Phase II Environmental Site Assessment

1208 Old Montreal Road, Ottawa, Ontario

Client:
DCR/Phoenix Group of Companies
18 Bentley Avenue
Ottawa, Ontario K2E 6T8

Project Number:
OTT-00234493-B0

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Date Submitted:
September 13, 2016

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Date Submitted:
September 13, 2016

Executive Summary

Exp Services Inc. (**exp**) was retained by DCR/Phoenix Group of Companies to complete a Phase II Environmental Site Assessment (ESA) of the property located at 1208 Old Montreal Road in Ottawa, Ontario. The purpose of this Phase I ESA was to determine if past or present site activities have resulted in actual or potential contamination at the site.

This report will be used for due diligence purposes in support of a real estate transaction. **Exp** understands this report will not be used to support a City of Ottawa permit application or to submit a Record of Site Condition due to a change in land use.

The site is located on the south side of Old Montreal Road, at 1154, 1172, 1176, 1180, and 1208 Old Montreal Road. At the time of the investigation, the site was used for residential and agricultural purposes. The surrounding properties are mostly residential and agricultural. The site is rectangular in shape and covers a total area of 14.6 hectares (36 acres). The area of the investigation is occupied by a residence and several barns/sheds in the northeast corner of the site.

The topography of the site consists of a topographic high at the house and barn locations of the site, with a steep slope downwards to the north to Old Montreal Road. The local groundwater flow direction is anticipated to be north towards the Ottawa River, at a distance of 1.2 km.

In August 2016, **exp** conducted a Phase I ESA of the Site with the findings summarized in a report entitled "Phase I Environmental Site Assessment, 1154, 1172, 1176, 1180, and1208 Old Montreal Road, Ottawa, Ontario", dated August 19, 2016. Based on the findings of the Phase I ESA report, the following areas of potential environmental concern (APEC) were identified:

Areas of Potential Environmental Concern	Media	Potential Contaminants of Concern	Comments
APEC 1 – The former aboveground fuel tank used to refuel farm vehicles	Soil and Groundwater	Petroleum Hydrocarbon (PHC) including benzene, toluene, ethylbenzene, and xylene (BTEX)	There was a former fuel tank located in the loft of a barn near the old farm house (1208 Old Montreal Road), which was used to refuel farm vehicles. The ground surface in the vicinity of the former tank is gravel. There may have been spillage associated with the tank and dispenser that could have potentially impacted the subsurface.

Based on the Phase I ESA findings, **exp** recommended conducting a Phase II ESA at the Site to determine the presence or absence of impacted soil and/or groundwater.

The Phase II ESA consisted of drilling ten (10) boreholes across the subject site in the vicinity of the former fuel tank. Each of the boreholes were completed as monitoring wells. Soil and groundwater samples were collected and submitted for laboratory analysis of petroleum hydrocarbon fractions (PHC) F1-F4 and BTEX.

Based on the Phase II ESA results, the following conclusions and recommendations are provided:

- On August 16, 2016, BH7 was advanced in the dispensing area of the former gasoline storage tank. Impacted soil and groundwater were found at this location. On August 19, 2016, three (3) boreholes (BH7A to BH7C) were advanced at the Site approximately 5 m north, south and west of BH7 in an attempt to delineate the petroleum impact. Impacted soil and groundwater were found to the north and to a lesser extent to the south.
- On August 31 and September 1, 2016, six (6) boreholes (BH8 to BH13) were drilled to the south (BH10), east (BH8 and BH9), and north (BH11 to BH13) of BH7 in an attempt to delineate the impact to soil and groundwater at the site.
- The stratigraphy at the Site generally consists of a layer of granular fill material followed by silty clay to a maximum depth drilled of 8.23 m. A sand a gravel till layer was found in BH13 at a depth of 4.16 m. There were petroleum odours noticed in soil samples in BH7 from 1.5 m to 3.3 m, BH7A from 1.5 m to 3.2 m, and in BH7C from 0.3 m to 3.0 m.
- On September 8, 2016, groundwater was encountered at a depth of 1.34 m to 5.90 m below the ground surface. No petroleum odours were observed in monitoring well BH7. All of the other monitoring wells did not have petroleum odours in the purge water during the sampling event. The groundwater flow direction was calculated to be to the northwest.
- The concentrations of BTEX parameters in BH7, BH7A and BH7C exceeded the Ministry of the Environment and Climate Change (MOECC) 2011 Table 2 site condition standards (SCS). The concentration of PHC F1 in the sample from BH7A also exceeded the MOECC 2011 Table 2 SCS. The remaining soil samples had PHC and BTEX concentrations that were less than the laboratory detection limits and were less than the MOECC 2011 Table 2 SCS.
- The BTEX concentrations measured in the groundwater sample collected from BH7 significantly exceeded the MOECC 2011 Table 3 SCS. The concentrations of PHC and BTEX measured in the remaining groundwater samples were less than the laboratory detection limits and were less than the MOECC 2011 Table 3 SCS.
- Petroleum impacted soil and groundwater were found at the location of the former tractor refuelling area of the site. The likely area of impacted soil has been estimated to be 600 m^2. Assuming an estimated thickness of impact of 1.5 m, the resulting volume of impacted soil in this zone is 900 m^3. The worst case area of impacted soil has been estimated to be 1,050 m^2. Assuming an estimated thickness of impact of 1.5 m, the resulting volume of impacted soil in the worst case zone is 1,575 m^3.
- Using a remediation cost of \$120/m^3, the cost to remediate the petroleum-impacted areas ranges from \$108,000 to \$189,000. These costs do not include impacted groundwater treatment and disposal. It is possible that since the soil at the site is silty clay, that there will be minimal groundwater infiltration into the remedial excavation.

This executive summary is a brief synopsis of the report and should not be read in lieu of reading the report in its entirety.

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1. Introduction

Exp Services Inc. (**exp**) was retained by DCR/Phoenix Group of Companies to complete a Phase II Environmental Site Assessment (ESA) of the property located at 1208 Old Montreal Road in Ottawa, Ontario, herein referred to as "the site". **Exp** understands that the Phase II ESA is required for due diligence purposes in support of a real estate transaction and that a Record of Site Condition is not required at this time.

1.1 Site Description

The site is located on the south side of Old Montreal Road, at 1154, 1172, 1176, 1180, and 1208 Old Montreal Road, as shown on Figure 1 in Appendix A. At the time of the investigation, the site was used for residential and agricultural purposes. The surrounding properties are mostly residential and agricultural. The site is rectangular in shape and covers a total area of 14.6 hectares (36 acres). The area of the Phase II ESA is occupied by a residence and several barns/sheds in the northeast corner of the site and has an area of approximately 0.4 ha. A site plan is provided in Figure 2 of Appendix A.

The topography of the site consists of a topographic high at the house and barn locations of the site, with a steep slope downwards to the north to Old Montreal Road. The local groundwater flow direction is anticipated to be north towards the Ottawa River, at a distance of 1.2 km.

1.2 Background

In August 2016, **exp** conducted a Phase I ESA of the Site with the findings summarized in a report entitled "Phase I Environmental Site Assessment1154, 1172, 1176, 1180, and1208 Old Montreal Road, Ottawa, Ontario", dated August 19, 2016. Based on the findings of the Phase I ESA report, the following areas of potential environmental concern (APEC) were identified and addressed as part of this investigation:

- There was a former fuel tank located in the loft of a barn near the old farm house which was used to refuel farm vehicles. The ground surface in the vicinity of the former tank is gravel. There may have been spillage associated with the tank and dispenser that could have potentially impacted the subsurface.

Based on the Phase I ESA findings, **exp** recommended conducting a Phase II ESA at the Site to determine the presence or absence of impacted soil and/or groundwater and delineate the possible impacts.

1.3 Objective

The purpose of the Phase II ESA is to confirm the presence or absence of subsurface soil or groundwater impact from the APEC as identified following the completion of the Phase I ESA.

2. Scope of Investigation

The Phase II ESA scope of work for the on-Site investigation consisted of the following activities:

- Request local public utility locating companies (cable, telephone, gas, hydro) to mark any underground utilities present at the Site;
- Retain a private utility locating company to mark all underground utilities present in the vicinity of the borehole locations and to clear the individual borehole locations;
- Advance a total of ten (10) boreholes boreholes at the Site, and instrument eight (8) of them with a monitoring well to facilitate groundwater sampling;
- Collect representative soil samples for chemical analysis of petroleum hydrocarbon fractions (PHC) F1-F4 and benzene, toluene, ethylbenzene, xylenes (BTEX);
- Collect groundwater samples from the monitoring wells for chemical analysis of BTEX and PHC.
- Measure groundwater levels of the monitoring wells and complete an elevation survey of the monitoring wells relative to an assumed benchmark;
- Inspect groundwater from all accessible monitoring wells;
- Review the analytical data and prepare a report summarizing the findings; and,
- Estimate costs to remediate the site if impacts are found.

3. Site Assessment Criteria

The assessment criteria, Site Condition Standards (SCS), applicable to a given site in Ontario are established under subsection 168.4(1) of the Environmental Protection Act. Tabulated generic criteria are provided in *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, MOE, July 2011. These criteria are based on site sensitivity (sensitive or non-sensitive), groundwater use (potable or non-potable), property use (residential, parkland, institutional, commercial, industrial, community and agricultural/other), soil type (coarse or medium to fine textured) and restoration depth (full or stratified restoration). In addition, site specific criteria may be established on the basis of the findings of a Risk Assessment carried out in accordance with Part IX and Schedule C of Ontario Regulation 153/09 (O. Reg. 153/09).

For assessment purposes, **exp** selected the Table 2 SCS for a residential land use with fine grained soil in a potable groundwater condition. The fine grained criteria were used based on field observations of soil texture.

The selection of this category was based on the following factors:

- The site was not considered a sensitive site and is not located in an area designated in a municipal official plan as a well-head protection area or other designation identified by the municipality for the protection of groundwater;
- The site and neighbouring properties rely on water wells for potable water;
- The site will be used for residential purposes;
- The predominant soil type on the site was considered to be fine-textured; and,
- There is no intention to carry out a stratified restoration at the site.

4. Methodology

4.1 Service Clearances

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

4.2 Drilling and Soil Sampling

On August 16, 2016, one (1) borehole (BH7) was advanced at the Site by Marathon Drilling Company Ltd., a licensed well contractor. This borehole was located in the dispensing area of the former gasoline storage tank. Impacted soil and groundwater were found at this location. On August 19, 2016, three (3) boreholes (BH7A to BH7C) were advanced at the Site approximately 5 m north, south and west of BH7 in an attempt to delineate the petroleum impact. Impacted soil and groundwater were found to the north and south, and to a lesser extent to the south.

On August 31, 2016, six (6) boreholes (BH8 to BH13) were drilled to the south (BH10), east (BH8 and BH9), and north (BH11 to BH13) of BH7 in an attempt to delineate the impact to soil and groundwater at the site. This phase of drilling was completed by M3 Drilling, a licensed well contractor.

The drilling was completed under the full-time supervision of **exp** staff. The locations of the boreholes and monitoring wells are presented on Figure 2 in Appendix A.

The boreholes were generally advanced to a maximum depth of 8.23 m below ground surface (bgs), using both a power auger drilling rig. Representative soil samples were recovered from the boreholes at regular depth intervals using stainless steel split spoon samplers. Dedicated nitrile gloves (i.e., one pair per sample) were used during sample handling. No petroleum-based greases or solvents were used during drilling activities.

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 B.

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.

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

Soil samples were selected for laboratory analysis based on combustible vapour measurements and visual and olfactory evidence of impacts, where observed. The following representative soil samples were submitted for laboratory analysis:

Table 4.2: Summary of Soil Samples Submitted for Laboratory Analyses

Borehole & Soil Sample Identification	Depth (m)	Rationale for Submission	Analysis
BH7 SS4	3.1 to 3.7	PHC odours and combustible vapour reading	PHC, BTEX
BH7 SS5	4.6 to 5.2	Attempt to delineate impact	PHC, BTEX
BH7A SS3	2.3 to 2.9	PHC odours and combustible vapour reading	PHC, BTEX
BH7A SS3	2.3 to 2.9	PHC odours and combustible vapour reading	PHC, BTEX
BH7A SS3	2.3 to 2.9	PHC odours and combustible vapour reading	PHC, BTEX
BH8 SS6	4.6 to 5.2	Highest combustible vapour reading	PHC, BTEX
BH9 SS6	4.6 to 5.2	Combustible vapour reading and or proximity to the water table	PHC, BTEX
BH10 SS2	1.5 to 2.1	Combustible vapour reading and or proximity to the water table	PHC, BTEX
BH11 SS9	6.8 to 7.4	Combustible vapour reading and or proximity to the water table	PHC, BTEX
BH12 SS3	4.6 to 5.2	Combustible vapour reading and or proximity to the water table	PHC, BTEX
BH13 SS3	4.6 to 5.1	Combustible vapour reading and or proximity to the water table	PHC, BTEX

Note: PHC – petroleum hydrocarbons fractions F1 to F4

BTEX – benzene, toluene, ethylbenzene, xylenes

4.3 Monitoring Well Installation

A groundwater monitoring well was installed in boreholes BH7, BH7B, and BH8 to BH13. The monitoring wells were installed in general accordance with the Ontario Water Resources Act - R.R.O. 1990, Regulation 903 - Amended to O. Reg. 128/03 and was installed by licensed well contractors (Marathon Drilling and M3 Drilling).

The monitoring wells were constructed of a 30 mm diameter, 3.0 m long Schedule 40 PVC screen and appropriate length riser pipe. The well screen has a slot size of approximately 0.25 mm (slot 10) and was sealed at the base with a PVC end cap. The annular space around the well screen was backfilled with silica sand to approximately 0.3 m above the top of the screen. The sand pack was extended above the

screen to allow for compaction of the sand pack and expansion of the overlying well seal. A granular bentonite ('Hole Plug') seal was placed in the borehole annulus from the top of the sand pack to approximately 0.3 m below ground surface. All monitoring wells were completed with a flush-mount protective steel casing cemented into place. Details of the well installations are provided on the borehole logs in Appendix B.

An elevation survey of the monitoring wells was completed on September 6, 2016. Elevations were referenced to a geodetic benchmark using a high precision global positioning system meter relative to mean sea level (m AMSL).

4.4 Groundwater Monitoring and Sampling

Groundwater monitoring and sampling activities were conducted on September 8, 2016. Prior to sampling, the depths to groundwater in the monitoring wells were measured using a water level meter and groundwater was purged from each monitoring well.

Groundwater sampling activities were completed using low-flow techniques. Purging and groundwater sampling was completed using a peristaltic pump, equipped with dedicated polyethylene tubing for each monitoring well. Groundwater samples were placed directly into the laboratory supplied bottles and/or vials and placed in a cooler containing ice for sample preservation purposes. The vials were inverted prior to being placed in a cooler to ensure that no head-space was present in the samples.

The representative groundwater samples were transported to Paracel Laboratories Ltd. (Paracel) of Ottawa, under Chain of Custody protocol, within 24 hours of sample collection for chemical analysis. Sample handling/storage procedures were consistent with those outlined previously for soil sampling. The groundwater samples were submitted for laboratory analysis of PHC and BTEX.

4.5 Deviations from CSA Standard

No deviations from the CSA Standard Z769-00 (R 2013) for Phase II ESAs, published in March 2000, were encountered during this Phase II ESA.

5. Findings

5.1 Subsurface Conditions

The detailed soil profiles encountered in the borehole are provided on the attached borehole logs (Appendix B). 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 Site, in order of depth, is summarized in the following sections.

5.1.1 Fill Material

A 0.1 m thick layer of grey crushed stone was observed in several boreholes at the ground surface. Brown sand and gravel mixed with silty sand was found in each of the boreholes either below the crushed stone or at the ground surface. The brown sand and gravel ranged in thickness from 0.5 m to 0.8 m. No indications of petroleum impact were identified in the fill.

5.1.2 Native Material

Below the fill was a brown to grey silty clay. This extended to the maximum depth drilled of 8.23 m. A sand a gravel till layer was found in BH13 at a depth of 4.16 m. There were petroleum odours noticed in soil samples in BH7 from 1.5 m to 3.3 m, BH7A from 1.5 m to 3.2 m, and in BH7C from 0.3 m to 3.0 m.

5.2 Groundwater

Groundwater elevations and water levels were measured at the Site on September 8, 2016. Groundwater was encountered at a depth of 1.34 m to 5.90 m below the ground surface. Petroleum sheens and odours were observed in the purge water from BH7. No other petroleum sheens or odours were observed during the 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	Top of Well Casing (m)	September 8, 2016	
		Water Level (mbtoc)	Water Level (MASL)
BH7	85.17	1.24	83.93
BH7B	84.99	1.79	83.20
BH8	84.49	2.48	82.01
BH9	86.29	2.42	83.87
BH10	85.80	1.79	84.01
BH11	79.18	5.73	73.45
BH12	77.10	5.22	71.88
BH13	75.14	2.19	72.95

Note: Elevations were referenced to a geodetic benchmark using a high precision global positioning system meter relative to mean sea level (m AMSL).
mbtoc – metres below top of plastic well casing
MASL – metres above sea level

Based on the water levels measured on September 8, 2016, the principal direction of groundwater flow in the overburden materials was to the northwest. **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. The elevation contours are presented on Figure 2.

6. Analytical Results

6.1 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 screening for combustible vapours and visual and/or olfactory evidence, where observed. Soil analytical results are summarized on Tables 1 in Appendix C and the Certificates of Analysis are enclosed in Appendix D.

6.1.1 Petroleum Hydrocarbons and BTEX

The PHC and BTEX concentrations in soil are shown in Table 1 in Appendix C. The concentrations of BTEX parameters in BH7, BH7A and BH7C exceeded the MOECC 2011 Table 2 SCS. The concentration of PHC F1 in the sample from BH7A also exceeded the MOECC 2011 Table 2 SCS. The remaining soil samples had PHC and BTEX concentrations that were less than the laboratory detection limits and were less than the MOECC 2011 Table 2 SCS.

6.2 Groundwater Quality

Groundwater samples were obtained from the eight newly installed monitoring wells. The groundwater analytical results are summarized on Table 2 in Appendix C and the Certificates of Analysis are enclosed in Appendix D.

6.2.1 Petroleum Hydrocarbons and BTEX

The PHC and BTEX concentrations in the submitted groundwater samples are shown in Table 2 in Appendix C. The monitoring wells are labeled BH7 to BH13. The BTEX concentrations measured in the groundwater sample collected from BH7 significantly exceeded the MOECC 2011 Table 3 SCS. The concentrations of PHC and BTEX measured in the remaining groundwater samples were less than the laboratory detection limits and were less than the MOECC 2011 Table 3 SCS.

6.3 Quality Assurance

Details regarding quality assurance measures taken in the field, including instrument calibration, decontamination procedures, use of dedicated equipment, sample storage and Chain of Custody documentation were provided in Section 4, Methodology.

The subcontract laboratory used during this investigation, Paracel Laboratories Ltd., is accredited by the Standards Council of Canada/Canadian Association of Environmental Analytical Laboratories (Accredited Laboratory No.97) in accordance with ISO/IEC 17025:1999 – "General Requirements for the Competence of Testing and Calibration Laboratories" for the analysis of all parameters for all samples in the scope of work for which SCS have been established under Ontario Regulation 153/04.

The "Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act" ("the Analytical Protocol"), prepared by the MOE, March 2004 amended as of July 1, 2011, establishes criteria used in assessing the performance of analytical laboratories when the data are used in support of the filing of Records of Site Condition.

The analytical program conducted by Paracel 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 Paracel 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 Paracel. 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.

6.4 Discussion

Petroleum impacted soil and groundwater were found at the location of the former tractor refuelling area of the site. The area of petroleum impact has been delineated. Based on the soil and groundwater results and groundwater flow direction in the silty clay, the most likely area of petroleum impact is shown in orange on Figure 3 in Appendix A. A worst case area of soil and groundwater impact is shown in yellow on Figure 3.

Based on laboratory results indicating exceedences of the MOECC SCS and field observations, the maximum thickness of impact of 3.5 m was measured in BH7. The likely area of impacted soil has been estimated to be 600 m^2. Assuming an estimated average thickness of impact of 1.5 m, the resulting volume of impacted soil in this zone is 900 m^3. The worst case area of impacted soil has been estimated to be 1,050 m^2. Assuming an estimated average thickness of impact of 1.5 m, the resulting volume of impacted soil in this zone is 1,575 m^3.

Using a remediation cost of \$120/m^3, the cost to remediate the petroleum-impacted areas ranges from \$108,000 to \$189,000. These costs also assume that the buildings have been removed and the water well has been decommissioned by a licensed well driller. These costs do not include impacted groundwater treatment and disposal. It is possible that since the soil at the site is silty clay, that there will be minimal groundwater infiltration into the remedial excavation.

7. Conclusions and Recommendations

Based on the Phase II ESA results, the following conclusions and recommendations are provided:

- On August 16, 2016, BH7 was advanced in the dispensing area of the former gasoline storage tank. Impacted soil and groundwater were found at this location. On August 19, 2016, three (3) boreholes (BH7A to BH7C) were advanced at the Site approximately 5 m north, south and west of BH7 in an attempt to delineate the petroleum impact. Impacted soil and groundwater were found to the north and to a lesser extent to the south.
- On August 31 and September 1, 2016, six (6) boreholes (BH8 to BH13) were drilled to the south (BH10), east (BH8 and BH9), and north (BH11 to BH13) of BH7 in an attempt to delineate the impact to soil and groundwater at the site.
- The stratigraphy at the Site generally consists of a layer of granular fill material followed by silty clay to a maximum depth drilled of 8.23 m. A sand a gravel fill layer was found in BH13 at a depth of 4.16 m. There were petroleum odours noticed in soil samples in BH7 from 1.5 m to 3.3 m, BH7A from 1.5 m to 3.2 m, and in BH7C from 0.3 m to 3.0 m.
- On September 8, 2016, groundwater was encountered at a depth of 1.34 m to 5.90 m below the ground surface. No petroleum odours were observed in monitoring well BH7. All of the other monitoring wells did not have petroleum odours in the purge water during the sampling event. The groundwater flow direction was calculated to be to the northwest.
- The concentrations of BTEX parameters in BH7, BH7A and BH7C exceeded the Ministry of the Environment and Climate Change (MOECC) 2011 Table 2 site condition standards (SCS). The concentration of PHC F1 in the sample from BH7A also exceeded the MOECC 2011 Table 2 SCS. The remaining soil samples had PHC and BTEX concentrations that were less than the laboratory detection limits and were less than the MOECC 2011 Table 2 SCS.
- The BTEX concentrations measured in the groundwater sample collected from BH7 significantly exceeded the MOECC 2011 Table 3 SCS. The concentrations of PHC and BTEX measured in the remaining groundwater samples were less than the laboratory detection limits and were less than the MOECC 2011 Table 3 SCS.
- Petroleum impacted soil and groundwater were found at the location of the former tractor refuelling area of the site. The likely area of impacted soil has been estimated to be 600 m^2. Assuming an estimated thickness of impact of 1.5 m, the resulting volume of impacted soil in this zone is 900 m^3. The worst case area of impacted soil has been estimated to be 1,050 m^2. Assuming an estimated thickness of impact of 1.5 m, the resulting volume of impacted soil in the worst case zone is 1,575 m^3.
- Using a remediation cost of \$120/m^3, the cost to remediate the petroleum-impacted areas ranges from \$108,000 to \$189,000. These costs do not include impacted groundwater treatment and disposal. It is possible that since the soil at the site is silty clay, that there will be minimal groundwater infiltration into the remedial excavation.

8. Limitation of Liability, Scope of Report, and Third Party Reliance

Basis of Report

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

Where applicable, recommended field services are the minimum necessary to ascertain that construction is being carried out in general conformity with building code guidelines, generally accepted practices and **exp**'s recommendations. Any reduction in the level of services recommended will result in **exp** providing qualified opinions regarding the adequacy of the work. **Exp** can assist design professionals or contractors retained by the Client to review applicable plans, drawings, and specifications as they relate to the Report or to conduct field reviews during construction.

Reliance on Information Provided

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

Standard of Care

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

Complete Report

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

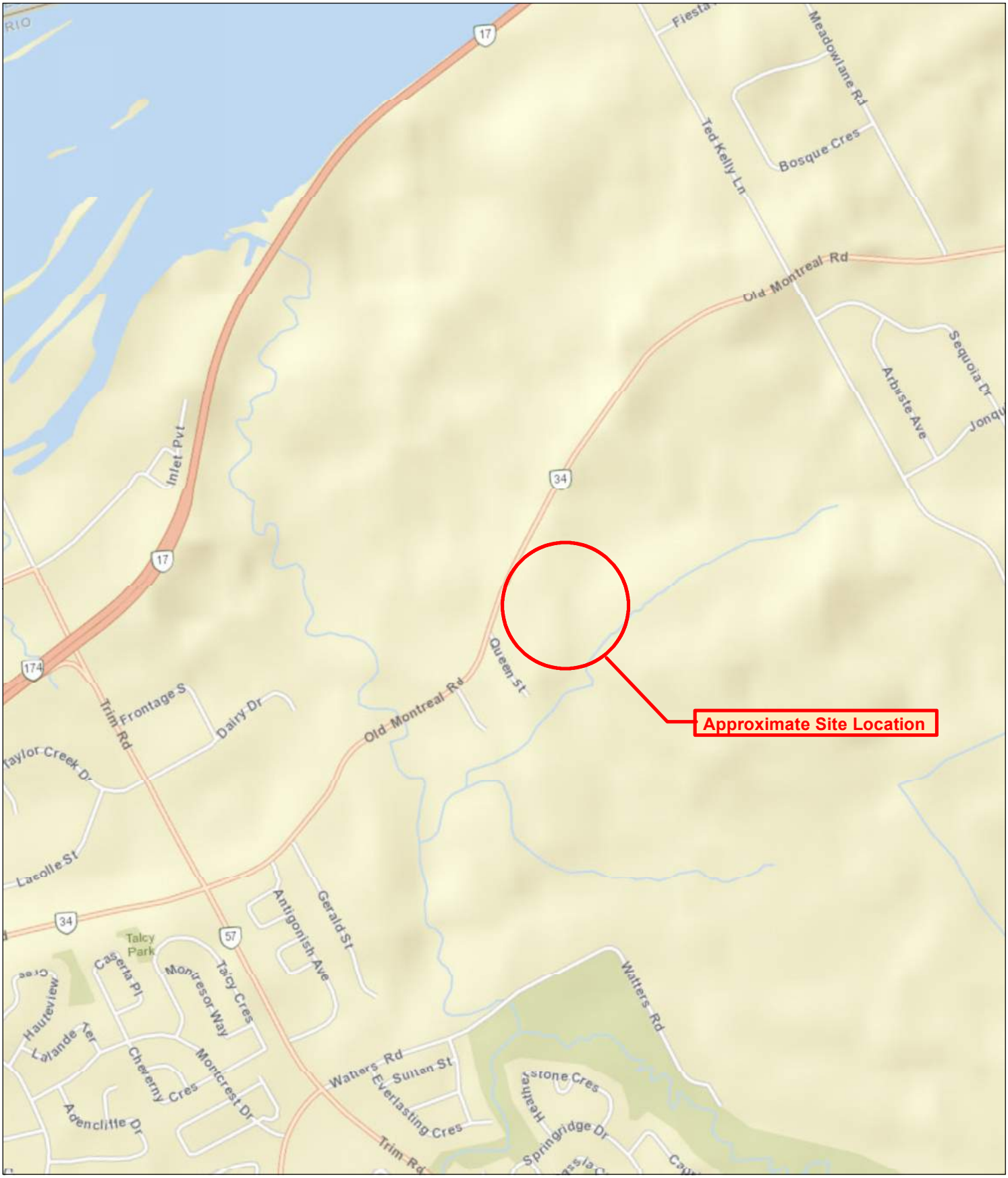
Use of Report

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

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

Appendices

Appendix A: Figures



exp Services Inc.
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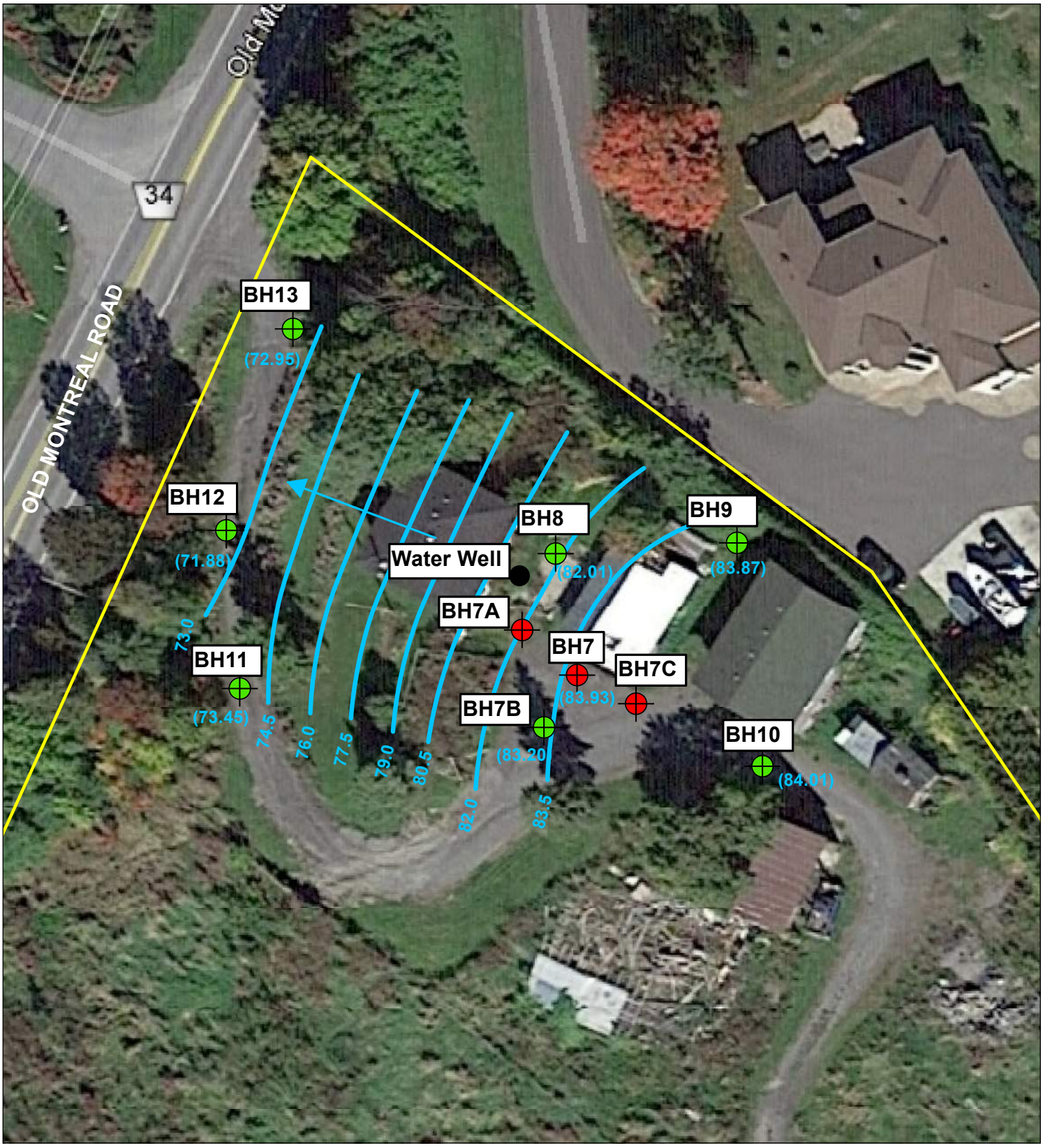
PROJECT TITLE:
PHASE II ENVIRONMENTAL
SITE ASSESSMENT
1154,1172,1176,1180,1208 Old Montreal Road
Ottawa, Ontario

DRAWING TITLE:
SITE LOCATION PLAN

PROJECT No.: OTT-00234493-C0	DWN: TG
SCALE: AS SHOWN	CHKD: MM
DATE: September 2016	FIG. No.: 1



Legend:

- Exp borehole soil and groundwater sample passes
- Exp borehole soil and/or water sample fails
- (73.35) Groundwater elevation Sept. 8, 2016
- Groundwater flow direction

0 3.5 7 14 21 28 35 Meters

N

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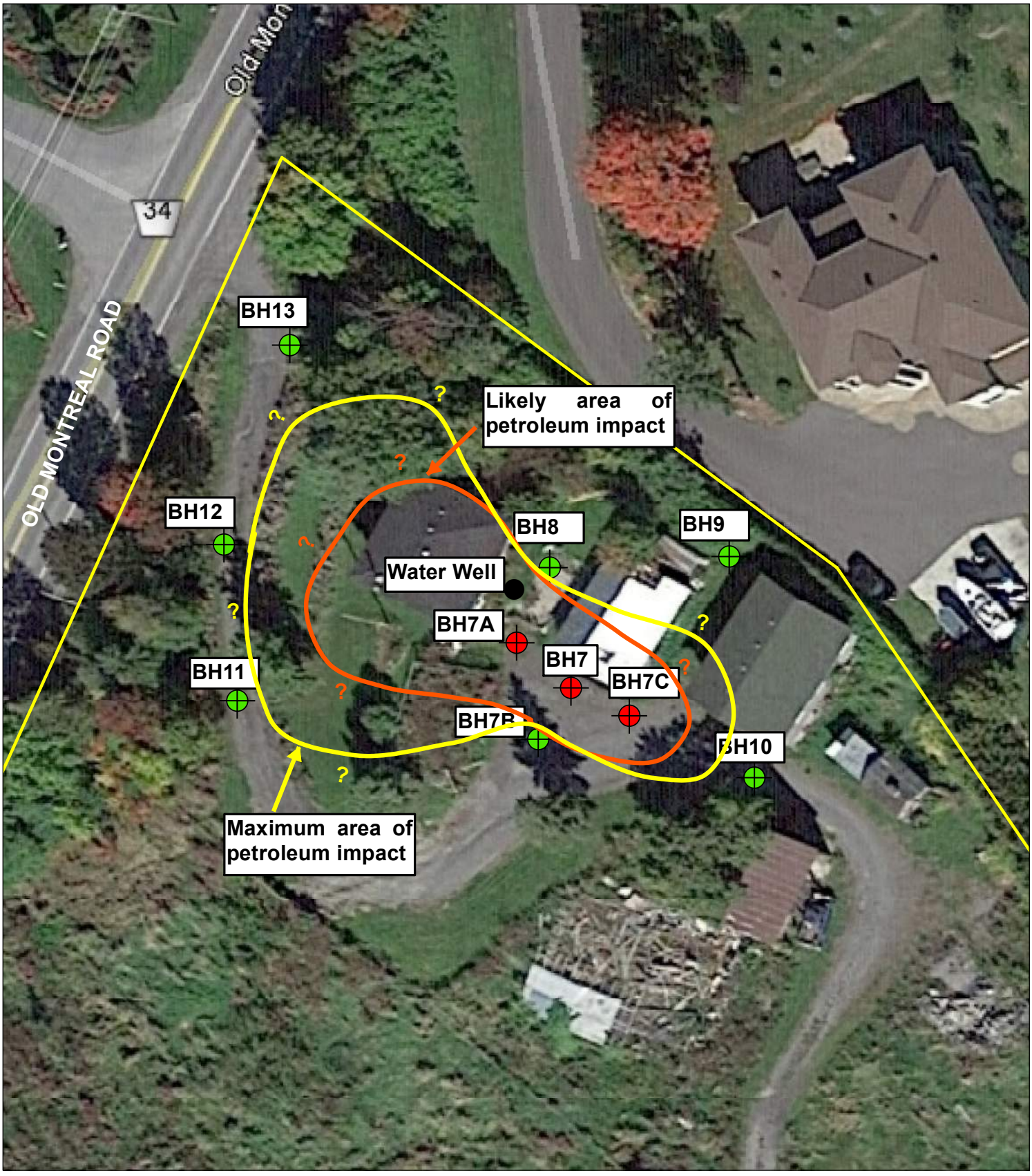
PROJECT TITLE:
Phase II ESA
1208 Old Montreal Road
Ottawa, Ontario

DRAWING TITLE:
BOREHOLE LOCATION PLAN
AND GROUNDWATER ELEVATIONS

PROJECT No.: OTT-00234493-B0	DWN: TG
SCALE: AS SHOWN	CHKD: MM
DATE: September 2016	FIG. No.: 2



Legend:
- Exp borehole soil sample passes
- Exp borehole soil and/or water sample fails

0 3.5 7 14 21 28 35 Meters

N

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PROJECT TITLE:
Phase II ESA
1208 Old Montreal Road
Ottawa, Ontario

DRAWING TITLE:
ESTIMATED AREAS OF PETROLEUM IMPACTED SOIL AND GROUNDWATER

PROJECT No.: OTT-00234493-B0	DWN: TG
SCALE: AS SHOWN	CHKD: MM
DATE: September 2016	FIG. No.: 3

Appendix B: Borehole Logs

Log of Borehole BH7

Project No: OTT-00234493-A0

Project: Phase II ESA

Location: 1208 Montreal Road, Ottawa

Figure No. _____

Page. 1 of 1

Date Drilled: 8/16/16

Drill Type: CME 75

Datum: Assumed

Logged by: MAD Checked by: IT

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

GWL	SYMBOL	SOIL DESCRIPTION	Assumed 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 Sand and gravel mixed with silty sand, brown, moist, (loose)	85.17	0	7 ○	0 □		
			84.3	1	10 ○	0 □		
		SILTY CLAY Brown to grey, moist to wet, petroleum odours from 1.5 m to 3.3 m, (hard to stiff).	83.83	2	13 ○	290 □		
				3	9 ○	460 □		
				4				
				5	4 ○	85 □		
				6	0 ⊕	0 □		
			78.0	7				
		Borehole Terminated at 7.16 m Depth						

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 9/13/16

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A flushmount monitoring well with a 51 mm slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00234493-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
5 days	2.1	-
23 days	1.3	

CORE DRILLING RECORD

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

Log of Borehole BH7A

Project No: OTT-00234493-A0

Project: Phase II ESA

Location: 1208 Montreal Road, Ottawa

Figure No. ____

Page. 1 of 1

Date Drilled: 8/16/16

Drill Type: CME 75

Datum: Assumed

Logged by: TG   Checked by: MM

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

GWL	SOIL DESCRIPTION	Assumed m	Depth (m)	SPT N Value / Shear Strength (kPa)	Combustible Vapour Reading (ppm)	Samples
		84.88	0			
	FILL Crushed stone, grey, moist, no odours, (loose).	84.8				
	FILL Sand, some silt, trace clay, brown to grey, moist, no odours, (loose).	84.1	1	13	0	☒
	SILTY CLAY Brown to grey, moist to wet, petroleum odours from 1.5 m to 3.2 m, (hard to stiff).			15	500	☒
			2			
					1600	☒
			3		65	☒
			4		0	☒
	Borehole Terminated at 4.88 m Depth	80.0				

Chart axes: 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; Natural Unit Wt. kN/m³

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00234493-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

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

Log of Borehole BH7B

Project No: OTT-00234493-A0

Project: Phase II ESA

Location: 1208 Montreal Road, Ottawa

Figure No. ____

Page. 1 of 1

Date Drilled: 8/16/16

Drill Type: CME 75

Datum: Assumed

Logged by: TG Checked by: MM

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

GWL	SYMBOL	SOIL DESCRIPTION	Assumed m	Depth
		FILL Crushed stone, grey, moist, no odours, (loose).	85.06 / 85.0	0
		FILL Sand, some silt, trace clay, brown to grey, moist, no odours, (loose).	84.3	1
		SILTY CLAY Brown to grey, moist to wet, no odours, (hard to stiff).	83.2	2
				3
				4
			79.6	5
		Borehole Terminated at 5.48 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

0 0 5 0 5

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A flushmount monitoring well with a 51 mm slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4 See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00234493-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
20 days	1.9	

CORE DRILLING RECORD

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

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 9/13/16

Log of Borehole BH7C

Project No: OTT-00234493-A0

Project: Phase II ESA

Location: 1208 Montreal Road, Ottawa

Figure No. _____

Page. 1 of 1

Date Drilled: 8/16/16

Drill Type: CME 75

Datum: Assumed

Logged by: TG Checked by: MM

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

GWL	SYMBOL	SOIL DESCRIPTION	Assumed m	Depth
		FILL Crushed stone, grey, moist, no odours, (loose).	85.39 / 85.3	0
		FILL Sand, some silt, trace clay, brown to grey, moist, no odours, (loose).	84.6	1
		SILTY CLAY Brown to grey, moist to wet, petroleum odours from 2.3 m to 3.0 m, (hard to stiff).		2
				3
				4
		Borehole Terminated at 4.88 m Depth	80.5	

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750

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

Samples

Natural Unit Wt. kN/m³

0 10 500 20 5

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00234493-A0

WATER LEVEL RECORDS

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

CORE DRILLING RECORD

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

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 9/13/16

Log of Borehole BH8

Project No: OTT-00234493-A0

Project: Phase II ESA

Location: 1208 Montreal Road, Ottawa

Date Drilled:

Drill Type:

Datum: Assumed

Logged by: TG Checked by: MM

Figure No.

Page. 1 of 1

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

GWL	SYMBOL	SOIL DESCRIPTION	Assumed m	Depth	Standard Penetration Test N Value (20 40 60 80) / Shear Strength kPa (50 100 150 200)	Combustible Vapour Reading (ppm) (250 500 750) / Natural Moisture Content % Atterberg Limits (% Dry Weight) (20 40 60)	SAMPLES	Natural Unit Wt. kN/m³
		FILL Crushed stone, grey, moist, no odours, (loose).	84.57	0				
		FILL Sand, some silt, trace clay, brown to grey, moist, no odours, (loose).	84.5					
		SILTY CLAY Brown to grey, moist to wet, no odours, (hard to stiff).	83.8	1		5		
				2		0		
			82.01			15		
				3	6	5		
				4		0		
						5		
				5		0		
				6		0		
			77.7					
		Borehole Terminated at 6.86 m Depth						

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 9/13/16

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. An above ground monitoring well with a 31 mm slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00234493-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
8 days	2.6	

CORE DRILLING RECORD

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

Log of Borehole BH9

Project No: OTT-00234493-A0

Project: Phase II ESA

Location: 1208 Montreal Road, Ottawa

Date Drilled: _____

Drill Type: _____

Datum: Assumed

Logged by: TG Checked by: MM

Figure No. _____

Page. 1 of 1

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

GWL	SYMBOL	SOIL DESCRIPTION	Assumed m	Depth
		FILL Sand and gravel mixed with silty sand, brown, moist, (loose)	85.49	0
			84.6	
		SILTY CLAY Brown to grey, moist to wet, no odours, (hard to stiff).		1
			83.87	
				2
				3
				4
				5
				6
				7
				8
			77.3	
		Borehole Terminated at 8.23 m Depth		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750

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

SAMPLES

Natural Unit Wt. kN/m³

0 0 0 0 0 20 20 0 0 0

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 9/13/16

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A flushmount monitoring well with a 31 mm slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00234493-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
8 days	1.6	

CORE DRILLING RECORD

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

Log of Borehole BH10

Project No: OTT-00234493-A0

Project: Phase II ESA

Location: 1208 Montreal Road, Ottawa

Figure No. _____

Page. 1 of 1

Date Drilled: _____

Drill Type: _____

Datum: Assumed

Logged by: TG Checked by: MM

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

GWL	SYMBOL	SOIL DESCRIPTION	Assumed m	Depth	Standard Penetration Test N Value 20 40 60 80 / Shear Strength kPa 50 100 150 200	Combustible Vapour Reading (ppm) 250 500 750 / Natural Moisture Content % Atterberg Limits (% Dry Weight) 20 40 60	SAMPLES	Natural Unit Wt. kN/m³
		FILL Crushed stone, grey, moist, no odours, (loose).	85.97 85.9	0				
		FILL Sand, some silt, trace clay, brown to grey, moist, no odours, (loose).	85.2	1				
		SILTY CLAY Brown to grey, moist to wet, no odours, (hard to stiff).	84.01	2				
				3				
				4				
				5				
				6				
				7				
		Borehole Terminated at 7.46 m Depth	78.5					

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 9/13/16

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A flushmount monitoring well with a 31 mm slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00234493-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
8 days	2.0	

CORE DRILLING RECORD

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

Log of Borehole BH11

Project No: OTT-00234493-A0

Project: Phase II ESA

Location: 1208 Montreal Road, Ottawa

Figure No. _____

Page. 1 of 1

Date Drilled: _____

Drill Type: _____

Datum: Assumed

Logged by: TG Checked by: MM

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

GWL	SYMBOL	SOIL DESCRIPTION	Assumed m	Depth
		FILL Crushed stone, grey, moist, no odours, (loose).	79.25 / 79.2	0
		FILL Sand, some silt, trace clay, brown to grey, moist, no odours, (loose).	78.5	1
		SILTY CLAY Brown to grey, moist to wet, no odours, (hard to stiff).		2
				3
				4
				5
			73.35	6
				7
			71.6	
		Borehole Terminated at 7.62 m Depth		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750

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

SAMPLES

Natural Unit Wt. kN/m³

NOTES:
1. Borehole data requires interpretation by exp before use by others
2. A flushmount monitoring well with a 31 mm slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp Services Inc report OTT-00234493-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
8 days	5.9	

CORE DRILLING RECORD

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

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 9/13/16

Log of Borehole BH12

Project No: OTT-00234493-A0

Project: Phase II ESA

Location: 1208 Montreal Road, Ottawa

Date Drilled: _____

Drill Type: _____

Datum: Assumed

Logged by: TG Checked by: MM

Figure No. _____

Page. 1 of 1

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

GWL	SYMBOL	SOIL DESCRIPTION	Assumed m	Depth
		FILL Sand and gravel mixed with silty sand, brown, moist, (loose)	77.29	0
			76.4	
		SILTY CLAY Brown to grey, moist to wet, no odours, (hard to stiff).		1
				2
				3
				4
				5
			71.88	
				6
				7
				8
			69.1	
		Borehole Terminated at 8.23 m Depth		

Standard Penetration Test N Value: 20 40 60 80

Shear Strength: 50 100 150 200 kPa

Combustible Vapour Reading (ppm): 250 500 750

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

SAMPLES

Natural Unit Wt. kN/m³

0 20 35 15 0

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 9/13/16

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A flushmount monitoring well with a 31 mm slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00234493-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
8 days	5.4	

CORE DRILLING RECORD

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

Log of Borehole BH13

Project No: OTT-00234493-A0

Project: Phase II ESA

Location: 1208 Montreal Road, Ottawa

Date Drilled: _____

Drill Type: _____

Datum: Assumed

Logged by: TG Checked by: MM

Figure No. _____

Page. 1 of 1

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

GWL	SYMBOL	SOIL DESCRIPTION	Assumed m	Depth
		FILL Crushed stone, grey, moist, no odours, (loose).	75.32 / 75.3	0
		FILL Sand, some silt, trace clay, brown to grey, moist, no odours, (loose).	74.6	1
		SILTY CLAY Brown to grey, moist to wet, no odours, (hard to stiff).	72.95	2
				3
				4
			70.2	5
		Borehole Terminated at 5.08 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

Combustible Vapour Reading: 0 at 2 m; 5 at 3 m; 85 at 5 m

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 9/13/16

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A flushmount monitoring well with a 31 mm slotted standpipe was installed in the borehole upon completion.
3. Field work supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00234493-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
8 days	2.4	

CORE DRILLING RECORD

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

Appendix C:
Analytical Summary Tables

TABLE 1 SOIL ANALYTICAL RESULTS *(µg/g)*
PETROLEUM HYDROCARBONS
1208 Old Montreal Road, Ottawa

Parameter	**MOECC Table 2[1]**	BH7-SS4	BH7-SS5	BH7A-SS3	BH7B-SS3	BH7C-SS3
Sample Date (d/m/y)	**Residential**	16/08/16	16/08/16	19/08/16	19/08/16	19/08/16
Sample Depth (mbsg)		3.1 - 3.7	4.6 - 5.2	2.3 - 2.9	2.3 - 2.9	2.3 - 2.9
Benzene	0.17	6.67	6.74	2.62	<0.02	0.4
Ethylbenzene	1.6	3.25	1.12	9.15	<0.05	1.25
Toluene	6	14.7	0.3	18.5	<0.05	0.67
Xylenes	25	7.74	1.63	33.1	<0.05	2.71
PHC F_1 (>C_6-C_{10})	65	27	8	76	<7	<7
PHC F_2 (>C_{10}-C_{16})	150	26	<4	13	<4	47
PHC F_3 (>C_{16}-C_{34})	1300	<8	<8	<8	<8	<8
PHC F_4 (>C_{34}-C_{50})	5600	<6	<6	<6	<6	<6

Parameter	**MOECC Table 2[1]**	BH8-SS6	BH9-SS6	BH10-SS2	BH11-SS9	BH12-SS3	BH13-SS3
Sample Date (d/m/y)	**Residential**	31/08/16	31/08/16	31/08/16	01/09/16	01/09/16	01/09/16
Sample Depth (mbsg)		4.6 - 5.2	4.6 - 5.2	1.5 - 2.1	6.8 - 7.4	4.6 - 5.2	4.6 - 5.1
Benzene	0.17	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	1.6	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Toluene	6	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Xylenes	25	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
PHC F_1 (>C_6-C_{10})	65	<7	<7	<7	<7	<7	<7
PHC F_2 (>C_{10}-C_{16})	150	<4	<4	<4	<4	<4	<4
PHC F_3 (>C_{16}-C_{34})	1300	<8	<8	<8	<8	<8	<8
PHC F_4 (>C_{34}-C_{50})	5600	<6	<6	<6	<6	<6	<6

NOTES:

1 MOECC *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 2 potable residential standards (fine grained soils).*

Shaded Concentration exceeds MOECC Table 2 residential soil quality standard.

TABLE 2 GROUNDWATER ANALYTICAL RESULTS *(µg/L)*
PHC and BTEX
1208 Old Montreal Road, Ottawa

Parameter	**MOECC Table 2[1]**	**BH7**	**BH7B**	**BH8**	**BH9**	**BH10**	**BH11**	**BH12**	**BH12**
Sample Date (d/m/y)		18/8/16	8/9/16	8/9/16	8/9/16	8/9/16	8/9/16	8/9/16	8/9/16
Benzene	5	18600	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	2.4	1000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	24	16800	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes	300	9900	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
PHC F_1 (C_6-C_{10})	750	<25	<25	<25	<25	<25	<25	<25	<25
PHC F_2 (>C_{10}-C_{16})	150	<100	<100	<100	<100	<100	<100	<100	<100
PHC F_3 (>C_{16}-C_{34})	500	<100	<100	<100	<100	<100	<100	<100	<100
PHC F_4 (>C_{34}-C_{50})	500	<100	<100	<100	<100	<100	<100	<100	<100

NOTES:

1 MOECC *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the EPA, April 2011, Table 2 potable standards (fine grained soils).*

Shaded Concentration exceeds MOECC Table 2 residential groundwater quality standard.

Appendix D:
Laboratory Certificates of Analysis

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Certificate of Analysis

exp Services Inc. (Ottawa)

100-2650 Queensview Dr.
Ottawa, ON K2B 8K2
Attn: Mark Devlin

Client PO:
Project: OTT00234493-A
Custody: 32454

Report Date: 22-Aug-2016
Order Date: 16-Aug-2016

Order #: 1634172

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1634172-01	BH7-SS4

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO:

Report Date: 22-Aug-2016
Order Date: 16-Aug-2016
Project Description: OTT00234493-A

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	18-Aug-16	20-Aug-16
PHC F1	CWS Tier 1 - P&T GC-FID	18-Aug-16	20-Aug-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	19-Aug-16	21-Aug-16
Solids, %	Gravimetric, calculation	18-Aug-16	18-Aug-16

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO:

Report Date: 22-Aug-2016
Order Date: 16-Aug-2016
Project Description: OTT00234493-A

	Client ID:	BH7-SS4	-	-	-
	Sample Date:	16-Aug-16	-	-	-
	Sample ID:	1634172-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	67.4	-	-	-
Volatiles					
Benzene	0.02 ug/g dry	6.67	-	-	-
Ethylbenzene	0.05 ug/g dry	3.25	-	-	-
Toluene	0.05 ug/g dry	14.7	-	-	-
m,p-Xylenes	0.05 ug/g dry	4.72	-	-	-
o-Xylene	0.05 ug/g dry	3.02	-	-	-
Xylenes, total	0.05 ug/g dry	7.74	-	-	-
Toluene-d8	Surrogate	101%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	27	-	-	-
F2 PHCs (C10-C16)	4 ug/g dry	26	-	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	-	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*3.25*		*ug/g*		*102*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	59.9	0.1	% by Wt.	59.7			0.4	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	*2.22*		*ug/g dry*		*103*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	192	7	ug/g		96.0	80-120			
F2 PHCs (C10-C16)	75	4	ug/g		83.8	80-120			
F3 PHCs (C16-C34)	163	8	ug/g		87.6	80-120			
F4 PHCs (C34-C50)	109	6	ug/g		87.9	80-120			
Volatiles									
Benzene	4.22	0.02	ug/g		106	60-130			
Ethylbenzene	4.78	0.05	ug/g		120	60-130			
Toluene	4.23	0.05	ug/g		106	60-130			
m,p-Xylenes	9.04	0.05	ug/g		113	60-130			
o-Xylene	4.60	0.05	ug/g		115	60-130			
Surrogate: Toluene-d8	*2.47*		*ug/g*		*77.2*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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Page 1 of 1

Client Name: exp Services Inc.	Project Reference: OTT-00234493-A	**Turnaround Time:**
Contact Name: Mark Devlin / Taryn Glancey / Mark McCallig	Quote #	☐ 1 Day ☐ 3 Day
Address: 100-2650 Queensview Dr. Ottawa	PO #	☐ 2 Day ☒ Regular
Telephone: (613) 793 3319	Email Address:	Date Required:

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 2 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Paracel Order Number: 1634172

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHC (F1-F4)	BTEX									
							Required Analyses										
1	BH7-SS4	S		2	Aug 16, 2016	10:00am	X	X				120ml + 1vial					
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments:

Method of Delivery: Walk-in

Relinquished By (Sign): Mark Devlin	Received by Driver/Depot:	Received at Lab: Rachel Subject	Verified By:
Relinquished By (Print): Mark Devlin	Date/Time:	Date/Time: Aug 16/16 4:56	Date/Time: 16/08/16 17:04
Date/Time: Aug 16, 2016 / 4:55 pm	Temperature: °C	Temperature: 13.6 °C	pH Verified [ ] By:

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Certificate of Analysis

exp Services Inc. (Ottawa)

100-2650 Queensview Dr.
Ottawa, ON K2B 8K2
Attn: Taryn Glancy

Client PO:
Project: OTT000234493
Custody: 32459

Report Date: 22-Aug-2016
Order Date: 18-Aug-2016

Order #: 1634297

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1634297-01	BH7 SS5

Approved By:

Tim McCooeye
Senior Advisor

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO:

Report Date: 22-Aug-2016
Order Date: 18-Aug-2016
Project Description: OTT000234493

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	18-Aug-16	18-Aug-16
PHC F1	CWS Tier 1 - P&T GC-FID	18-Aug-16	18-Aug-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	19-Aug-16	21-Aug-16
Solids, %	Gravimetric, calculation	21-Aug-16	21-Aug-16

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO:

Report Date: 22-Aug-2016
Order Date: 18-Aug-2016
Project Description: OTT000234493

	Client ID:	BH7 SS5	-	-	-
	Sample Date:	16-Aug-16	-	-	-
	Sample ID:	1634297-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	63.7	-	-	-
Volatiles					
Benzene	0.02 ug/g dry	6.74	-	-	-
Ethylbenzene	0.05 ug/g dry	1.12	-	-	-
Toluene	0.05 ug/g dry	0.30	-	-	-
m,p-Xylenes	0.05 ug/g dry	1.03	-	-	-
o-Xylene	0.05 ug/g dry	0.60	-	-	-
Xylenes, total	0.05 ug/g dry	1.63	-	-	-
Toluene-d8	Surrogate	106%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	8	-	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	-	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	-	-

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO:

Report Date: 22-Aug-2016
Order Date: 18-Aug-2016
Project Description: OTT000234493

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*3.25*		*ug/g*		*102*	*50-140*			

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO:

Report Date: 22-Aug-2016
Order Date: 18-Aug-2016
Project Description: OTT000234493

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	84.9	0.1	% by Wt.	85.3			0.5	25	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	192	7	ug/g		96.0	80-120			
F2 PHCs (C10-C16)	75	4	ug/g		83.8	80-120			
F3 PHCs (C16-C34)	163	8	ug/g		87.6	80-120			
F4 PHCs (C34-C50)	109	6	ug/g		87.9	80-120			
Volatiles									
Benzene	4.22	0.02	ug/g		106	60-130			
Ethylbenzene	4.78	0.05	ug/g		120	60-130			
Toluene	4.23	0.05	ug/g		106	60-130			
m,p-Xylenes	9.04	0.05	ug/g		113	60-130			
o-Xylene	4.60	0.05	ug/g		115	60-130			
Surrogate: Toluene-d8	*2.47*		*ug/g*		*77.2*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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Page 1 of 1

Client Name: exp	Project Reference: 234493	**Turnaround Time:**
Contact Name: Taryn Glancy / Mark McCalla	Quote #	☐ 1 Day ☐ 3 Day
Address: 100-2650 Queensview	PO #	☐ 2 Day ☐ Regular
Telephone: Ottawa, ON	Email Address:	Date Required: Monday Aug 22

Criteria: ☑ O. Reg. 153/04 (As Amended) Table 2 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: _____ ☐ Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Paracel Order Number:
1634297 - Soil
1634298 - Water

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHC F1→F4	BTEX									
1	BH7 SS5	S			Aug 16		X	X						120ml + 1 vial			
2	BH7 SS6	S			2		X	X			(Hold)			↓			
3	MW 7	GW			Aug 18		X	X									
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments:

Method of Delivery: Walk in

Relinquished By (Sign):	Received by Driver/Depot:	Received at Lab:	Verified By: Rachel Sibyect
Relinquished By (Print):	Date/Time:	Date/Time: Aug 18/16	Date/Time: Aug 18/16 2:01
Date/Time: Aug 18/16 1015 hrs	Temperature: ____ °C	Temperature: 19.3 °C 10:15a	pH Verified ☒ By: N/A

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Certificate of Analysis

exp Services Inc. (Ottawa)

100-2650 Queensview Dr.
Ottawa, ON K2B 8K2
Attn: Mark McCalla

Client PO:
Project: OTT000234493A
Custody: 109572

Report Date: 22-Aug-2016
Order Date: 19-Aug-2016

Order #: 1634410

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1634410-01	BH7A
1634410-02	BH7B
1634410-03	BH7C

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO:

Report Date: 22-Aug-2016
Order Date: 19-Aug-2016
Project Description: OTT000234493A

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	21-Aug-16	22-Aug-16
PHC F1	CWS Tier 1 - P&T GC-FID	21-Aug-16	22-Aug-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	20-Aug-16	21-Aug-16
Solids, %	Gravimetric, calculation	21-Aug-16	21-Aug-16

Certificate of Analysis

Client: exp Services Inc. (Ottawa)

Client PO:

Report Date: 22-Aug-2016

Order Date: 19-Aug-2016

Project Description: OTT000234493A

	Client ID:	BH7A	BH7B	BH7C	-
	Sample Date:	19-Aug-16	19-Aug-16	19-Aug-16	-
	Sample ID:	1634410-01	1634410-02	1634410-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	75.1	75.3	72.2	-
Volatiles					
Benzene	0.02 ug/g dry	2.62	<0.02	0.40	-
Ethylbenzene	0.05 ug/g dry	9.15	<0.05	1.25	-
Toluene	0.05 ug/g dry	18.5	<0.05	0.67	-
m,p-Xylenes	0.05 ug/g dry	22.3	<0.05	2.07	-
o-Xylene	0.05 ug/g dry	10.8	<0.05	0.64	-
Xylenes, total	0.05 ug/g dry	33.1	<0.05	2.71	-
Toluene-d8	Surrogate	100%	97.4%	96.4%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	76	<7	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	13	<4	47	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*3.25*		*ug/g*		*102*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	96	7	ug/g dry	76			23.8	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	105	8	ug/g dry	75			32.9	30	QR-04
F4 PHCs (C34-C50)	23	6	ug/g dry	21			8.9	30	
Physical Characteristics									
% Solids	84.9	0.1	% by Wt.	85.3			0.5	25	
Volatiles									
Benzene	2.59	0.02	ug/g dry	2.62			1.0	50	
Ethylbenzene	9.78	0.05	ug/g dry	9.15			6.7	50	
Toluene	17.6	0.05	ug/g dry	18.5			4.9	50	
m,p-Xylenes	23.3	0.05	ug/g dry	22.3			4.4	50	
o-Xylene	11.2	0.05	ug/g dry	10.8			3.8	50	
Surrogate: Toluene-d8	*1.43*		*ug/g dry*		*94.7*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	192	7	ug/g		96.0	80-120			
F2 PHCs (C10-C16)	100	4	ug/g		111	80-120			
F3 PHCs (C16-C34)	206	8	ug/g		111	80-120			
F4 PHCs (C34-C50)	138	6	ug/g		111	80-120			
Volatiles									
Benzene	4.22	0.02	ug/g		106	60-130			
Ethylbenzene	4.78	0.05	ug/g		120	60-130			
Toluene	4.23	0.05	ug/g		106	60-130			
m,p-Xylenes	9.04	0.05	ug/g		113	60-130			
o-Xylene	4.60	0.05	ug/g		115	60-130			
Surrogate: Toluene-d8	*2.47*		*ug/g*		*77.2*	*50-140*			

Qualifier Notes:

QC Qualifiers :

QR-04 : Duplicate results exceeds RPD limits due to non-homogeneous matrix.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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Chain of Custody (Lab Use Only)
№ 109572

Page 1 of 1

Client Name: exp	Project Reference: 234493-A
Contact Name: Matt McCalla / Taryn Glang	Quote #
Address: 100-2650 Queensview, Ottawa	PO #
Telephone:	Email Address:

Turnaround Time: ☒ 1 Day ☐ 3 Day ☐ 2 Day ☐ Regular
Date Required: Monday

Criteria: ☑ O. Reg. 153/04 (As Amended) Table 2 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ____ ☐ Other: ____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Paracel Order Number: 1634410

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)							
1	BH7A	S			Aug 19		+								- 120ml + 1 vial -					
2	BH7B	↓			↓		+								↓					
3	BH7C	↓			↓		+								↓					
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: Walk-in

Relinquished By (Sign): [signature]	Received by Driver/Depot: [signature]	Received at Lab: SUMETPORN DORMAI	Verified By: Rachel Subject
Relinquished By (Print):	Date/Time: 08/19/16 1:53pm	Date/Time: AUG 19, 2016 03:20	Date/Time: Aug 19/16 4:00
Date/Time: Aug 19/16 1:52 Pm	Temperature: 10.8 °C	Temperature: 14.3 °C	pH Verified ☒ By: N/A

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Certificate of Analysis

exp Services Inc. (Ottawa)

100-2650 Queensview Dr.
Ottawa, ON K2B 8K2
Attn: Taryn Glancy

Client PO:
Project: OTT000234493
Custody: 32571

Report Date: 9-Sep-2016
Order Date: 2-Sep-2016

Order #: 1636372

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1636372-01	BH12 SS3
1636372-02	BH13 SS3
1636372-03	BH11 SS9
1636372-04	BH10 SS2
1636372-05	BH9 SS6
1636372-06	BH8 SS6

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO:

Report Date: 09-Sep-2016
Order Date: 2-Sep-2016
Project Description: OTT000234493

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	2-Sep-16	7-Sep-16
PHC F1	CWS Tier 1 - P&T GC-FID	2-Sep-16	7-Sep-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	6-Sep-16	7-Sep-16
Solids, %	Gravimetric, calculation	7-Sep-16	7-Sep-16

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO:

Report Date: 09-Sep-2016
Order Date: 2-Sep-2016
Project Description: OTT000234493

	Client ID:	BH12 SS3	BH13 SS3	BH11 SS9	BH10 SS2
	Sample Date:	01-Sep-16	01-Sep-16	01-Sep-16	31-Aug-16
	Sample ID:	1636372-01	1636372-02	1636372-03	1636372-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	64.0	91.1	62.5	67.5
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene-d8	Surrogate	105%	104%	105%	105%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6

	Client ID:	BH9 SS6	BH8 SS6	-	-
	Sample Date:	31-Aug-16	31-Aug-16	-	-
	Sample ID:	1636372-05	1636372-06	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	66.1	66.3	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	105%	105%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*8.54*		*ug/g*		*107*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	87.6	0.1	% by Wt.	85.5			2.5	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	*3.89*		*ug/g dry*		*108*	*50-140*			

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO:

Report Date: 09-Sep-2016
Order Date: 2-Sep-2016
Project Description: OTT000234493

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	189	7	ug/g		94.4	80-120			
F2 PHCs (C10-C16)	94	4	ug/g		104	80-120			
F3 PHCs (C16-C34)	220	8	ug/g		118	80-120			
F4 PHCs (C34-C50)	148	6	ug/g		119	80-120			
Volatiles									
Benzene	3.39	0.02	ug/g		84.9	60-130			
Ethylbenzene	3.37	0.05	ug/g		84.2	60-130			
Toluene	3.85	0.05	ug/g		96.3	60-130			
m,p-Xylenes	7.08	0.05	ug/g		88.5	60-130			
o-Xylene	3.29	0.05	ug/g		82.2	60-130			
Surrogate: Toluene-d8	*7.66*		*ug/g*		*95.7*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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Chain of Custody

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№ 32571

Page 1 of 1

Client Name: exp	Project Reference: 234493	**Turnaround Time:**
Contact Name: Taryn Glang / Mark McCallum	Quote #	☐ 1 Day ☐ 3 Day
Address: 100-2650 Queensview	PO #	☐ 2 Day ☒ ~~Regular~~
Telephone: 613-688 1899	Email Address:	Date Required:

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 2 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number: 1636372

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHC F1-F4	BTEX									
1	BH12 SS3	S		2	Sep 1		X	X		120 + vial.							
2	BH13 SS3																
3	BH11 SS9																
4	BH10 SS2				Aug 31												
5	BH9 SS6																
6	BH8 SS6																
7																	
8																	
9																	
10																	

Comments:

Method of Delivery: Walk in

Relinquished By (Sign): Taryn Glang	Received by Driver/Depot:	Received at Lab:	Verified By: Rachel Subject
Relinquished By (Print): Taryn Glang Sep 2 9:18 a.m.	Date/Time:	Date/Time: Sept 2/16 9:18a	Date/Time: Sep 2/16 11:35
Date/Time:	Temperature: °C	Temperature: 10.4 °C	pH Verified ☒ By: N/A

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Certificate of Analysis

exp Services Inc. (Ottawa)

100-2650 Queensview Dr.
Ottawa, ON K2B 8K2
Attn: Taryn Glancy

Client PO:
Project: OTT000234493
Custody: 32459

Report Date: 22-Aug-2016
Order Date: 18-Aug-2016

Order #: 1634298

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1634298-01	MW7

Approved By:

Dale Robertson, BSc
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	18-Aug-16	22-Aug-16
PHC F1	CWS Tier 1 - P&T GC-FID	18-Aug-16	22-Aug-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	19-Aug-16	20-Aug-16

Certificate of Analysis

Report Date: 22-Aug-2016

Client: exp Services Inc. (Ottawa)

Order Date: 18-Aug-2016

Client PO:

Project Description: OTT000234493

	Client ID:	MW7	-	-	-
	Sample Date:	18-Aug-16	-	-	-
	Sample ID:	1634298-01	-	-	-
	MDL/Units	Water	-	-	-
Volatiles					
Benzene	0.5 ug/L	18600	-	-	-
Ethylbenzene	0.5 ug/L	1000	-	-	-
Toluene	0.5 ug/L	16800	-	-	-
m,p-Xylenes	0.5 ug/L	6330	-	-	-
o-Xylene	0.5 ug/L	3570	-	-	-
Xylenes, total	0.5 ug/L	9900	-	-	-
Toluene-d8	Surrogate	92.2%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-
F1 + F2 PHCs	125 ug/L	<125	-	-	-
F3 + F4 PHCs	200 ug/L	<200	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: Toluene-d8	*85.0*		*ug/L*		*106*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Volatiles									
Benzene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: Toluene-d8	*84.6*		*ug/L*		*106*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	2240	25	ug/L		112	68-117			
F2 PHCs (C10-C16)	1670	100	ug/L		93.0	60-140			
F3 PHCs (C16-C34)	3160	100	ug/L		85.0	60-140			
F4 PHCs (C34-C50)	2120	100	ug/L		85.3	60-140			
Volatiles									
Benzene	29.5	0.5	ug/L	ND	73.8	50-140			
Ethylbenzene	34.0	0.5	ug/L	ND	84.9	50-140			
Toluene	31.5	0.5	ug/L	ND	78.8	50-140			
m,p-Xylenes	64.5	0.5	ug/L	ND	80.7	50-140			
o-Xylene	32.5	0.5	ug/L	ND	81.3	50-140			
Surrogate: Toluene-d8	*69.2*		*ug/L*		*86.5*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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Chain of Custody
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№ 32459

Page 1 of 1

Client Name: exp	Project Reference: 234493
Contact Name: Taryn Glancy / Mark McCalla	Quote #
Address: 100-2650 Queensview	PO #
Telephone: Ottawa, ON	Email Address:

Turnaround Time:
☐ 1 Day ☐ 3 Day
☐ 2 Day ☐ Regular
Date Required: Monday Aug 22

Criteria: ☑ O. Reg. 153/04 (As Amended) Table 2 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: _____ ☐ Other: _____

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Required Analyses

Paracel Order Number:
1634297 - Soil.
1634298 - Water.

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHC F1->F4	BTEX									
1	BH7 SS.5	S			Aug 16		x	x							-120mL 1 vial		
2	BH7 SS6	S			↓		x	x			(Hold)				↓		
3	MW 7	GW			Aug 18		x	x									
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments:

Method of Delivery: Walk in

Relinquished By (Sign):	Received by Driver/Depot:	Received at Lab:	Verified By: Rachel Sibcet
Relinquished By (Print):	Date/Time:	Date/Time: Aug 18/16	Date/Time: Aug 18/16 2:01
Date/Time: Aug 18/16 1015 hrs	Temperature: °C	Temperature: 19.3 °C 10:15	pH Verified (K) By: N/A

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Certificate of Analysis

exp Services Inc. (Ottawa)

100-2650 Queensview Dr.
Ottawa, ON K2B 8K2
Attn: Mark McCalla

Client PO:
Project: OTT000234493A
Custody: 32595

Report Date: 12-Sep-2016
Order Date: 8-Sep-2016

Order #: 1637215

This Certificate of Analysis contains analytical data applicable to the following samples as submitted:

Paracel ID	Client ID
1637215-01	BH7B
1637215-02	BH8
1637215-03	BH9
1637215-04	BH10
1637215-05	BH11
1637215-06	BH12
1637215-07	BH13

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO:

Report Date: 12-Sep-2016
Order Date: 8-Sep-2016
Project Description: OTT000234493A

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	10-Sep-16	11-Sep-16
PHC F1	CWS Tier 1 - P&T GC-FID	10-Sep-16	11-Sep-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	9-Sep-16	9-Sep-16

Certificate of Analysis
Client: exp Services Inc. (Ottawa)
Client PO:

Report Date: 12-Sep-2016
Order Date: 8-Sep-2016
Project Description: OTT000234493A

	Client ID:	BH7B	BH8	BH9	BH10
	Sample Date:	08-Sep-16	08-Sep-16	08-Sep-16	08-Sep-16
	Sample ID:	1637215-01	1637215-02	1637215-03	1637215-04
	MDL/Units	Water	Water	Water	Water
Volatiles					
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene-d8	Surrogate	101%	103%	102%	101%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
F1 + F2 PHCs	125 ug/L	<125	<125	<125	<125
F3 + F4 PHCs	200 ug/L	<200	<200	<200	<200

	Client ID:	BH11	BH12	BH13	-
	Sample Date:	08-Sep-16	08-Sep-16	08-Sep-16	-
	Sample ID:	1637215-05	1637215-06	1637215-07	-
	MDL/Units	Water	Water	Water	-
Volatiles					
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene-d8	Surrogate	103%	100%	102%	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	-
F1 + F2 PHCs	125 ug/L	<125	<125	<125	-
F3 + F4 PHCs	200 ug/L	<200	<200	<200	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: Toluene-d8	*33.8*		*ug/L*		*106*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Volatiles									
Benzene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: Toluene-d8	*32.8*		*ug/L*		*102*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1900	25	ug/L		95.1	68-117			
F2 PHCs (C10-C16)	1740	100	ug/L		96.8	60-140			
F3 PHCs (C16-C34)	3610	100	ug/L		97.1	60-140			
F4 PHCs (C34-C50)	2350	100	ug/L		94.8	60-140			
Volatiles									
Benzene	25.6	0.5	ug/L		64.0	60-130			
Ethylbenzene	39.6	0.5	ug/L		99.0	60-130			
Toluene	49.1	0.5	ug/L		123	60-130			
m,p-Xylenes	96.6	0.5	ug/L		121	60-130			
o-Xylene	51.1	0.5	ug/L		128	60-130			
Surrogate: Toluene-d8	*25.5*		*ug/L*		*79.7*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable
ND: Not Detected
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.

CCME PHC additional information:

- The method for the analysis of PHCs complies with the Reference Method for the CWS PHC and is validated for use in the laboratory. All prescribed quality criteria identified in the method has been met.
- F1 range corrected for BTEX.
- F2 to F3 ranges corrected for appropriate PAHs where available.
- The gravimetric heavy hydrocarbons (F4G) are not to be added to C6 to C50 hydrocarbons.
- In the case where F4 and F4G are both reported, the greater of the two results is to be used for comparison to CWS PHC criteria.

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Chain of Custody
(Lab Use Only)
№ 32595

Page 1 of 1

Client Name: EXP	Project Reference: 234493-A	**Turnaround Time:**
Contact Name: Mark McCallo / David Clarke	Quote #	☐ 1 Day ☐ 3 Day
Address: 100-2650 Queensview Dr	PO #	☒ 2 Day ☐ Regular
Telephone: 613 688 1899	Email Address: Mark.McCallo@exp.com; Daniel.Clarke@exp.com	Date Required:

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 2 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)

Paracel Order Number: 1637215

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	Required Analyses: PHC 1-4	Required Analyses: BTEX
1	BH7B	GW		3	Sept 8/16		X	X
2	BH8							
3	BH9							
4	BH10							
5	BH11							
6	BH12							
7	BH13							
8								
9								
10								

Comments:

Method of Delivery: Walk-in

Relinquished By (Sign):	Received by Driver/Depot:	Received at Lab:	Verified By: Rachel Subject
Relinquished By (Print): Daniel Clarke	Date/Time:	Date/Time: Sept 8/16 3:18p	Date/Time: Sep 8/16 3:35
Date/Time: Sept 8/16	Temperature: °C	Temperature: 10.3 °C	pH Verified ☐ By: N/A