	1.0	6341797
Methylene Chloride(Dichloromethane)	ug/L	<2.0	2.0	6341797
Methyl Ethyl Ketone (2-Butanone)	ug/L	<10	10	6341797
Methyl Isobutyl Ketone	ug/L	<5.0	5.0	6341797
Methyl t-butyl ether (MTBE)	ug/L	<0.50	0.50	6341797
Styrene	ug/L	<0.50	0.50	6341797
1,1,1,2-Tetrachloroethane	ug/L	<0.50	0.50	6341797
1,1,2,2-Tetrachloroethane	ug/L	<0.50	0.50	6341797
Tetrachloroethylene	ug/L	<0.20	0.20	6341797
Toluene	ug/L	<0.20	0.20	6341797

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

Bureau Veritas Laboratories 32 Colonnade Rd, Unit #1000, Nepean, ON K2E 7J6 Phone: 613 274-0573 Fax: 613 274-0574 Website: www.bvlabs.com

O.REG 153 VOCS BY HS (WATER)

BV Labs ID		KVG987		
Sampling Date		2019/09/19		
COC Number		737545-01-01		
	UNITS	**TRIP BLANK LOT # 3640**	**RDL**	**QC Batch**
1,1,1-Trichloroethane	ug/L	<0.20	0.20	6341797
1,1,2-Trichloroethane	ug/L	<0.50	0.50	6341797
Trichloroethylene	ug/L	<0.20	0.20	6341797
Trichlorofluoromethane (FREON 11)	ug/L	<0.50	0.50	6341797
Vinyl Chloride	ug/L	<0.20	0.20	6341797
p+m-Xylene	ug/L	<0.20	0.20	6341797
o-Xylene	ug/L	<0.20	0.20	6341797
Total Xylenes	ug/L	<0.20	0.20	6341797
Surrogate Recovery (%)				
4-Bromofluorobenzene	%	100		6341797
D4-1,2-Dichloroethane	%	96		6341797
D8-Toluene	%	96		6341797

RDL = Reportable Detection Limit
QC Batch = Quality Control Batch

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TEST SUMMARY

BV Labs ID: KVG982 **Collected:** 2019/09/19
Sample ID: MW6 **Shipped:**
Matrix: Water **Received:** 2019/09/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6343928	N/A	2019/09/25	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6347800	2019/09/23	2019/09/24	Prabhjot Gulati
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6343754	N/A	2019/09/25	Denis Reid

BV Labs ID: KVG983 **Collected:** 2019/09/19
Sample ID: MW7 **Shipped:**
Matrix: Water **Received:** 2019/09/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6343928	N/A	2019/09/25	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6347800	2019/09/23	2019/09/24	Prabhjot Gulati
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6343754	N/A	2019/09/25	Denis Reid

BV Labs ID: KVG984 **Collected:** 2019/09/19
Sample ID: MW8 **Shipped:**
Matrix: Water **Received:** 2019/09/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6343928	N/A	2019/09/25	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6347800	2019/09/23	2019/09/24	Prabhjot Gulati
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6343754	N/A	2019/09/25	Denis Reid

BV Labs ID: KVG985 **Collected:** 2019/09/19
Sample ID: MW10 **Shipped:**
Matrix: Water **Received:** 2019/09/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6343928	N/A	2019/09/25	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6347800	2019/09/23	2019/09/24	Prabhjot Gulati
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6343754	N/A	2019/09/25	Denis Reid

BV Labs ID: KVG986 **Collected:** 2019/09/19
Sample ID: BH4 **Shipped:**
Matrix: Water **Received:** 2019/09/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6343928	N/A	2019/09/25	Automated Statchk
Petroleum Hydrocarbons F2-F4 in Water	GC/FID	6347800	2019/09/23	2019/09/24	Prabhjot Gulati
Volatile Organic Compounds and F1 PHCs	GC/MSFD	6343754	N/A	2019/09/25	Denis Reid

BV Labs ID: KVG987 **Collected:** 2019/09/19
Sample ID: TRIP BLANK LOT # 3640 **Shipped:**
Matrix: Water **Received:** 2019/09/19

Test Description	Instrumentation	Batch	Extracted	Date Analyzed	Analyst
1,3-Dichloropropene Sum	CALC	6343928	N/A	2019/09/24	Automated Statchk
Volatile Organic Compounds in Water	GC/MS	6341797	N/A	2019/09/23	Rebecca McClean

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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

Results relate only to the items tested.

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QUALITY ASSURANCE REPORT

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6341797	4-Bromofluorobenzene	2019/09/23	87	70 - 130	88	70 - 130	106	%		
6341797	D4-1,2-Dichloroethane	2019/09/23	99	70 - 130	95	70 - 130	102	%		
6341797	D8-Toluene	2019/09/23	108	70 - 130	109	70 - 130	91	%		
6343754	4-Bromofluorobenzene	2019/09/24	106	70 - 130	105	70 - 130	101	%		
6343754	D4-1,2-Dichloroethane	2019/09/24	109	70 - 130	109	70 - 130	111	%		
6343754	D8-Toluene	2019/09/24	104	70 - 130	105	70 - 130	95	%		
6347800	o-Terphenyl	2019/09/24	95	60 - 130	97	60 - 130	93	%		
6341797	1,1,1,2-Tetrachloroethane	2019/09/23	96	70 - 130	104	70 - 130	<0.50	ug/L	NC	30
6341797	1,1,1-Trichloroethane	2019/09/23	90	70 - 130	98	70 - 130	<0.20	ug/L	NC	30
6341797	1,1,2,2-Tetrachloroethane	2019/09/23	98	70 - 130	101	70 - 130	<0.50	ug/L	NC	30
6341797	1,1,2-Trichloroethane	2019/09/23	97	70 - 130	100	70 - 130	<0.50	ug/L	NC	30
6341797	1,1-Dichloroethane	2019/09/23	91	70 - 130	96	70 - 130	<0.20	ug/L	NC	30
6341797	1,1-Dichloroethylene	2019/09/23	95	70 - 130	102	70 - 130	<0.20	ug/L	NC	30
6341797	1,2-Dichlorobenzene	2019/09/23	90	70 - 130	96	70 - 130	<0.50	ug/L	NC	30
6341797	1,2-Dichloroethane	2019/09/23	95	70 - 130	97	70 - 130	<0.50	ug/L	NC	30
6341797	1,2-Dichloropropane	2019/09/23	87	70 - 130	92	70 - 130	<0.20	ug/L	NC	30
6341797	1,3-Dichlorobenzene	2019/09/23	91	70 - 130	99	70 - 130	<0.50	ug/L	NC	30
6341797	1,4-Dichlorobenzene	2019/09/23	98	70 - 130	106	70 - 130	<0.50	ug/L	NC	30
6341797	Acetone (2-Propanone)	2019/09/23	105	60 - 140	101	60 - 140	<10	ug/L	NC	30
6341797	Benzene	2019/09/23	92	70 - 130	98	70 - 130	<0.20	ug/L	NC	30
6341797	Bromodichloromethane	2019/09/23	90	70 - 130	94	70 - 130	<0.50	ug/L	NC	30
6341797	Bromoform	2019/09/23	97	70 - 130	101	70 - 130	<1.0	ug/L	NC	30
6341797	Bromomethane	2019/09/23	89	60 - 140	87	60 - 140	<0.50	ug/L	NC	30
6341797	Carbon Tetrachloride	2019/09/23	100	70 - 130	85	70 - 130	<0.20	ug/L	NC	30
6341797	Chlorobenzene	2019/09/23	91	70 - 130	98	70 - 130	<0.20	ug/L	NC	30
6341797	Chloroform	2019/09/23	86	70 - 130	91	70 - 130	<0.20	ug/L	NC	30
6341797	cis-1,2-Dichloroethylene	2019/09/23	88	70 - 130	92	70 - 130	<0.50	ug/L	NC	30
6341797	cis-1,3-Dichloropropene	2019/09/23	95	70 - 130	91	70 - 130	<0.30	ug/L	NC	30
6341797	Dibromochloromethane	2019/09/23	96	70 - 130	101	70 - 130	<0.50	ug/L	NC	30
6341797	Dichlorodifluoromethane (FREON 12)	2019/09/23	80	60 - 140	87	60 - 140	<1.0	ug/L	NC	30
6341797	Ethylbenzene	2019/09/23	87	70 - 130	99	70 - 130	<0.20	ug/L	NC	30
6341797	Ethylene Dibromide	2019/09/23	96	70 - 130	99	70 - 130	<0.20	ug/L	NC	30

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6341797	Hexane	2019/09/23	102	70 - 130	111	70 - 130	<1.0	ug/L	NC	30
6341797	Methyl Ethyl Ketone (2-Butanone)	2019/09/23	100	60 - 140	99	60 - 140	<10	ug/L	NC	30
6341797	Methyl Isobutyl Ketone	2019/09/23	105	70 - 130	108	70 - 130	<5.0	ug/L	NC	30
6341797	Methyl t-butyl ether (MTBE)	2019/09/23	85	70 - 130	91	70 - 130	<0.50	ug/L	NC	30
6341797	Methylene Chloride(Dichloromethane)	2019/09/23	101	70 - 130	104	70 - 130	<2.0	ug/L	NC	30
6341797	o-Xylene	2019/09/23	87	70 - 130	106	70 - 130	<0.20	ug/L	NC	30
6341797	p+m-Xylene	2019/09/23	76	70 - 130	87	70 - 130	<0.20	ug/L	NC	30
6341797	Styrene	2019/09/23	72	70 - 130	84	70 - 130	<0.50	ug/L	NC	30
6341797	Tetrachloroethylene	2019/09/23	85	70 - 130	94	70 - 130	<0.20	ug/L	NC	30
6341797	Toluene	2019/09/23	93	70 - 130	102	70 - 130	<0.20	ug/L	NC	30
6341797	Total Xylenes	2019/09/23					<0.20	ug/L	NC	30
6341797	trans-1,2-Dichloroethylene	2019/09/23	91	70 - 130	97	70 - 130	<0.50	ug/L	NC	30
6341797	trans-1,3-Dichloropropene	2019/09/23	107	70 - 130	94	70 - 130	<0.40	ug/L	NC	30
6341797	Trichloroethylene	2019/09/23	91	70 - 130	98	70 - 130	<0.20	ug/L	NC	30
6341797	Trichlorofluoromethane (FREON 11)	2019/09/23	93	70 - 130	100	70 - 130	<0.50	ug/L	NC	30
6341797	Vinyl Chloride	2019/09/23	88	70 - 130	94	70 - 130	<0.20	ug/L	NC	30
6343754	1,1,1,2-Tetrachloroethane	2019/09/25	105	70 - 130	112	70 - 130	<0.50	ug/L	NC	30
6343754	1,1,1-Trichloroethane	2019/09/25	100	70 - 130	104	70 - 130	<0.20	ug/L	NC	30
6343754	1,1,2,2-Tetrachloroethane	2019/09/25	98	70 - 130	107	70 - 130	<0.50	ug/L	NC	30
6343754	1,1,2-Trichloroethane	2019/09/25	105	70 - 130	110	70 - 130	<0.50	ug/L	NC	30
6343754	1,1-Dichloroethane	2019/09/25	97	70 - 130	101	70 - 130	<0.20	ug/L	NC	30
6343754	1,1-Dichloroethylene	2019/09/25	99	70 - 130	103	70 - 130	<0.20	ug/L	NC	30
6343754	1,2-Dichlorobenzene	2019/09/25	87	70 - 130	94	70 - 130	<0.50	ug/L	NC	30
6343754	1,2-Dichloroethane	2019/09/25	101	70 - 130	106	70 - 130	<0.50	ug/L	NC	30
6343754	1,2-Dichloropropane	2019/09/25	88	70 - 130	93	70 - 130	<0.20	ug/L	NC	30
6343754	1,3-Dichlorobenzene	2019/09/25	85	70 - 130	91	70 - 130	<0.50	ug/L	NC	30
6343754	1,4-Dichlorobenzene	2019/09/25	89	70 - 130	96	70 - 130	<0.50	ug/L	NC	30
6343754	Acetone (2-Propanone)	2019/09/25	106	60 - 140	110	60 - 140	<10	ug/L	NC	30
6343754	Benzene	2019/09/25	94	70 - 130	99	70 - 130	<0.20	ug/L	NC	30
6343754	Bromodichloromethane	2019/09/25	93	70 - 130	98	70 - 130	<0.50	ug/L	NC	30
6343754	Bromoform	2019/09/25	109	70 - 130	119	70 - 130	<1.0	ug/L	NC	30
6343754	Bromomethane	2019/09/25	87	60 - 140	103	60 - 140	<0.50	ug/L	NC	30

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QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6343754	Carbon Tetrachloride	2019/09/25	102	70 - 130	108	70 - 130	<0.20	ug/L	NC	30
6343754	Chlorobenzene	2019/09/25	85	70 - 130	90	70 - 130	<0.20	ug/L	NC	30
6343754	Chloroform	2019/09/25	89	70 - 130	95	70 - 130	<0.20	ug/L	NC	30
6343754	cis-1,2-Dichloroethylene	2019/09/25	85	70 - 130	90	70 - 130	<0.50	ug/L	NC	30
6343754	cis-1,3-Dichloropropene	2019/09/25	67 (1)	70 - 130	92	70 - 130	<0.30	ug/L	NC	30
6343754	Dibromochloromethane	2019/09/25	103	70 - 130	111	70 - 130	<0.50	ug/L	NC	30
6343754	Dichlorodifluoromethane (FREON 12)	2019/09/25	90	60 - 140	124	60 - 140	<1.0	ug/L	NC	30
6343754	Ethylbenzene	2019/09/25	84	70 - 130	88	70 - 130	<0.20	ug/L	NC	30
6343754	Ethylene Dibromide	2019/09/25	96	70 - 130	103	70 - 130	<0.20	ug/L	NC	30
6343754	F1 (C6-C10) - BTEX	2019/09/25					<25	ug/L	NC	30
6343754	F1 (C6-C10)	2019/09/25	91	60 - 140	97	60 - 140	<25	ug/L	NC	30
6343754	Hexane	2019/09/25	94	70 - 130	99	70 - 130	<1.0	ug/L	NC	30
6343754	Methyl Ethyl Ketone (2-Butanone)	2019/09/25	102	60 - 140	109	60 - 140	<10	ug/L	NC	30
6343754	Methyl Isobutyl Ketone	2019/09/25	94	70 - 130	104	70 - 130	<5.0	ug/L	NC	30
6343754	Methyl t-butyl ether (MTBE)	2019/09/25	87	70 - 130	90	70 - 130	<0.50	ug/L	NC	30
6343754	Methylene Chloride(Dichloromethane)	2019/09/25	95	70 - 130	99	70 - 130	<2.0	ug/L	NC	30
6343754	o-Xylene	2019/09/25	86	70 - 130	91	70 - 130	<0.20	ug/L	NC	30
6343754	p+m-Xylene	2019/09/25	86	70 - 130	91	70 - 130	<0.20	ug/L	NC	30
6343754	Styrene	2019/09/25	85	70 - 130	94	70 - 130	<0.50	ug/L	NC	30
6343754	Tetrachloroethylene	2019/09/25	90	70 - 130	94	70 - 130	<0.20	ug/L	NC	30
6343754	Toluene	2019/09/25	88	70 - 130	93	70 - 130	<0.20	ug/L	NC	30
6343754	Total Xylenes	2019/09/25					<0.20	ug/L	NC	30
6343754	trans-1,2-Dichloroethylene	2019/09/25	85	70 - 130	91	70 - 130	<0.50	ug/L	NC	30
6343754	trans-1,3-Dichloropropene	2019/09/25	72	70 - 130	104	70 - 130	<0.40	ug/L	NC	30
6343754	Trichloroethylene	2019/09/25	92	70 - 130	97	70 - 130	<0.20	ug/L	2.1	30
6343754	Trichlorofluoromethane (FREON 11)	2019/09/25	107	70 - 130	114	70 - 130	<0.50	ug/L	NC	30
6343754	Vinyl Chloride	2019/09/25	100	70 - 130	117	70 - 130	<0.20	ug/L	NC	30
6347800	F2 (C10-C16 Hydrocarbons)	2019/09/24	94	50 - 130	94	60 - 130	<100	ug/L	NC	30
6347800	F3 (C16-C34 Hydrocarbons)	2019/09/24	95	50 - 130	105	60 - 130	<200	ug/L	NC	30

QUALITY ASSURANCE REPORT(CONT'D)

			Matrix Spike		SPIKED BLANK		Method Blank		RPD	
QC Batch	Parameter	Date	% Recovery	QC Limits	% Recovery	QC Limits	Value	UNITS	Value (%)	QC Limits
6347800	F4 (C34-C50 Hydrocarbons)	2019/09/24	104	50 - 130	107	60 - 130	<200	ug/L	NC	30

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

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

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

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

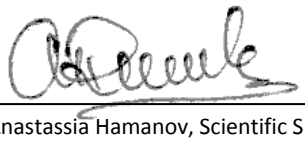
Surrogate: A pure or isotopically labeled compound whose behavior mirrors the analytes of interest. Used to evaluate extraction efficiency.

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

(1) The recovery was below the lower control limit. This may represent a low bias in some results for this specific analyte.

VALIDATION SIGNATURE PAGE

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



Anastassia Hamanov, Scientific Specialist

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

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19-Sep-19 14:53
Alisha Williamson
B9Q3808
URE ENV-1403

Presence of Visible Particulate/Sediment

Maxxam Analytics
CAM FCD-01013/5

When there is >1cm of visible particulate/sediment, the amount will be recorded in the field below

Bottle Types

		Inorganics						Organics											Hydrocarbons							Volatiles				Other
	Sample ID	All	CrVI	CN	General	Hg	Metals (Diss.)	Organic 1 of 2	Organic 2 of 2	PCB 1 of 2	PCB 2 of 2	Pest/ Herb 1 of 2	Pest/ Herb 2 of 2	SVOC/ ABN 1 of 2	SVOC/ ABN 2 of 2	PAH 1 of 2	PAH 2 of 2	Dioxin /Furan	F1 Vial 1	F1 Vial 2	F1 Vial 3	F1 Vial 4	F2-F4 1 of 2	F2-F4 2 of 2	F4G	VOC Vial 1	VOC Vial 2	VOC Vial 3	VOC Vial 4	
1	MW6	TS																											
2	MW7	TS																											
3	MW8	TS																											
4	MW10	TS																											
5	BH4	TS																											
6																													
7																													
8																													
9																													
10																													

Comments:

Legend:	
P	Suspended Particulate
TS	Trace Settled Sediment (just covers bottom of container or less)
S	Sediment greater than (>) Trace, but less than (<) 1 cm

Recorded By: (signature/print) Ramesh Ramesh Ramesh.

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

19-Sep-19 14:53
Alisha Williamson
B9Q3808

Page 1 of 1

INVOICE TO:		REPORT TO:		PROJECT INFORMATION:	
Company Name:	#17498 exp Services Inc	Company Name:	EXP SERVICES	Quotation #:	B91718
Attention:	Accounts Payable	Attention:	Mark McCalla	P.O. #:	STREAM 3
Address:	100-2650 Queensview Drive	Address:		Project:	OTT-00252997-B0
	Ottawa ON K2B 8H6			Project Name:	
Tel:	(613) 688-1899 Fax: (613) 225-7337	Tel:	Fax:	Site #:	
Email:	accounting.ottawa@exp.com; Karen.Burke@exp.com;	Email:	mark.mccalla@exp.com	Sampled By:	Philip Oliveira

URE ENV-1403

Lab Use Only: Bottle Order #: 737545 | COC #: C#737545-01-01 | Project Manager: Alisha Williamson

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

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

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

Special Instructions:

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

Field Filtered (please circle): Metals / Hg / Cr VI

ANALYSIS REQUESTED (PLEASE BE SPECIFIC)

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

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

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

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	O.Reg 153 VOCs by HS & F1-F4	PHC F2-F4	# of Bottles	Comments
1		MW 6	2019-09-19	9h35	GW	X	X	5	
2		MW 7	2019-09-19	10h25	GW	X	X	5	
3		MW 8	2019-09-19	11h15	GW	X	X	5	
4		MW 10	2019-09-19	12h00	GW	X	X	5	
5		BH4	2019-09-19	12h55	GW	X	X	5	
6		TRIP BLANK	2019-09-19	N/A.				2	
7									
8									RECEIVED IN OTTAWA
9									on ice
10									

* RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time	# jars used and not submitted
Philip Oliveira Philip Oliveira	2019-09-19	14h50	Jesse Leyen BV LABS STAFF	19/09/19 2019/09/20	14:53 08:00	

Laboratory Use Only

Time Sensitive	Temperature (°C) on Recei	Custody Seal	Yes	No
	8.1 3.6	Present	X	
		Intact	X	

10, 9, 10

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

White: BV Labs Yellow: Client

* UNLESS OTHERWISE AGREED TO IN WRITING, WORK SUBMITTED ON THIS CHAIN OF CUSTODY IS SUBJECT TO BV LABS' STANDARD TERMS AND CONDITIONS. SIGNING OF THIS CHAIN OF CUSTODY DOCUMENT IS ACKNOWLEDGMENT AND ACCEPTANCE OF OUR TERMS WHICH ARE AVAILABLE FOR VIEWING AT WWW.BVLABS.COM/TERMS-AND-CONDITIONS.

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

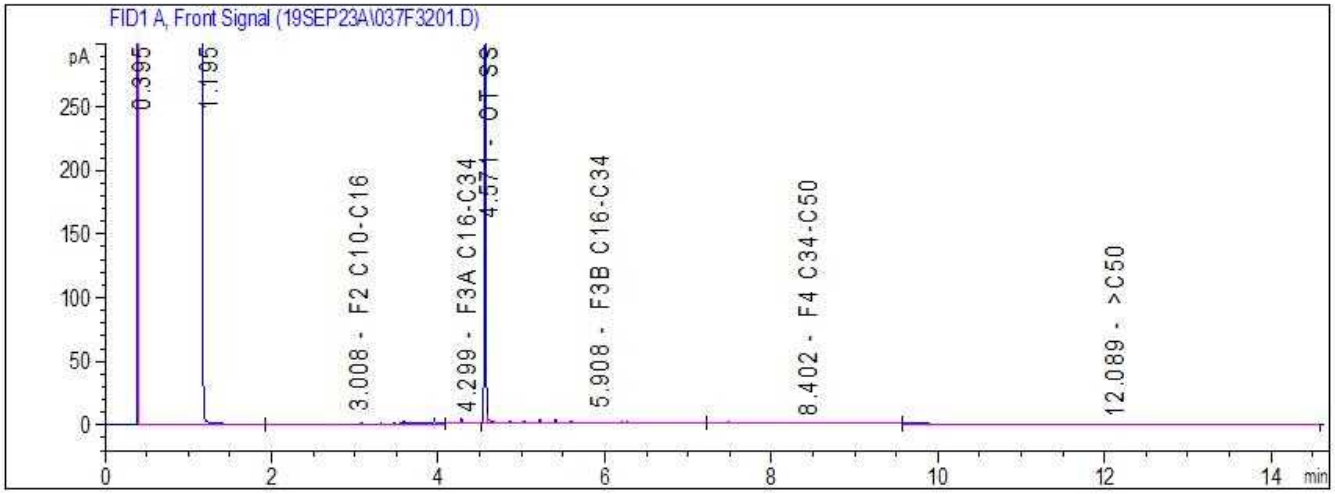
** SAMPLE CONTAINER, PRESERVATION, HOLD TIME AND PACKAGE INFORMATION CAN BE VIEWED AT WWW.BVLABS.COM/RESOURCES/CHAIN-OF-CUSTODY-FORMS.

Bureau Veritas Canada (2019) Inc.

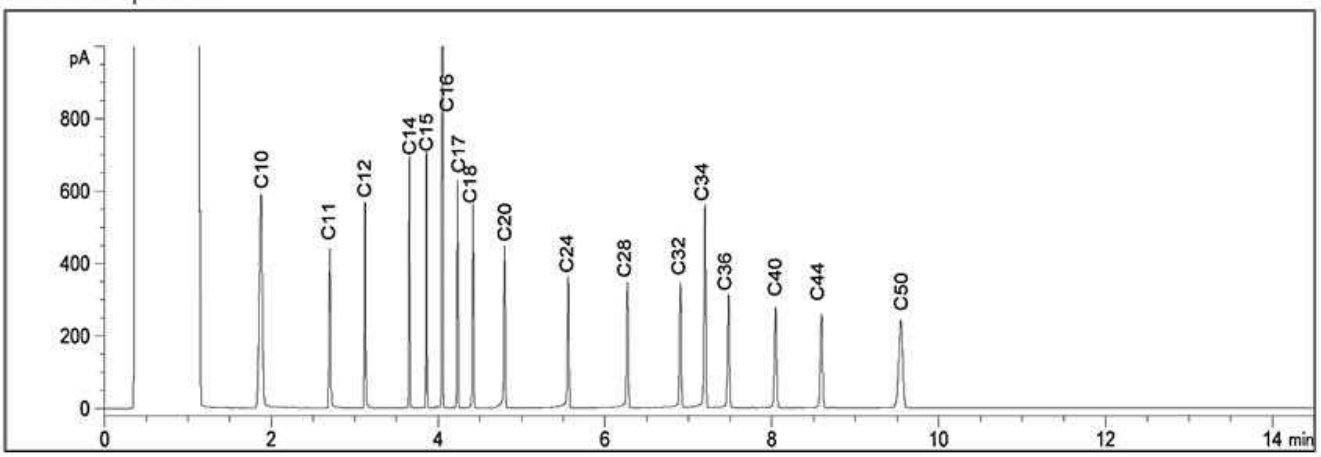
BV Labs Job #: B9Q3808
Report Date: 2019/09/26
BV Labs Sample: KVG982

exp Services Inc
Client Project #: OTT-00252997-B0
Client ID: MW6

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

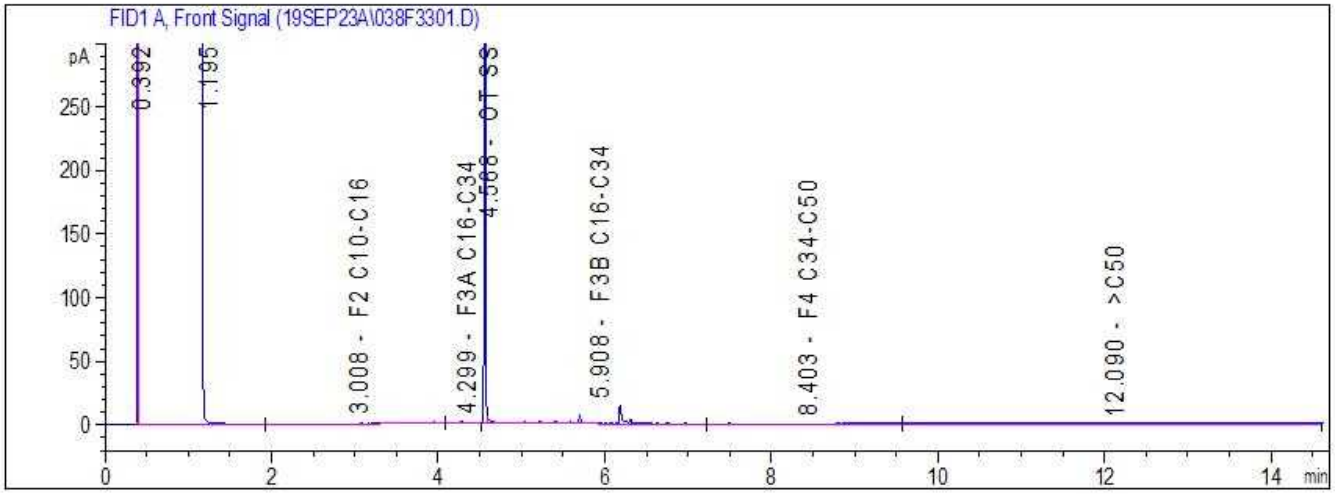
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

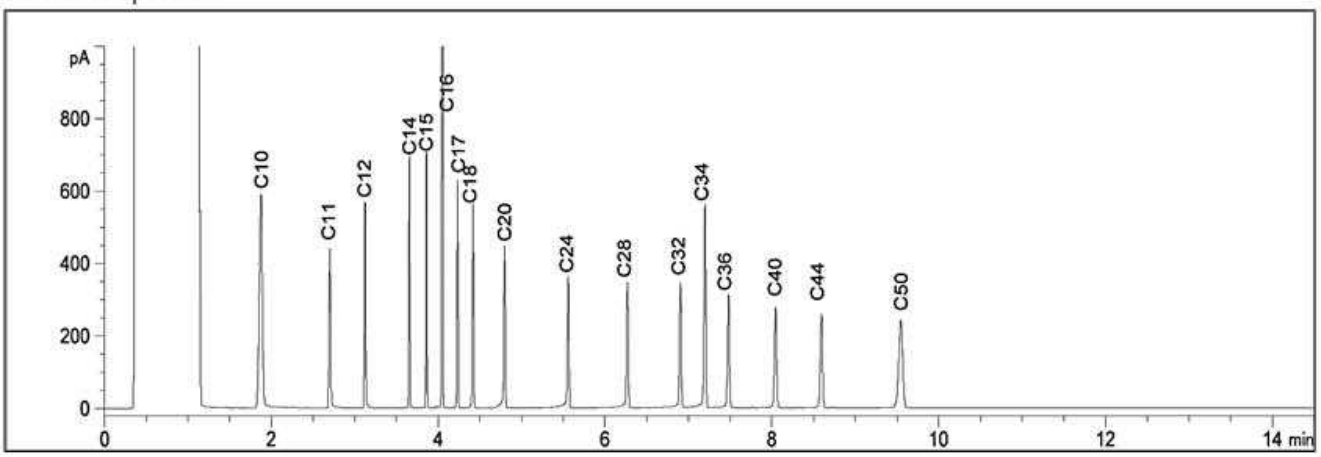
BV Labs Job #: B9Q3808
Report Date: 2019/09/26
BV Labs Sample: KVG983

exp Services Inc
Client Project #: OTT-00252997-B0
Client ID: MW7

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

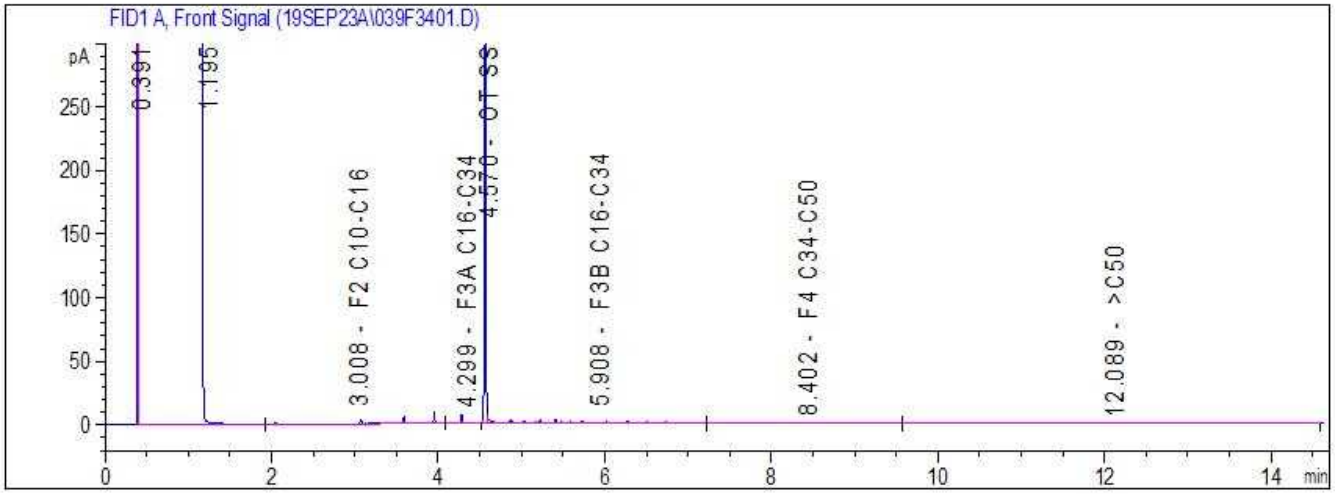
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

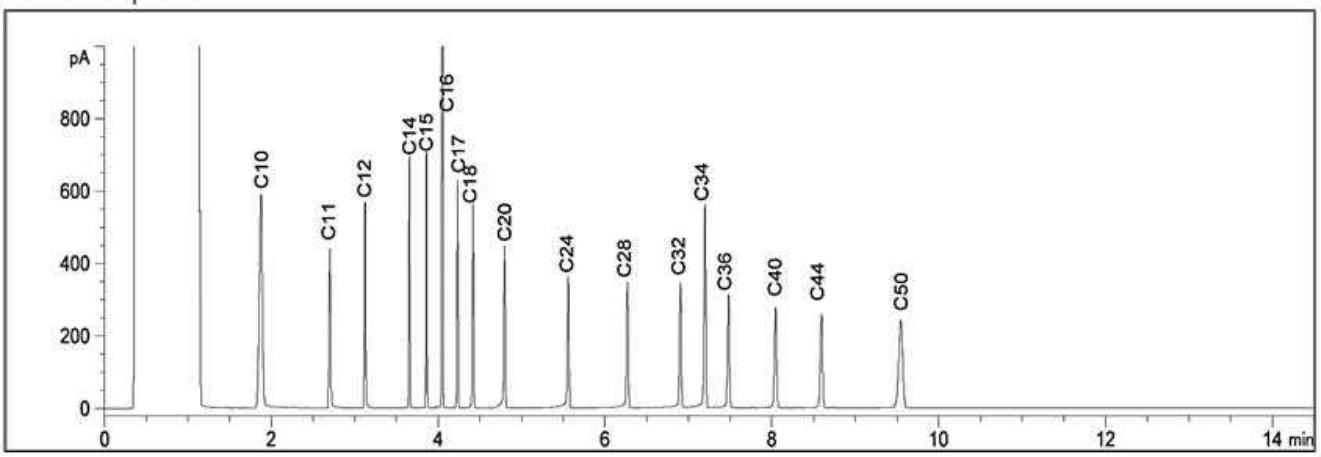
BV Labs Job #: B9Q3808
Report Date: 2019/09/26
BV Labs Sample: KVG984

exp Services Inc
Client Project #: OTT-00252997-B0
Client ID: MW8

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

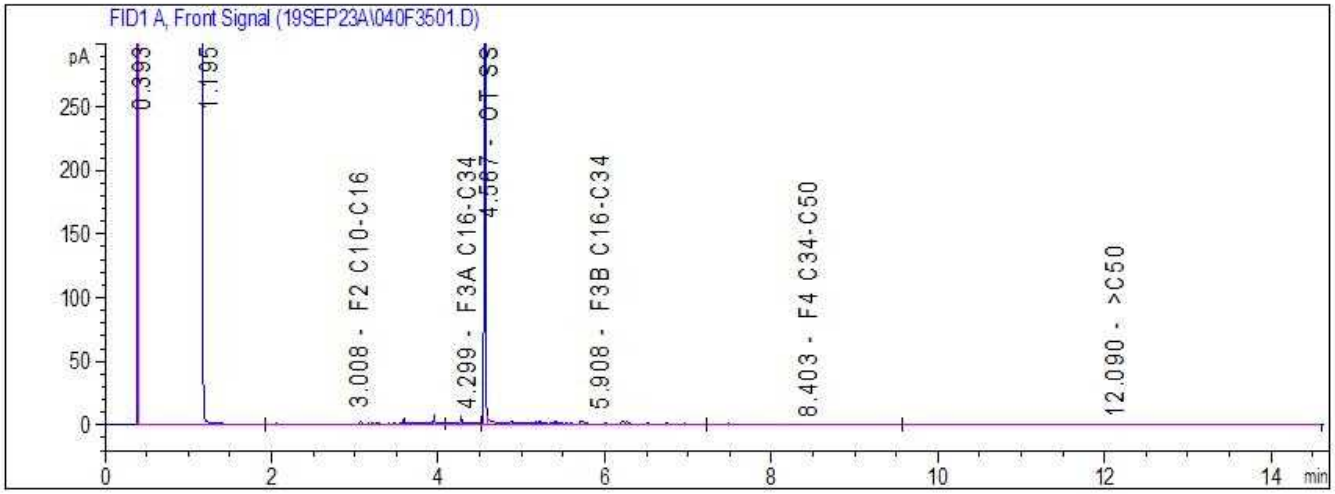
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

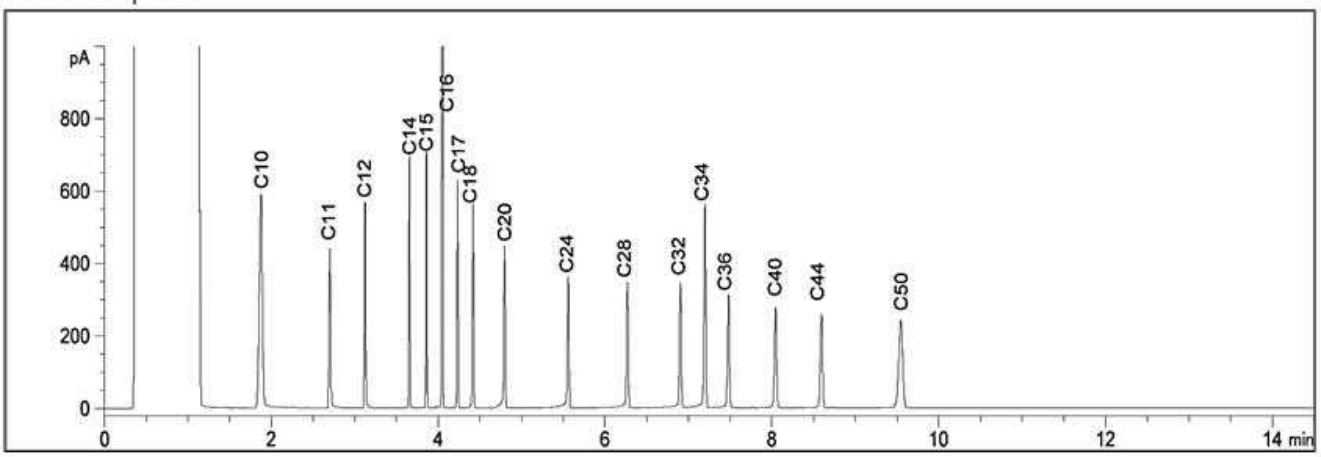
BV Labs Job #: B9Q3808
Report Date: 2019/09/26
BV Labs Sample: KVG985

exp Services Inc
Client Project #: OTT-00252997-B0
Client ID: MW10

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

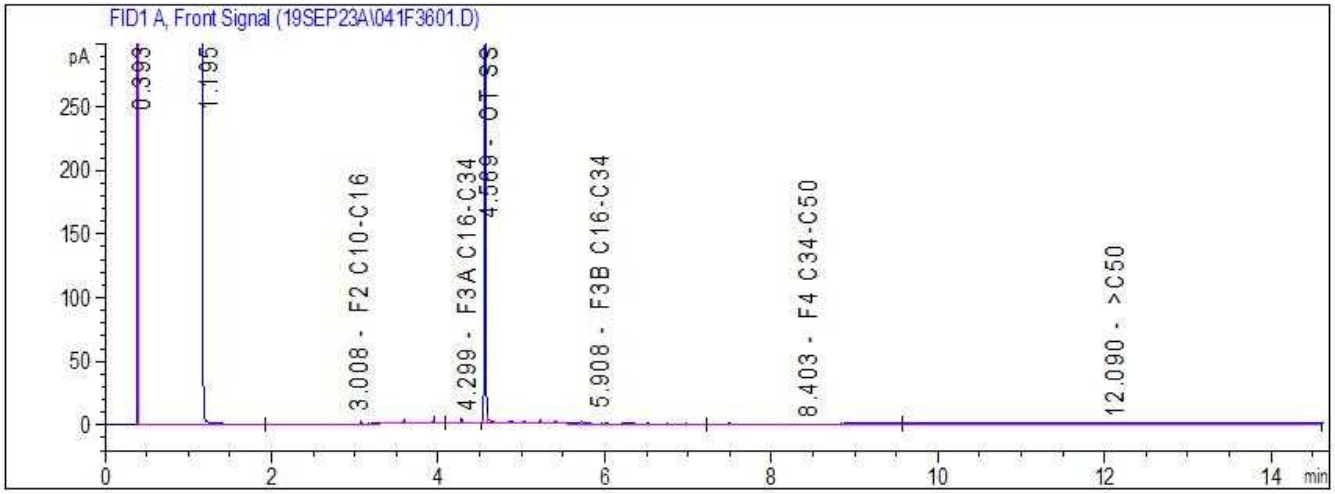
Gasoline: **C6 - C12**	Diesel: **C10 - C24**	Jet Fuels: **C6 - C16**
Varsol: **C8 - C12**	Fuel Oils: **C6 - C32**	Creosote: **C10 - C26**
Kerosene: **C8 - C16**	Motor Oils: **C16 - C50**	Asphalt: **C18 - C50+**

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

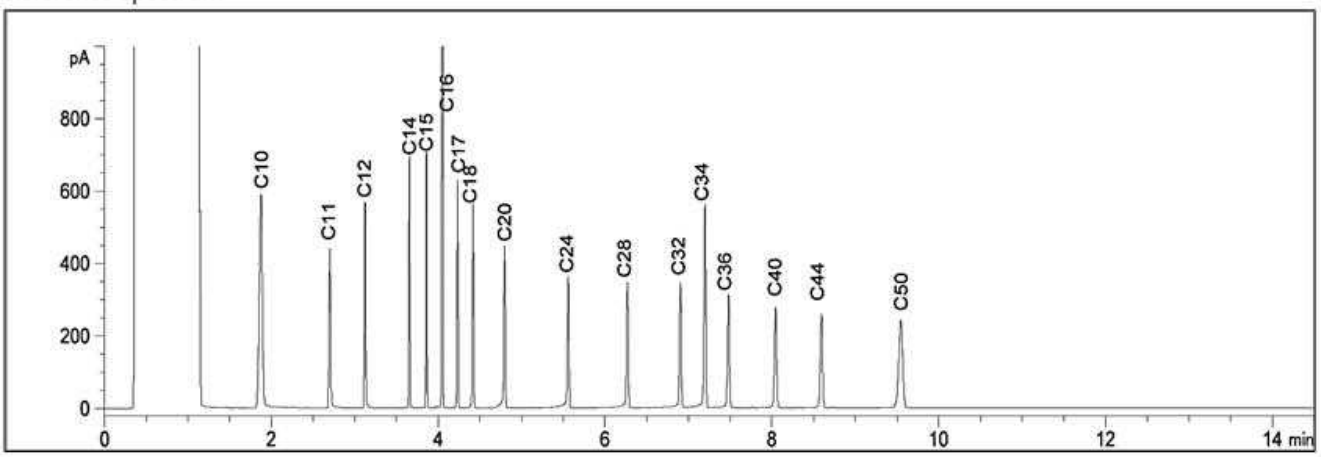
BV Labs Job #: B9Q3808
Report Date: 2019/09/26
BV Labs Sample: KVG986

exp Services Inc
Client Project #: OTT-00252997-B0
Client ID: BH4

Petroleum Hydrocarbons F2-F4 in Water Chromatogram



Reference Spectrum



TYPICAL PRODUCT CARBON NUMBER RANGES

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

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