



Phase II Environmental Site Assessment Update 112 Montreal Road, Ottawa, Ontario

Client

1147310 Ontario Incorporated
7 Strathearn Avenue
Brampton, Ontario L6T 4P1

Project Number:

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Date Submitted

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Executive Summary

Exp Services Inc. (**exp**) was retained by 1147310 Ontario Incorporated to complete a Phase II Environmental Site Assessment (ESA) Update for the property located at 112 Montreal Road, in Ottawa (site), Ontario. The objective of the Phase II ESA was to address areas of potential environmental concern (APEC) identified in a Phase I ESA conducted at the site by **exp** and to support the City of Ottawa Site Plan Approval permitting requirements.

The findings of the Phase I ESA were presented in a report entitled *Phase I Environmental Site Assessment, 112 Montreal Road, Ottawa, Ontario* dated December 20, 2013. The Phase I ESA identified the following on-site APECs:

Table EX.1: Areas of Potential Environmental Concern

Areas of Potential Environmental Concern (APEC)	Location of APEC	Potentially Contaminating Activity (PCA)	Potential Contaminants of Concern (PCOC)
1. Poor quality fill	On-site	#71 Fill Material of Unknown Quality	PHC, BTEX, and metals
2. Retail Fuel Outlet present since 1930s	120 Montreal Road (Adjacent north-east)	#37 Fuel Storage and Dispensing	Petroleum Hydrocarbons (PHCs) including benzene, toluene, ethylbenzene and xylenes (BTEX), metals, volatile organic compounds (VOC)
3. Dry Cleaners for almost 60 years	94 Montreal Road (Adjacent north-west)	#29 Dry Cleaning (where chemicals are used)	VOC
4. Bulk Fuel Depot in the 1970s	296 Kendall Ave. (30 m east)	#37 Fuel Storage and Dispensing	PHC and BTEX
5. Automotive Garage in the 1960's	283 Kendall Ave. (300 m east)	#68 Repair Garages	PHC, BTEX, and metals

This Phase II ESA was conducted in accordance with the Phase II ESA standard as defined by Ontario Regulation 153/04, as amended by Ontario Regulation 511/09 (O.Reg. 153/04), and in accordance with generally accepted professional practices. The Phase II ESA consisted advancing a total of ten (10) boreholes and completing selected boreholes as groundwater monitoring wells in November 2013.

For assessment purposes, **exp** selected the Site Condition Standards (SCS), provided in Table 3 of *Soil, Groundwater and Sediment Standards for use Under Part XV.1 of the Environmental Protection Act*, Ministry of the Environment (MOE), 2011 for residential use at a site with coarse textured soil in accordance with Ontario Regulation 153/04, as amended in Regulation 511/09. In addition, **exp** compared the soil results to Table 1 SCS to determine if excess soil maybe be relocated to a different site during site redevelopment.

The results and findings of the Phase II ESA conducted at the site are summarized as follows:

- The general stratigraphy at the site, as observed in the boreholes, started with brown silty sand and gravel fill with cobbles and boulders. Underlying the topsoil or fill was native silty sand and gravel till. Limestone bedrock was encountered in each of the boreholes between 2.31 and 3.28 m below ground surface (bgs). The limestone bedrock was cored approximately 4.5 m in all boreholes except MW13-3.
- The depth to groundwater in the two overburden monitoring wells was 2.35 m and 2.38 m. The depth to groundwater in the bedrock wells ranged from 2.6 m to 4.1 m. Based on the groundwater elevations, the bedrock groundwater below the site was calculated to flow in a northeasterly direction. Based on the bedrock groundwater elevations, the horizontal hydraulic gradient is estimated at 0.017. Assuming a range of hydraulic conductivities for limestone bedrock of 1.0×10^{-7} cm/s to 1.0×10^{-3} cm/s, the average groundwater velocity would be approximately 0.2 m/year.
- The soil cores retrieved from the boreholes did not have a sheen, the presence of a separate organic phase, or other evidence of a non-aqueous phase liquid (NAPL) either in the surficial fill or overburden soil materials. Inspection of development and purged waters and groundwater samples found no indications of the presence of NAPL within the fill and overburden materials at the locations sampled.
- All PHC and BTEX parameters were either non-detect or below the 2011 MOE Table 3 SCS, with the exception of the soil sample collected from MW13-4 at a depth of 1.2 m to 1.8 m. The concentration of PHC F3 (365 ug/g) in this sample exceeded the MOE Table 3 residential soil quality standard of 300 ug/g. The PHC F3 concentration in the blind duplicate soil was 536 ug/g. The soil sample collected from MW13-1 had a lead concentration (325 ug/g) that exceeded the MOE Table 3 standard of 120 ug/g. This borehole is located near the main entrance to the site. In addition, the two shallow soil samples collected east of the Parkway building BH13-10 and BH13-11 had concentrations of barium, lead and zinc (BH13-10) and lead and zinc (BH13-11) that exceeded the MOE Table 3 standards. All other soil samples had concentrations of the tested metals that were less than the 2011 MOE Table 3 SCS.
- There were no groundwater exceedences of the 2011 MOE Table 3 SCS.
- Based on the results of the Phase II ESA, the concentration of PHC F3 at MW13-4 exceeded the MOE Table 3 SCS. Because the PHC-impacted soil is present above the water table, it would not have been transported by groundwater. It is likely the result of poor quality fill at the site. The area represented by this exceedence using the halfway to clean borehole approach is approximately 350 m^2 . With a thickness of petroleum impact of 1.0 m, the resulting volume of impacted soil is 350 m^3 . In addition, there is metals impacted fill located at MW13-1 near Montreal Road and in the north half of the Parkway building and east of the building at BH13-10 and BH13-11. The area of lead impacted soil at MW13-1 has not been delineated but likely extends a distance of 20 m to the south. The resulting area is approximately 525 m^2 . The thickness of impact is likely 2 m with a resulting volume of $1,050 \text{ m}^3$. The area of metals impact at the Parkway building is approximately 630 m^2 with a thickness of 0.5 m for a volume of 315 m^3 .
- In addition to the above, there were exceedences of the MOE Table 1 background concentrations in the soil samples collected from MW13-9 (xylenes) and in MW13-6 (antimony). Any excess soil that needs to be removed from the site will have to meet the MOE Table 1 criteria for unrestricted disposal options. Additional testing and analyses will be required to provide soil management options which could involve unrestricted or restricted off-site disposal at a site willing to accept the soil, reuse on-site, or off-site disposal at a site (for soil less than Table 1) or landfill disposal (for soil that exceeds Table 1).

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1. Introduction

Exp Services Inc. (exp) was retained by 1147310 Ontario Incorporated to complete a Phase II Environmental Site Assessment (ESA) Update for the property located at 112 Montreal Road, in Ottawa (site), Ontario. The objective of the Phase II ESA was to address areas of potential environmental concern (APEC) identified in a Phase I ESA conducted at the site by exp and to support the City of Ottawa Site Plan Approval permitting requirements.

This report has been prepared in accordance with the Phase II ESA standard as defined by Ontario Regulation 153/04, as amended by Ontario Regulation 511/09 (O.Reg. 153/04), and in accordance with generally accepted professional practices. Subject to this standard of care, exp makes no express or implied warranties regarding its services and no third party beneficiaries are intended. Limitation of liability, scope of report and third party reliance are outlined in Section 9 of this report.

1.1 Site Description

The site is located at 112 Montreal Road, just west of the Vanier Parkway, as shown on Figure 1 (Appendix A). The property is legally described as Lot 5 and Part of Lots 6 and 7 Block 2, Registered Plan 29 and Lot 88 Part of Lots 40 and 41 Registered Plan No. 49, City of Ottawa. The site has a total area of 0.96 hectares and is approximately rectangular in shape. The site is zoned TM3 H (42), traditional mainstreet, mixed commercial and residential zone.

At the time of the investigation, the site was occupied by a motor hotel consisting of seven structures, including a laundry building and former residential home. The buildings were reportedly constructed between 1955 and 1968 and are currently occupied by the hotel. The site is serviced by municipal water, sewer, cable, hydro, natural gas, and telephone. Paved parking areas are located around the buildings. Surrounding properties consist of commercial development to the north and southwest. The remaining adjacent land use to the south, east and southeast is residential. The Vanier Parkway borders the eastern edge of the site. Based on topography, it is anticipated that overburden groundwater flows in a westerly direction towards the Rideau River found approximately 300 metres west of the site. Previous environmental investigations determined that the groundwater flow direction at the subject site is to the north west.

The approximate Universal Transverse Mercator (UTM) coordinates for the subject site centroid is NAD83, Zone 18, 447090.54 m E, 5031321.27 m N. The UTM coordinates were based on an estimate derived using Google Earth™. The accuracy of the centroid is estimated to range from 5 to 50 m.

1.2 Property Ownership

The owner contact information is provided below:

Owner Contact: Naushad Jinah
1147310 Ontario Incorporated/Econolodge Downtown East Ottawa
112 Montreal Road, Ottawa, ON K1L 6E6
Tel: 613-746-4641

1.3 Current and Proposed Future Uses

At the time of the Phase II ESA, the subject site was occupied by seven structures, including a laundry building and former residential home. The buildings were reportedly constructed between 1955 and 1968 and are currently occupied by the hotel. The site is serviced by municipal water, sewer, cable, hydro, natural gas, and telephone. Paved parking areas are located around the buildings. The site is proposed to be redeveloped with commercial and residential buildings. **Exp** understands that a Record of Site Condition is required for this change in land use.

1.4 Applicable Site Condition Standards

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" ("the SGWS Standards"), MOE, April 2011. These criteria, which came into force on July 1, 2011, 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 O. Reg. 153/04, as amended.

The SGWS Standards specify SCS for soil, groundwater and sediment that are tabulated as follows:

Table 1 – Full Depth Background Site Condition Standards;

Table 2 – Full Depth Generic Site Condition Standards in a Potable Ground Water Condition;

Table 3 – Full Depth Generic Site Condition Standards in a Non-Potable Ground Water Condition.;

Table 4 – Stratified Site Condition Standards in a Potable Ground Water Condition;

Table 5 – Stratified Site Condition Standards in a Non-Potable Ground Water Condition;

Table 6 – Generic Site Condition Standards for Shallow Soils in a Potable Ground Water Condition;

Table 7 – Generic Site Condition Standards for Shallow Soils in a Non-Potable Ground Water Condition

Table 8 – Generic Site Condition Standards for Use within 30 m of a Water Body in a Potable Groundwater Condition;

Table 9 – Generic Site Condition Standards for Use within 30 m of a Water Body in a Non-Potable Groundwater Condition.

For assessment purposes, **exp** selected the 2011 Table 3 SCS for residential property use in a non-potable groundwater situation with coarse textured soil.

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

- The site was not considered a sensitive site;
- Municipal water and sewer is provided for the area;
- The site 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 will be used for residential purposes;
- Grain-size analysis was completed on four soil samples ranging in depth from 1.5 m to 4.9 m, The predominant soil type on the site was considered to be coarse-textured; and,
- There is no intention to carry out a stratified restoration at the site.

2. Background Information

2.1 Physical Setting

The site is located at 112 Montreal Road, just west of the Vanier Parkway. The site has a total area of 0.96 hectares and is approximately rectangular in shape. At the time of the investigation, the site was occupied by seven structures, including a laundry building and former residential home. The buildings were reportedly constructed between 1955 and 1968 and are currently occupied by the hotel. The site is serviced by municipal water, sewer, cable, hydro, natural gas, and telephone. Paved parking areas are located around the buildings.

Based on a review of historical aerial photographs, chain of title information, historical maps, and other records review, it appears the site was first developed as early as the 1930's. It was likely residential at this time. The site was then developed into a Motor Hotel in the 1940's. The site is bound by commercial land uses to the north (across Montreal Road), east (across the Vanier Parkway), commercial and residential to the west and south. Based on static water levels measured in previously constructed monitoring wells in 1995, groundwater flow was interpreted to be to the northwest. The Phase II ESA study area is shown on Figure 2 in Appendix A.

The properties located south and east of the site were considered up-gradient with respect to the anticipated groundwater flow direction. As such, there was the potential for the historic and current operations of the properties located up-gradient of the site to pose an environmental impact to the site. The locations of the areas of potential environmental concern (APECs) are shown on Figure 3 in Appendix A. The land is relatively flat with a difference in elevation of less than 1 m over the 150 m length of the property.

No areas of natural significance were present within 250 m of the subject site.

2.2 Past Investigations

The following reports were reviewed by **exp**:

- *Phase I Environmental Site Assessment 112 Montreal Road, Vanier, Ontario*, dated 1994 prepared by Trow Consulting Engineers Limited (now **exp**).

The Phase I ESA included a review of past, present, and adjacent land uses, correspondence with the provincial ministry of environment (MOE), and a review of aerial photographs, topographic maps, fire insurance records, and municipal directories available for the site. A site visit was also conducted to comment on site characteristics and to investigate the potential for on and off site contamination sources.

The report concluded that there was a potential for subsurface contamination from off-site sources. These sources included: the adjacent site to the northeast which served as a gas station with underground petroleum storage tanks (UST); and an aboveground storage tank (AST) on the adjacent property near the southwest corner of the site. Concerns regarding on-site contaminants include oil staining and a black substance noted in the crawlspace of one of the buildings and the previous car lot, which was located on the northwest corner of the site in the 1950's. It was also reported that friable asbestos, polychlorinated biphenyls (PCB) in fluorescent lights ballasts and electrical transformers, and refrigerants containing chlorofluorocarbons (CFC) were present on the site. It was recommended that a subsurface investigation be conducted to confirm the presence or absence of any on-site contamination.

- *Phase II Environmental Site Assessment 112 Montreal Road, Vanier, Ontario, dated 1995* prepared by Trow Consulting Engineers Limited.

Additional work in the form of a Phase II ESA was completed in several stages to verify the subsurface conditions and investigate the potential for contamination as described above. A total of eight interior and exterior testpits were constructed and 25 exterior boreholes were drilled on the site. Field observations indicated that the site is underlain by 1.8 to 3.6 metres of overburden comprised of fill material. The bedrock underlying the fill was cored in several boreholes. Limestone bedrock, which slopes towards the Rideau River to the west, was observed to underlie the site. Groundwater was encountered and 15 monitoring wells were installed in the boreholes. Based on static water levels measured in the wells, groundwater flow was interpreted to be to the northwest.

Twenty soil/rock samples and 20 groundwater samples, including duplicate and field blank samples, were submitted for laboratory analysis. The results of the analyses of total petroleum hydrocarbons (TPH), benzene, toluene, ethylbenzene, xylene (BTEX), lead and other parameters were compared to the provincial criteria which existed at the time. Based on the analytical results obtained, three soil samples exceeded the criteria for arsenic (TP5 – 0.04m to 0.09m), pH (TP6 – 0.04m to 0.1m) and petroleum hydrocarbons (BH7 – 0 to 0.15m). With respect to the provincial guidelines in existence in 1994, six of the groundwater samples were found to exceed the criteria related to petroleum hydrocarbons.

- *Phase I ESA Update, Howard Johnson Express Inn Ottawa 112 Montreal Road, Vanier, Ontario, dated November 2000* prepared by Trow Consulting Engineers Limited.

The concentrations of petroleum hydrocarbons and related compounds in groundwater noted in the previous investigation did not exceed the current guidelines (1996) for a non-potable groundwater condition. Petroleum hydrocarbon levels in a surface soil sample from BH-7 (AS1 from 0 to 0.15m) exceeded the current soil quality criteria. As the field screening indicated no elevated volatiles were noted in the soil underlying the petroleum hydrocarbon-impacted gravel in BH-7, it is likely that the impact was limited to surficial materials. Arsenic levels in surface soil sample from TP-5 (AS2 from 0.04 to 0.1m) exceeded the 1996 soil quality criteria. The elevated levels of arsenic found in surficial materials in the crawlspace under Building B was a concern as the area was accessed by maintenance personnel for repair work. Electrical conductivity in soil samples from BH-8, TP-1, TP-2 and TP-5 exceeded the 1996 soil quality criteria.

- *Phase I ESA Update, Howard Johnson Express Inn Ottawa 112 Montreal Road, Vanier, Ontario, dated October 2005* prepared by Trow Consulting Engineers Limited.

It was Trow's understanding that in January 2004, Seacor Environmental Inc. supervised the removal of the disused heating oil UST and collected soil samples from beneath it for laboratory analysis. The results indicated that the concentrations of petroleum hydrocarbon parameters met the 2004 MOE soil quality criteria. No groundwater samples were collected at that time.

No USTs or ASTs were observed during the site visit.

- *Phase I ESA Update, 112 Montreal Road, Ottawa, Ontario, dated November 2010* prepared by Trow Associates Inc.

Based on current on-site and off-site land use activities, there were no new operations that may have adversely impacted the subsurface soil and/or groundwater regimes. The review of these previous environmental reports did not indicate any new potential or new actual sources of contamination. Based on the findings of the update to the Phase I ESA, no additional investigative work was considered necessary or recommended in 2010.

Comparison of Soil and Groundwater Results to Current MOE Standards

Based on a comparison of the soil results to the new MOE soil and groundwater standards of July 2011, the concentrations of the tested parameters in both soil and groundwater were generally less than the MOE Table 3 standards for a residential land use. There are two soil exceedences for metals parameters located under the north part of the Parkway building. Lead and arsenic exceed the new MOE soil quality criteria for a residential land use. Both of these soil samples were collected in the basement of the building and represent the top 0.15 m of soil. The metals concentrations are much less in other test pits and boreholes to the south and west have therefore delineated the impact in those directions. However, the metals impact has not been delineated to the east. Minor PHC impact to soil was found in two boreholes located just west of the north part of the Parkway building. This impact has been delineated to the east, west and south.

In terms of groundwater, petroleum impacted groundwater was documented just west of the north part of the Parkway building. This impact to groundwater was delineated to the south and west with previous monitoring wells. Minor PHC impacts were noted in three shallow bedrock monitoring wells located east of the Parkway building. **Exp** has confirmed that these wells are still present and they should be resampled to assess the groundwater for PHC impacts.

3. Scope of the Investigation

3.1 Overview of Site Investigation

The purpose of the Phase II ESA was to investigate the soil and groundwater quality and to obtain soil and groundwater data to further characterize conditions in the surficial fill/shallow overburden soils so that 1147310 Ontario Incorporated can redevelop the property with commercial and residential buildings and to support the City of Ottawa Site Plan Approval permitting requirements.

3.2 Media Investigated

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

3.3 Phase I ESA Conceptual Site Model

The site is located on the south side of Montreal Road, just west of the Vanier Parkway in Ottawa as shown on Figure 2. The site has a total area of 0.96 hectares and is approximately rectangular in shape. At the time of the investigation, the site was occupied by seven structures, including a laundry building and a former residential home. The buildings were reportedly constructed between 1955 and 1968 and are currently occupied by the hotel. The site is serviced by municipal water, sewer, cable, hydro, natural gas, and telephone. Paved parking areas are located around the buildings.

Based on topography and previous investigations at the site, the groundwater flow in the overburden at the site was anticipated to be the west and the site was considered down gradient from the lands to the south and east. The site is at a similar elevation to the lands in each direction. The topography of the site is relatively flat, with a difference in elevation less than 1 m across the site. The closest body of water to the site is the Rideau River, located 0.3 km west of the site. Based on this large intervening distance, there is little risk of the site impacting the river. In addition, there are no known local potable groundwater uses in the area.

The general stratigraphy at the site, as observed in the boreholes from 1994, started with brown silty sand and gravel fill with cobbles and boulders. Underlying the topsoil or fill was native silty sand and gravel till. Limestone bedrock was encountered in each of the boreholes between 2.31 and 3.28 m below ground surface (bgs). Based on the groundwater elevations, the groundwater below the site was assessed to flow in a northerly direction. Regional groundwater flow is expected to generally flow to the west towards the Rideau River, approximately 300 m west of the site. No areas of natural significance were present in the vicinity of the subject site.

Based on the 2013 Phase I ESA, the identified APEC and potential contaminants of concern (PCOC) are shown on Figure 3 in Appendix A and summarized in table below.

Table 3.1: Areas of Potential Environmental Concern

Areas of Potential Environmental Concern (APEC)	Location of APEC	Potentially Contaminating Activity (PCA)	Potential Contaminants of Concern (PCOC)
1. Poor quality fill	On-site	#71 Fill Material of Unknown Quality	PHC, BTEX, and metals
2. Retail Fuel Outlet present since 1930s	120 Montreal Road (Adjacent north-east)	#37 Fuel Storage and Dispensing	Petroleum Hydrocarbons (PHCs) including benzene, toluene, ethylbenzene and xylenes (BTEX), metals, volatile organic compounds (VOC)
3. Dry Cleaners for almost 60 years	94 Montreal Road (Adjacent north-west)	#29 Dry Cleaning (where chemicals are used)	VOC
4. Bulk Fuel Depot in the 1970s	296 Kendall Ave. (30 m east)	#37 Fuel Storage and Dispensing	PHC and BTEX
5. Automotive Garage in the 1960's	283 Kendall Ave. (300 m east)	#68 Repair Garages	PHC, BTEX, and metals

3.4 Deviations from Sampling and Analysis Plan

The field investigative and sampling program was carried out following the requirements of the Site Sampling and Analysis Plan (Appendix B). No significant deviations from the Sampling and Analysis Plan were reported, which affected the sampling and data quality objectives.

3.5 Impediments

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

4. Investigation Method

4.1 General

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

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

- Request local utility locating companies (e.g., cable, telephone, gas, hydro) to mark any underground utilities present at the subject site;
- Retain a private utility locating company to mark any underground utilities present in the vicinity of the borehole locations and to clear the individual borehole locations;
- Advance a total of nine (9) boreholes and complete them as groundwater monitoring wells;
- Collect representative soil samples for chemical analysis of petroleum hydrocarbons (PHCs) Fractions F1 to F4 including benzene, toluene, ethylbenzene and xylenes (BTEX), volatile organic compounds (VOC), and metals;
- Collect representative groundwater samples for chemical analysis of PHCs including BTEX and VOC; and,
- Prepare a report of the findings.

Exp personnel who completed this project included Ms. Taryn Glancy, M. A. Sc. and Mark McCalla, P. Geo.

4.2 Drilling Program

Prior to the commencement of drilling activities, the locations of underground utilities including telephone, water, natural gas and electrical lines were marked out by U.S.L-1 of Ottawa, a private utility locating service, that also cleared the individual borehole locations. The Phase II ESA was conducted at the same time as a Geotechnical Investigation which is detailed in a separate report.

On October 23 and 24 and November 7, 2013, a licensed well contractor advanced nine boreholes (MW13-1 to MW13-9) under the full-time supervision of exp staff. The boreholes were advanced using a truck mounted CME 55 drilling rig equipped with augers and split spoons samplers and drilled to a maximum depth of 7.80 mbgs. In addition to the boreholes, two hand auger boreholes were drilled east of the north part of the Parkway building (BH13-10 and BH13-11) at the former BH18 and BH23 (1994) locations. They were advanced to completion depths of between 0.96 mbgs and 0.4 mbgs. Soil samples were collected from the hand auger boreholes at each different soil layer. The approximate boreholes/monitoring well locations are shown on the Site Plan on Figure 3 in Appendix A.

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

4.3 Soil Sampling

The soil sampling during the completion of this Phase II ESA was undertaken in accordance with the Sampling and Analysis Plan presented in Appendix B.

Soil samples for geologic characterization and chemical analysis were collected on a continuous basis in the overburden materials using 5 cm diameter, 61 cm long, split spoon samplers advanced into the subsurface using a truck mount drill. The soil cores were removed from the samplers upon retrieval by drilling personnel. Grab samples were collected from the hand auger boreholes at regular intervals using a hand auger that was cleaned between samples. Geologic details of the recovered cores were logged by exp field staff and samples were collected from selected cores for chemical analysis.

Measures were taken in the field and during transport to preserve sample integrity prior to chemical analysis. Recommended volumes of soil samples selected for chemical analysis were collected from the recovered cores into pre-cleaned, laboratory-supplied glass sample jars/vials identified for the specified analytical test group. All soil samples were placed in clean coolers containing ice prior to and during transportation to the subcontract laboratory, Paracel Laboratories Ltd. (Paracel) of Ottawa, Ontario.

Decontamination and other protocols were followed during sample collection and handling to minimize the potential for sample cross-contamination. New, dedicated disposable nitrile gloves were used for the handling and sampling of each retrieved soil core. The core barrel samplers were decontaminated between sampling intervals by the drilling contractor using a potable water/phosphate-free detergent solution followed by rinses with potable water.

4.4 Field Screening Measurements

A portion of each soil core was placed in a sealed “zip-lock” plastic bag and allowed to reach ambient temperature prior to field screening using a Gastechtor combustible vapour meter, calibrated with hexane. The measurements were made by inserting the instrument’s probe into the plastic bag while manipulating the sample to ensure volatilization of the soil gases. These readings provide a real-time indication of the relative concentration of combustible vapors (indicative of petroleum impact) encountered in the subsurface during drilling and are used to aid in the assessment of the vertical and horizontal extent of contamination and the selection of soil samples for analysis.

The field screening measurements, in parts per million (ppm) hexane equivalent, are presented with the borehole logs provided in Appendix C.

4.5 Groundwater: Monitoring Well Installation

Groundwater monitoring wells were installed in each of the boreholes. 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 were installed by Downing Drilling, a licensed well contractor.

The monitoring wells consisted of a 1.5 m to 3.05 m length of 50 mm diameter Schedule 40 PVC screen and an appropriate length of PVC riser pipe. The annular space around the wells was backfilled with sand to an average height of 0.3 m above the top of the screen. A bentonite seal was added from the top of the sand pack to approximately 0.3 m below ground surface. The monitoring wells were completed with flush mount protector at ground surface. Details of the monitoring well installations are shown on the Borehole Logs provided in Appendix C.

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

Table 4.1: Monitoring Well Installation Details

Monitoring Well/Piezometer	TOC Elevation (m)	Top of Sand Elevation (m)	Top of Screen Elevation (m)	Bottom of Screen Elevation (m)	Bottom of Borehole Elevation (m)	Depth of Borehole (mbgs)
MW13-1A	100.06	98.90	1.19	97.4	97.4	6.65
MW13-1B	99.98	96.96	96.50	93.45	93.45	2.72
MW13-2	99.66	97.41	97.11	94.11	94.11	5.64
MW13-3	99.69	98.76	98.46	96.96	96.96	2.79
MW13-4	99.75	96.11	95.81	92.76	92.76	5.74
MW13-5	99.41	95.63	95.33	92.28	92.28	7.23
MW13-6	99.75	95.98	95.68	92.97	92.97	6.91
MW13-7	99.74	95.95	95.65	92.60	92.60	7.26
MW13-8	99.93	96.36	96.06	93.01	93.01	7.01
MW13-9	100.58	96.21	95.91	92.86	92.86	7.77

Note: Elevations were referenced to an arbitrary benchmark (top of manhole cover southeast of main lobby entrance of motel) with assigned elevation of 100.00 m above sea level.

4.6 Groundwater: Field Measurement of Water Quality Parameters

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

4.7 Groundwater: Sampling

Groundwater samples were collected from each of the newly installed monitoring wells on November 14, 2013. Water samples were collected from the existing monitoring wells BH18 and BH23 on November 19, 2013. The monitoring activities consisted of measuring the depth to groundwater in each monitoring well so that groundwater flow and direction below the site could be assessed. The water level measurements were recorded on water level log sheets or in a bound field notebook. The water level meter probe was decontaminated between monitoring well locations with a spray bottle of water and alconox solution, paper towel, then potable water.

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

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

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

4.8 Sediment: Sampling

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

4.9 Analytical Testing

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

4.9.1 Soil Sampling

Representative soil samples from each borehole were selected for laboratory analysis based on field screening results, sample location and depth interval. The requested laboratory analysis was based on the identified contaminants of concern. The representative soil samples selected for laboratory analysis, the rationale for each sample and the requested analyses are summarized in Table 4.2.

Table 4.2: Summary of Soil Samples Submitted for Chemical Analyses

Borehole & Soil Sample ID	Depth (m)	Rational for Submission	Analysis
MW13-1 SS4	1.2 – 1.8	Elevated combustible vapour reading	BTEX, PHC, metals
MW13-2 SS5	2.4 – 3.0	Near bedrock surface	BTEX and PHC
MW13-3 SS3	1.2 – 1.8	Highest combustible vapour reading	BTEX, PHC, metals
MW13-4 SS3	1.2 – 1.8	Highest combustible vapour reading	BTEX, PHC, metals
MW13-6 SS1	0.15 – 0.75	Fill soil quality	BTEX, PHC, metals
MW13-9 SS5	1.8 – 2.4	Highest combustible vapour reading	BTEX and PHC
BH13-10 S2	0.6 – 0.9	Fill soil quality	Metals, pH
BH13-11 S1	0.0 – 0.4	Fill soil quality	metals

Notes: PHCs – Petroleum Hydrocarbons

BTEX – Benzene, Toluene, Ethyl benzene and Xylenes

4.9.2 Groundwater Sampling

Groundwater samples were collected from nine monitoring wells including two previously installed monitoring wells (1994) located east of the Parkway Building (BH18 and BH23). Groundwater samples were not collected from MW13-5, MW13-7 and MW13-8 as these wells were for geotechnical purposes. All groundwater samples were submitted for laboratory analysis of PHC and VOC (including BTEX).

4.10 Elevation Survey

An elevation survey was conducted to obtain vertical control of the newly installed monitoring well locations. The top of casing and ground surface elevation of each monitoring well location was surveyed relative to an arbitrary benchmark (top of manhole cover southeast of main lobby entrance) with assigned elevation of 100 m.

4.11 Quality Assurance and Quality Control Measures

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

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

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

5. Review and Evaluation

5.1 Geology

The detailed soil profiles encountered in each borehole are provided on the attached borehole logs (Appendix C). Boundaries of soil indicated on the log sheets are intended to reflect transition zones for the purpose of environmental assessment and should not be interpreted as exact planes of geological change. The general stratigraphy at the site, as observed in the boreholes, started with brown silty sand and gravel fill with cobbles and boulders. Underlying the topsoil or fill was native silty sand and gravel till. Limestone bedrock was encountered in each of the boreholes between 2.31 and 3.28 m below ground surface (bgs). The limestone bedrock was cored approximately 4.5 m in all boreholes except MW13-3. A brief description of the soil stratigraphy at the site, in order of depth, is summarized in the following sections. The interpreted site geology is shown on the enclosed cross section (Figure 5).

5.1.1 Fill Material

The fill material encountered in all boreholes consisted of brown to grey silty sandy with some gravel. Brick debris was observed in MW13-1 and MW13-3. The fill thickness was relatively uniform in all boreholes to a depth of approximately 0.7 to 2.4 m bgs. No odours or visual indications of impact were observed in the fill material.

5.1.2 Native Material

The native material was encountered in all boreholes, which consisted of native silty sand and gravel till, with some boulders and cobbles. Limestone bedrock was encountered in all of the boreholes between 2.31 and 3.28 m bgs. No odours or visual indications of impact were observed in the till material. Grain size analyses were completed on two soil samples of the till material which determined this material qualified as coarse grained.

5.2 Groundwater: Elevations and Flow Direction

Relative groundwater elevations were measured on November 14, 2013 and are recorded on the borehole logs in Appendix C. The groundwater elevations are summarized below in Table 5.1. No petroleum sheens were observed in the monitoring wells.

Table 5.1: Groundwater Elevations

Monitoring Well ID	Top of Well Casing (m)	November 14, 2013	
		Water level (mbtoc)	Groundwater Elevation (m)
MW13-1A	100.06	2.38	97.68
MW13-1B	99.98	3.73	96.25
MW13-2	99.66	2.79	96.88
MW13-3	99.69	2.35	97.33
MW13-4	99.75	2.98	96.78
MW13-5	99.41	3.55	95.86

MW13-6	99.75	3.93	95.83
MW13-7	99.74	2.60	97.14
MW13-8	99.93	4.11	95.82
MW13-9	100.58	3.32	97.26

Note: Elevations were referenced to an arbitrary benchmark (top of manhole cover southeast of main lobby entrance) with assigned elevation of 100 m.

The depth to groundwater in the two overburden monitoring wells was 2.35 m and 2.38 m. Since there are only two monitoring wells in the overburden, the groundwater flow direction in the overburden could not be confirmed. Regional overburden groundwater flow is expected to generally flow to the west towards the Rideau River, approximately 300 m west of the site.

The depth to groundwater in the bedrock wells ranged from 2.6 m to 4.11 m. Based on the groundwater elevations, the bedrock groundwater below the site was calculated to flow in a northeasterly direction (Figure 3). The groundwater flow pattern in bedrock could be influenced by buried services and by construction dewatering that was required during excavation for the large building located approximately 60 m southeast of the subject site.

5.3 Groundwater: Hydraulic Conductivity

The overburden groundwater was detected in the native soil in two boreholes just above the till bedrock interface. The predominant native soil type at the site was determined to be a silty sand till. The hydraulic conductivity of the subsurface native soils (till) at the site was calculated to be 6.4×10^{-5} cm/s using the empirical Hazen formula which uses the grain size curve to estimate hydraulic conductivity. However, groundwater was mostly found within the bedrock at the site. Based on the published literature, the hydraulic conductivity of the limestone bedrock at the site is estimated to range between 1.0×10^{-7} cm/s to 1.0×10^{-3} cm/s (Freeze and Cherry, 1979).

5.4 Groundwater: Hydraulic Gradient

Horizontal hydraulic gradients were estimated for the groundwater flow components identified in the bedrock aquifer (i.e. northerly flow) based on November 2013 groundwater elevations.

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

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

Where,

i = horizontal hydraulic gradient;

Δh (m) = groundwater elevation difference; and,

Δs (m) = separation distance.

Groundwater flow horizontal hydraulic gradient is estimated at 0.017 in a northeasterly direction.

The vertical hydraulic gradient between the shallow and deep monitoring wells at MW13-1 was downward.

5.5 Soil Texture

Grain size analyses were completed on two soil samples. The results showed that both of the samples of the till material layer, wherein the water table is located, had more than 50% retained on the 0.075 um sieve. Therefore, the coarse grained SCS were used for comparison purposes.

5.6 Soil: Field Screening and Observations

Field screening involved using the combustible vapour meter to measure vapour concentrations, in parts per million (ppm) hexane equivalent, in the collected soil samples in order to assess the presence of soil gases which would imply potential petroleum hydrocarbon impact. The vapour readings obtained during the drilling activities are presented on the borehole logs in Appendix C. As indicated on the borehole logs, the combustible vapour readings ranged from 0 ppm to 20 ppm. These results indicate do not indicate significant petroleum impact to soil.

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

5.7 Soil Quality

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

The Table 3 SCS are applicable if soil pH is in the range of 5 to 9 for surface soil (less than 1.5 m below soil surface) and 5 to 11 for subsurface soil (greater than 1.5 m below soil surface). A soil sample was submitted for pH analysis. The pH result was 7.22 which indicates that the soil pH falls within the appropriate range and MOE Table 3 SCS is appropriate.

5.7.1 Petroleum Hydrocarbons (PHCs), F1 to F4 including BTEX

Six (6) soil samples were submitted for the chemical analysis of PHC and BTEX. As shown in Table 1 in Appendix D, all PHC and BTEX parameters were either non-detect or below the 2011 MOE Table 3 SCS, with the exception of the soil sample collected from MW13-4 at a depth of 1.2 m to 1.8 m. The concentration of PHC F3 (365 ug/g) in this sample exceeded the MOE Table 3 residential soil quality standard of 300 ug/g. The PHC F3 concentration in the blind duplicate soil was 536 ug/g. The laboratory reporting detection limits (RDLs) were also below the 2011 MOE Table 3 SCS.

The concentrations of PHC in the sample collected from MW13-4 exceeded the MOE Table 1 background concentrations. Similarly, the concentrations of benzene in MW13-9 slightly exceeded the MOE Table 1 background concentration.

5.7.2 Metals

Six (6) soil samples were submitted for the chemical analysis of metals. As shown in Table 3 in Appendix D, the soil sample collected from MW13-1 had a lead concentration (325 ug/g) that exceeded the MOE Table 3 standard of 120 ug/g. This borehole is located near the main entrance to the site. In addition, the two shallow soil samples collected east of the Parkway building BH13-10 and BH13-11 had

concentrations of barium, lead and zinc (BH13-10) and lead and zinc (BH13-11) that exceeded the MOE Table 3 standards. All other soil samples had concentrations of the tested metals that were less than the 2011 MOE Table 3 SCS. The laboratory RDLs were also below the 2011 MOE Table 3 SCS.

The concentrations of antimony, barium and lead in the sample collected from MW13-1 SS4 exceeded the MOE Table 1 background concentrations. Similarly, the concentrations of molybdenum in MW13-3 and antimony in MW13-6 exceeded the MOE Table 1 background concentrations. The concentrations of barium, lead, and or zinc in the two hand auger boreholes located east of the Parkway building exceeded the MOE Table 1 background concentrations.

5.8 Ground Water Quality

Groundwater samples were collected for chemical analysis on November 14 and 19, 2013. Summaries of the groundwater analytical results are found in Appendix D. Copies of the laboratory Certificates of Analysis for the selected groundwater samples are provided in Appendix E.

5.8.1 Petroleum Hydrocarbons (PHCs), F1 to F4 including BTEX

Twelve (12) groundwater samples were submitted for the chemical analysis of PHCs, including BTEX. As shown in Table 4 in Appendix D, the concentrations of PHC and BTEX parameters in all of the groundwater samples were either non-detect or below the 2011 Table 3 SCS. The laboratory RDLs were also below the 2011 MOE Table 3 SCS.

5.8.2 Volatile Organic Compounds (VOC)

Nine (9) groundwater samples were submitted for chemical analysis of VOC. As shown in Table 5 in Appendix D, the concentrations of VOC parameters were either non-detect or below the 2011 MOE Table 3 SCS. The laboratory RDLs were also below the 2011 MOE Table 3 SCS.

5.9 Sediment Quality

As no surface water body was on-site, the Phase II ESA did not include sediment sampling.

5.10 Quality Assurance and Quality Control Results

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

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

Review of field activity documentation indicated that recommended sample volumes were collected from soil and groundwater for each analytical test group into appropriate containers and preserved with proper chemical reagents in accordance with the protocols set out in the *Protocol for Analytical Methods used in*

the Assessment of Properties under Part XV.1 of the Environmental Protection Act (MOE, 2004). Samples were preserved at the required temperatures in insulated coolers and met applicable holding time requirements, when relinquished to the receiving laboratory.

Duplicate soil samples BH13-4 SS3 (BTEX, PHC and metals) and duplicate groundwater samples MW13-6 (PHC and VOC) were submitted for chemical analysis. For QA/QC purposes, the analytical sample results are quantitatively evaluated by calculating the relative percent difference (RPD) between the samples and their duplicates. The concentrations of BTEX in the duplicate soil and groundwater samples were less than the laboratory reported detection limits for both the primary and duplicate samples and therefore RPD could not be calculated. The concentrations of PHC parameters in the primary and duplicate sample had an average RPD of 46.3 which is much less than the MOE standard RPD value of 50 for organic parameters in soil. The concentrations of metals parameters in the primary and duplicate sample had an average RPD of 10.2 which is much less than the MOE standard RPD value of 30 for metal parameters in soil. Therefore, the data is acceptable from a RPD perspective.

The subcontract laboratory used during this investigation, Paracel Laboratories Ltd., is accredited by the Standards Council of Canada/Canadian Association for Laboratory Accreditation. The analysis of all parameters for all samples in the scope of work for which SCS have been established under Ontario Regulation 153/04.

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

The analytical program conducted by 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.

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

5.11 Phase Two Conceptual Site Model (CSM)

This section presents a Conceptual Site Model (CSM) providing a narrative, graphical and tabulated description integrating information related to the Site's geologic and hydrogeological conditions, areas of potential environmental concern/potential contaminating activities, the presence and distribution of contaminants of concern, contaminant fate and transport, and potential exposure pathways. These components are described in the following sections. The presentation of the Phase II ESA CSM makes reference to the following attached drawings:

- Figure 1 – Location Plan;

- Figure 2 – Borehole Location Plan;
- Figure 3 – Groundwater Elevations;
- Figure 4 – Geological Cross Sections; and,
- Figure 5 – Areas of Impact.

5.11.1 Site Description

The site is located at 112 Montreal Road, just west of the Vanier Parkway in Ottawa. The property is legally described as Lot 5 and Part of Lots 6 and 7 Block 2, Registered Plan 29 and Lot 88 Part of Lots 40 and 41 Registered Plan No. 49, City of Ottawa. The site has a total area of 0.96 hectares and is approximately rectangular in shape. The site is zoned TM3 H (42), traditional mainstreet, mixed commercial and residential zone.

At the time of the investigation, the site is occupied by a motor hotel consisting of seven structures, including a laundry building and former residential home. The buildings were reportedly constructed between 1955 and 1968 and are currently occupied by the hotel. The site is serviced by municipal water, sewer, cable, hydro, natural gas, and telephone. Paved parking areas are located around the buildings. Surrounding properties consist of commercial development to the north and southwest. The remaining adjacent land use to the south, east and southeast is residential. The Vanier Parkway borders the eastern edge of the site. Based on topography, it is anticipated that overburden groundwater flows in a westerly direction towards the Rideau River found approximately 300 metres west from the site. Previous environmental investigations confirmed that groundwater flow direction at the subject site is to the northwest.

5.11.2 Site Conditions

The site is located in a developed residential area where potable water is supplied by the City of Ottawa and therefore the MOE Table 3 Site Condition Standard (SCS) is applied to the site.

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

Based on the Phase II ESA investigation, soil pH samples collected from the site were within the acceptable range of surficial and subsurface soil for the application of MOE Table 3 SCS. Furthermore, the site is not a shallow soil property as defined in Section 43.1 of the regulation, nor does it include all or part of a water body or is adjacent to a water body or includes land that is within 30 metres of a water body.

5.11.3 Geological and Hydrogeological Setting

Based on the information provided on the physiographic, geologic and topographic maps, the surface soils in this physiographic region were predominately composed of silty sand with some clay and gravel till deposits. The nearest surface water body to the site is the Rideau River, located approximately 300 m west of the site.

The location of the geologic cross-sections prepared from site boreholes are presented on Figure 4. The general stratigraphy at the site, as observed in the boreholes, started with brown silty sand and gravel fill with cobbles and boulders. Underlying the topsoil or fill was native silty sand and gravel till. Limestone bedrock was encountered in each of the boreholes between 2.31 and 3.28 m below ground surface. Monitoring wells were installed into the overburden and bedrock at the site.

The depth to groundwater in the monitoring wells ranged from approximately 2.3 to 4.1 m bgs. Based on the bedrock groundwater elevations, the horizontal hydraulic gradient is estimated at 0.017. Assuming a range of hydraulic conductivities for limestone bedrock of 1.0×10^{-7} cm/s to 1.0×10^{-3} cm/s, the average groundwater velocity would be approximately 0.2 m/year.

5.11.4 Underground Utilities

The underground utilities pertaining to water, natural gas, and sewer enter the site on the north side at Montreal Road. Gas, bell, water and sewers are present throughout the site. Based on the depth of groundwater levels (1.6 to 4.1 m below grade), there is the potential for underground utilities to influence the groundwater flow at the site and as such, the underground utilities may provide preferential pathways for the migration of the contaminants of concern (COCs).

5.11.5 Areas of Potential Environmental Concern/Potential Contaminants of Concern

As per Ontario Regulation 153/04, as amended, a Potential Contaminating Activity (PCA) is defined as one of the 71 industrial operations set out in Table 2 of Schedule D that occurs or has occurred on the site or within the Phase One ESA study area. Based on Phase I ESA, the identified areas of potential environmental concern (APEC) and potential contaminants of concern (PCOC) are summarized in table below and are shown on Figure 3 in Appendix A.

Table 5.1: Summary of Areas of Potential Environmental Concern

Areas of Potential Environmental Concern (APEC)	Location of APEC	Potentially Contaminating Activity (PCA)	Potential Contaminants of Concern (PCOC)
1. Poor quality fill	On-site	#71 Fill Material of Unknown Quality	PHC, BTEX, and metals
2. Retail Fuel Outlet present since 1930s	120 Montreal Road (Adjacent north-east)	#37 Fuel Storage and Dispensing	Petroleum Hydrocarbons (PHCs) including benzene, toluene, ethylbenzene and xylenes (BTEX), metals, volatile organic compounds (VOC)
3. Dry Cleaners for almost 60 years	94 Montreal Road (Adjacent north-west)	#29 Dry Cleaning (where chemicals are used)	VOC
4. Bulk Fuel Depot in the 1970s	296 Kendall Ave. (30 m east)	#37 Fuel Storage and Dispensing	PHC and BTEX
5. Automotive Garage in the 1960's	283 Kendall Ave. (300 m east)	#68 Repair Garages	PHC, BTEX, and metals

5.11.6 Investigation and Remediation

The Phase II ESA was conducted to assess the soil and groundwater quality at the site. As indicated in the APEC and PCOC Table (above), the analytical program of the Phase II ESA included testing of soil and groundwater for PHCs, including BTEX, VOC, and metals from the boreholes and monitoring wells installed on the site. The borehole and monitoring well locations are shown on Figure 2 in Appendix A.

Based on the results of the Phase II ESA, all PHC and BTEX parameters were either non-detect or below the 2011 MOE Table 3 SCS, with the exception of the soil sample collected from MW13-4 at a depth of 1.2 m to 1.8 m. The concentration of PHC F3 (365 ug/g) in this sample exceeded the MOE Table 3 residential soil quality standard of 300 ug/g. The laboratory reporting detection limits (RDLs) were also below the 2011 MOE Table 3 SCS. In addition, the soil sample collected from MW13-1 had a lead concentration (325 ug/g) that exceeded the MOE Table 3 standard of 120 ug/g. This borehole is located near the main entrance to the site. In addition, the two shallow soil samples collected east of the Parkway building BH13-10 and BH13-11 had concentrations of barium, lead and zinc (BH13-10) and lead and zinc (BH13-11) that exceeded the MOE Table 3 standards. All other soil samples had concentrations of the tested metals that were less than the 2011 MOE Table 3 SCS. The laboratory RDLs were also below the 2011 MOE Table 3 SCS.

There were no groundwater exceedences of the 2011 MOE Table 3 SCS. All groundwater samples had concentration of the analyzed parameters that were less than the 2011 MOE Table 3 SCS.

5.11.7 Contaminants of Concern (COC)

Based on the results of the Phase II ESA, the concentration of PHC F3 at MW13-4 at a depth of 1.2 m to 1.8 m exceeded the MOE Table 3 SCS. The area represented by this exceedence using the halfway to clean borehole approach is approximately 350 m². With a thickness of petroleum impact of 1.0 m, the resulting volume of impacted soil is 350 m³. In addition, there is metals impacted fill located at MW13-1 near Montreal Road and in the north half of the Parkway building and east of the building at BH13-10 and BH13-11. The area of lead impacted soil at MW13-1 has not been delineated but likely extends a distance of 20 m to the south. The resulting area is approximately 525 m². The thickness of impact is likely 2 m with a resulting volume of 1,050 m³. The area of metals impact at the Parkway building is approximately 630 m² with a thickness of 0.5 m for a volume of 315 m³.

There were no exceedences for groundwater at the Site. Therefore, there are no groundwater contaminants of concern at the subject Site.

In addition to the above, there were exceedences of the MOE Table 1 background concentrations in the soil samples collected from MW13-9 (xylenes) and in MW6 (antimony). Any excess soil that needs to be removed from the site will have to meet the MOE Table 1 criteria for unrestricted disposal options. Additional testing and analyses will be required to provide soil management options which could involve unrestricted or restricted off-site disposal at a site willing to accept the soil, reuse on-site, or off-site disposal at a site (for soil less than Table 1) or landfill disposal (for soil that exceeds Table 1).

5.11.8 Contaminant Fate and Transport

Soil COCs

PHC impacted soil is found in the northeast part of the site at the site and is likely limited in extent, since the nearest boreholes have non-detectable concentrations of PHC F3. Because the PHC-impacted soil is present above the water table, it would not have been transported by groundwater. It is likely the result of

poor quality fill at the site. The presence of elevated concentrations of metals in soil at the site is likely attributed to poor quality fill placed at the subject site.

The soil PHC impacts may be affected by natural attenuation mechanisms in the soil environment, which effectively reduces the concentrations, including advection mixing, mechanical dispersion/molecular diffusion, phase partitions (e.g. sorption and volatilization), and possibly abiotic or biotic chemical reactions. Concentrations of PHC in soil will be reduced by the effects of molecular diffusion and the creation of concentration gradients.

The less volatile PHC F3 and non-volatile metals, may undergo abiotic or biotic chemical reactions associated with the soil mineral particles and the micro-organisms present in the overburden material. Depending on the pH of the soil pore water in the unsaturated zone and in the groundwater, as well as the availability of exchangeable ions, metal ions will be removed from solution by exchange reactions at cationic exchange sites on the soil mineral particle surfaces.

As a result of the various natural attenuation mechanisms in the soil environment and the fact that there is no source of petroleum on the subject site, the concentrations of COCs in soil at the site will be reduced over time.

Groundwater COCs

No impacts were observed in the groundwater at the site and therefore, there are no contaminants of concern in groundwater at the subject Site.

5.11.9 Exposure Pathways

Human Health Receptors and Exposure Pathways

Based on the current and future commercial land use of the subject site, the potential on-site human receptors that may be present on the site comprise construction workers, long-term workers, and property visitors. The metals impacted soil at MW13-1 occurs at a depth of at least 1 m under asphalt and the impacts at the Parkway building are in the basement and east of the building where there is no public access.

The relevant exposure pathways considered as part of the CSM for construction workers are soil particulate inhalation, soil-dermal contact, incidental soil ingestion, and outdoor air inhalation during excavation activities.

Ecological Receptors and Exposure Pathways

Based on the future commercial land use of the subject site, and the lack of exposed soil surfaces at the site, there will be no on-site ecological receptors.

6. Summary and Conclusions

The results and findings of the Phase II ESA conducted at the site are summarized as follows:

- The general stratigraphy at the site, as observed in the boreholes, started with brown silty sand and gravel fill with cobbles and boulders. Underlying the topsoil or fill was native silty sand and gravel till. Limestone bedrock was encountered in each of the boreholes between 2.31 and 3.28 m below ground surface (bgs). The limestone bedrock was cored approximately 4.5 m in all boreholes except MW13-3.
- The depth to groundwater in the two overburden monitoring wells was 2.35 m and 2.38 m. The depth to groundwater in the bedrock wells ranged from 2.6 m to 4.11 m. Based on the groundwater elevations, the bedrock groundwater below the site was calculated to flow in a northeasterly direction. Based on the bedrock groundwater elevations, the horizontal hydraulic gradient is estimated at 0.017. Assuming a range of hydraulic conductivities for limestone bedrock of 1.0×10^{-7} cm/s to 1.0×10^{-3} cm/s, the average groundwater velocity would be approximately 0.2 m/year.
- The soil cores retrieved from the boreholes did not have a sheen, the presence of a separate organic phase, or other evidence of a non-aqueous phase liquid (NAPL) either in the surficial fill or overburden soil materials. Inspection of development and purged waters and groundwater samples found no indications of the presence of NAPL within the fill and overburden materials at the locations sampled.
- All PHC and BTEX parameters were either non-detect or below the 2011 MOE Table 3 SCS, with the exception of the soil sample collected from MW13-4 at a depth of 1.2 m to 1.8 m. The concentration of PHC F3 (365 ug/g) in this sample exceeded the MOE Table 3 residential soil quality standard of 300 ug/g. The PHC F3 concentration in the blind duplicate soil was 536 ug/g. The soil sample collected from MW13-1 had a lead concentration (325 ug/g) that exceeded the MOE Table 3 standard of 120 ug/g. This borehole is located near the main entrance to the site. In addition, the two shallow soil samples collected east of the Parkway building BH13-10 and BH13-11 had concentrations of barium, lead and zinc (BH13-10) and lead and zinc (BH13-11) that exceeded the MOE Table 3 standards. All other soil samples had concentrations of the tested metals that were less than the 2011 MOE Table 3 SCS.
- There were no groundwater exceedences of the 2011 MOE Table 3 SCS.
- Based on the results of the Phase II ESA, the concentration of PHC F3 at MW13-4 exceeded the MOE Table 3 SCS. Because the PHC-impacted soil is present above the water table, it would not have been transported by groundwater. It is likely the result of poor quality fill at the site. The area represented by this exceedence using the halfway to clean borehole approach is approximately 350 m². With a thickness of petroleum impact of 1.0 m, the resulting volume of impacted soil is 350 m³. In addition, there is metals impacted fill located at MW13-1 near Montreal Road and in the north half of the Parkway building and east of the building at BH13-10 and BH13-11. The area of lead impacted soil at MW13-1 has not been delineated but likely extends a distance of 20 m to the south. The resulting area is approximately 525 m². The thickness of impact is likely 2 m with a resulting volume of 1,050 m³. The area of metals impact at the Parkway building is approximately 630 m² with a thickness of 0.5 m for a volume of 315 m³.
- In addition to the above, there were exceedences of the MOE Table 1 background concentrations in the soil samples collected from MW13-9 (xylenes) and in MW13-6 (antimony). Any excess soil that needs to be removed from the site will have to meet the MOE Table 1 criteria for unrestricted

disposal options. Additional testing and analyses will be required to provide soil management options which could involve unrestricted or restricted off-site disposal at a site willing to accept the soil, reuse on-site, or off-site disposal at a site (for soil less than Table 1) or landfill disposal (for soil that exceeds Table 1).

7. References

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

- *Environmental Protection Act*, R.S.O. 1990, Chapter E.19, as amended, September 2004;
- Exp Services Inc. March 2012. *Asbestos Survey*, 112 Montreal Road, Ottawa, Ontario.
- Exp Services Inc. December 2013, *Phase I Environmental Site Assessment*, 112 Montreal Road, Ottawa, Ontario.
- *Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario*, Ministry of the Environment of Ontario, December 1996;
- *Ontario Regulation 153/04 (made under the Environmental Protection Act)*, May 2004 (MOE);
- *Ontario Regulation 511/09 (made under the Environmental Protection Act)*, July 2011 (MOE).
- *Protocol for Analytical Methods Used in the Assessment of Properties under Part XV.1 of the Environmental Protection Act*, March 2004;
- *Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act*, March 2004; and,
- *The Ontario Water Resources Act - R.R.O. 1990, Regulation 903 - Amended to O. Reg. 128/03*, August 2003;
- Trow Consulting Engineers April 11, 1994, *Phase I Environmental Site Assessment*, 112 Montreal Road, Vanier, Ontario.
- Trow Consulting Engineers 1995, *Phase II Environmental Site Assessment*, 112 Montreal Road, Vanier, Ontario.
- Trow Consulting Engineers Limited November 2000. *Phase I ESA Update*, Howard Johnson Express Inn Ottawa, 112 Montreal Road, Ottawa, Ontario.
- Trow Associates Inc. October 2005. *Phase I ESA Update*, 112 Montreal Road, Ottawa, Ontario.
- Trow Associates Inc. November 2010. *Phase I ESA Update*, 112 Montreal Road, Ottawa, Ontario.

8. General Limitations

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

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

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

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

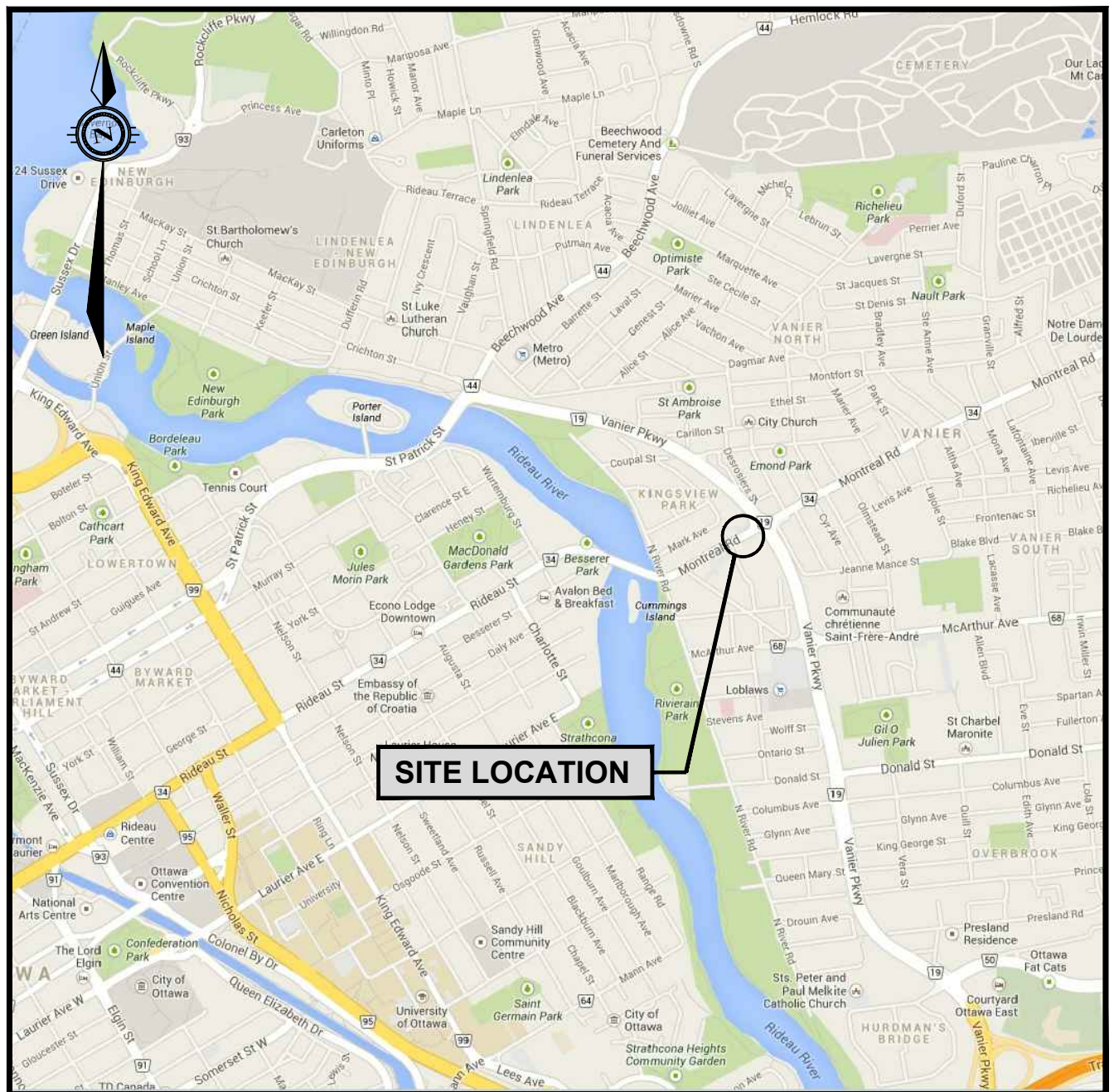
This report was prepared for the exclusive use of the 1147310 Ontario Incorporated and may not be reproduced in whole or in part, without the prior written consent of **exp**, or used or relied upon in whole or in part by other parties for any purposes whatsoever. Any use which a third party makes of this report, or any part thereof, or any reliance on or decisions to be made based on it, are the responsibility of such third parties. **Exp Services Inc.** accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

We trust this report is satisfactory for your purposes. Should you have any questions, please do not hesitate to contact this office.

exp Services Inc.

1147310 Ontario Incorporated
Phase II Environmental Site Assessment
112 Montreal Road, Ottawa, Ontario
OTT-00214936-B0
January 14, 2014

Appendix A: Figures



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Ottawa, ON K2B 8H6, Canada

scale 1:20,000	CLIENT: 1147310 ONTARIO INCORPORATED	project no. OTT-00214936-B0
date JANUARY 2014	TITLE: SITE LOCATION PLAN	FIG 1
drawn by P. GHAFFARI	112 MONTREAL ROAD, OTTAWA, ONTARIO	

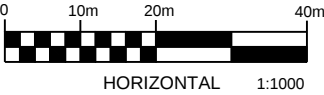
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Plotted by: ghaffarip



LEGEND



MONITORING WELL LOCATION & NUMBER



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scale
1:1000
design
M.G.M.
checked
M.G.M.
drawn by
P.G.

CLIENT:
1147310 ONTARIO INCORPORATED
TITLE:
**MONITORING WELL LOCATION PLAN
112 MONTREAL ROAD, OTTAWA, ONTARIO**

project no.
OTT-00214936-B0
date
JANUARY 2014
drawing no.
FIG 2

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LEGEND



MONITORING WELL LOCATION & NUMBER

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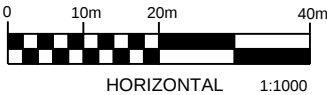
BEDROCK WATER ELEVATION [NOV. 14, 2013]

(95.82)*

OVERBURDEN WATER ELEVATION [NOV. 14, 2013]



GROUNDWATER CONTOUR AND ELEVATION (mm)



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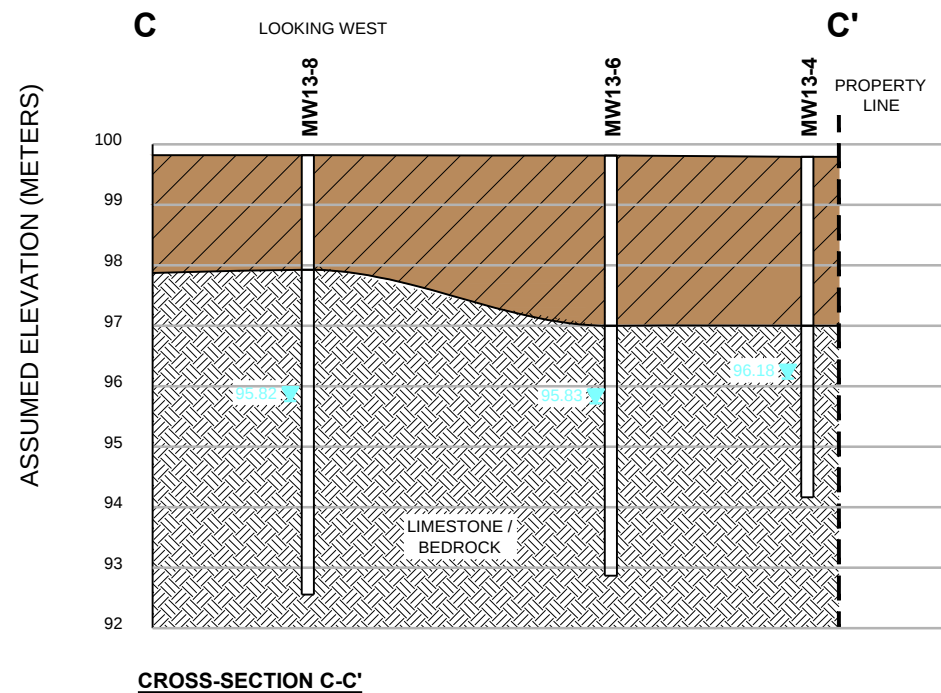
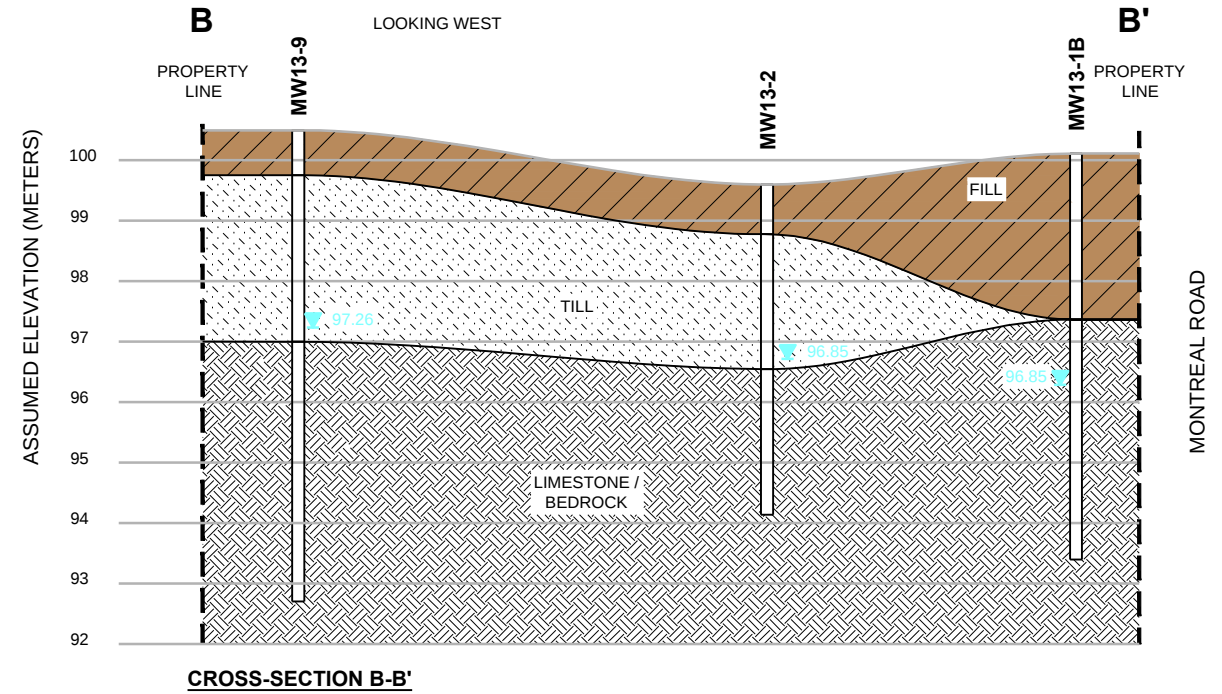
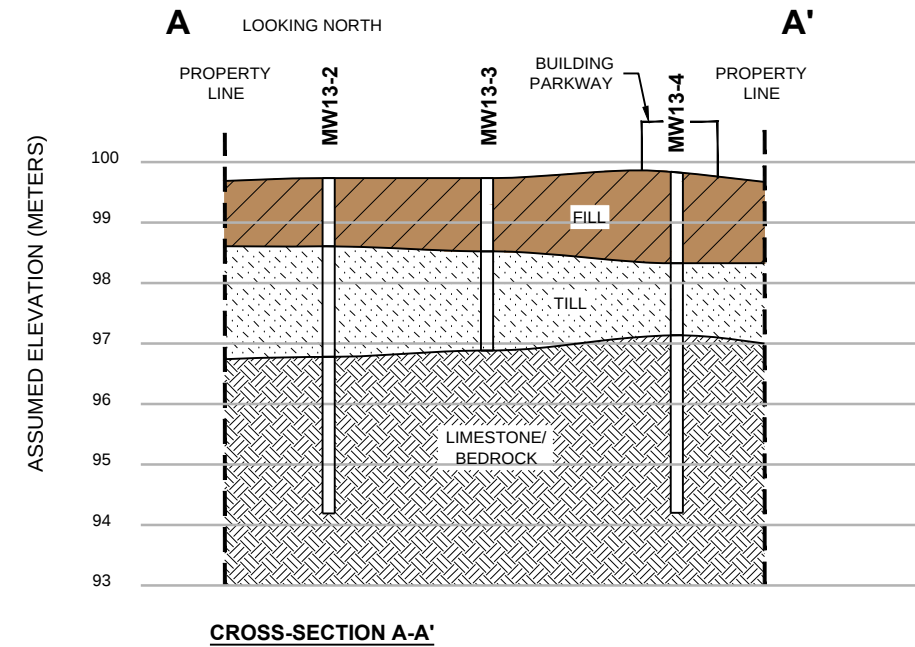
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2650 Queensview Drive, Suite 100
Ottawa, ON K2B 8H6, Canada

scale
1:1000
design
M.G.M.
checked
M.G.M.
drawn by
P.G.

CLIENT:
1147310 ONTARIO INCORPORATED
TITLE:
**GROUNDWATER FLOW PLAN
112 MONTREAL ROAD, OTTAWA, ONTARIO**

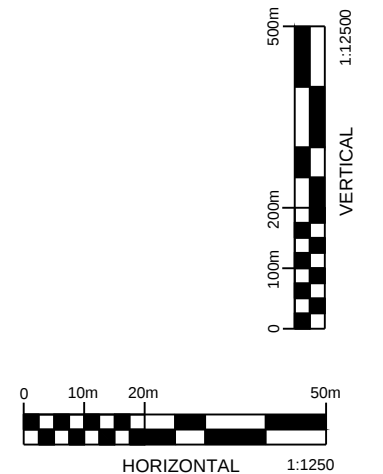
project no.
OTT-00214936-B0
date
JANUARY 2014
drawing no.
FIG 3

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Plotted by: ghaffarip



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-  FILL
-  TILL
-  LIMESTONE / BEDROCK



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scale	AS NOTED	
design	M.G.M.	checked M.G.M.
drawn by	P.G.	

CLIENT:	1147310 ONTARIO INCORPORATED	
TITLE:	CROSS SECTIONS 112 MONTREAL ROAD, OTTAWA, ONTARIO	

project no.	OTT-00214936-B0
date	JANUARY 2014
drawing no.	FIG 4

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SOIL	RESULT	MOE TABLE 3
MW13-1	325	120
LEAD		

SOIL	RESULT	MOE TABLE 3
MW13-4	364	300
PHCF3		

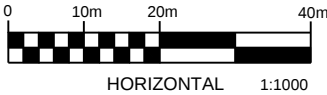
SOIL	RESULT	MOE TABLE 3
MW13-10	498	390
BARIUM		
LEAD	560	120
ZINC	428	340

SOIL	RESULT	MOE TABLE 3
MW13-11	218	120
LEAD		
ZINC	375	340

LEGEND

-  **MW13-8** MONITORING WELL LOCATION & NUMBER
- MOE TABLE 3** FULL DEPTH GENERIC SITE CONDITION STANDARDS (2011)
IN A NON-POTABLE GROUNDWATER CONDITION
- PHC** PETROLEUM HYDROCARBONS
(CONCENTRATIONS IN ug/g)

 ESTIMATED AREA
OF IMPACTED SOIL



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scale 1:1000
design M.G.M. checked M.G.M.
drawn by P.G.

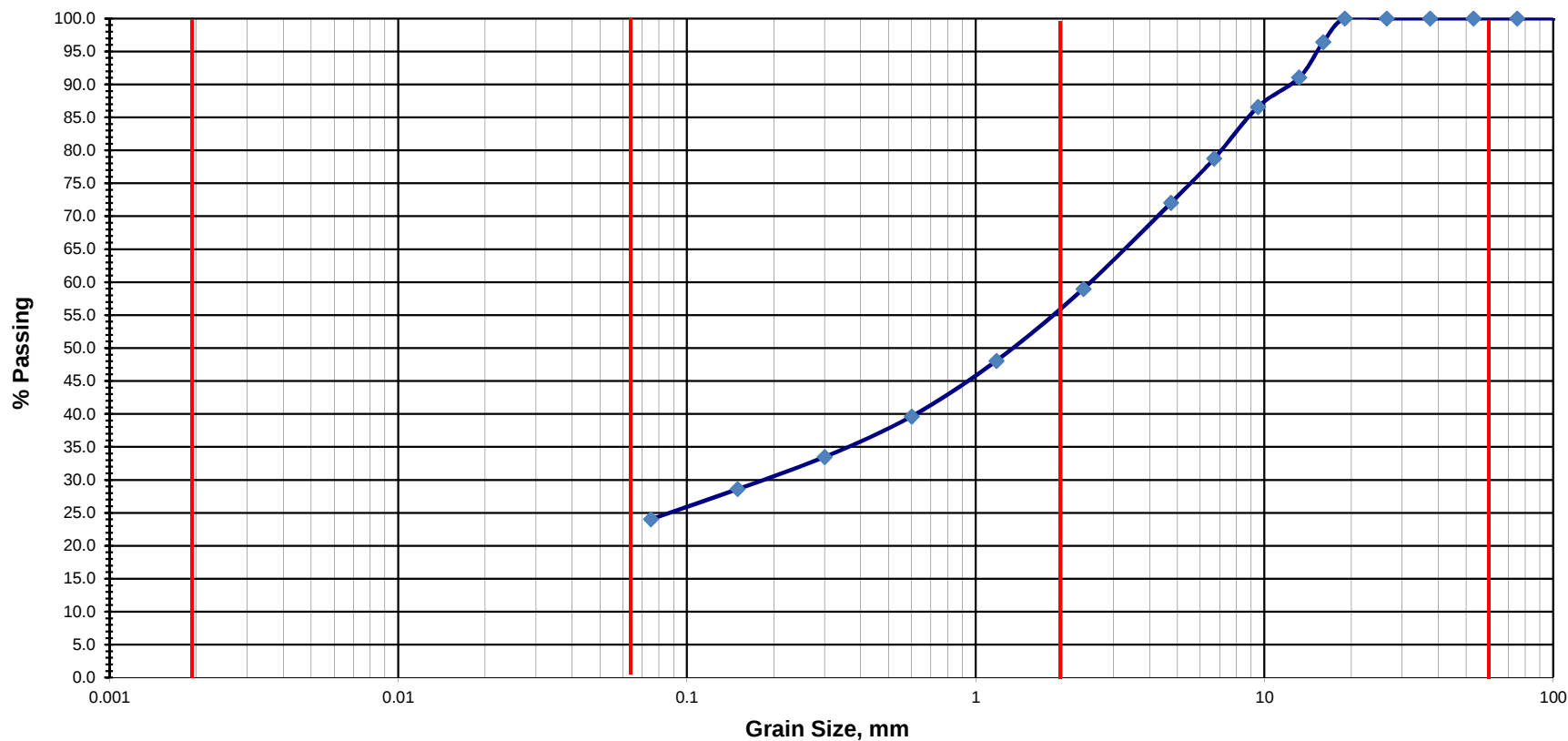
CLIENT: **1147310 ONTARIO INCORPORATED**
TITLE: **AREAS OF IMPACTED SOIL
112 MONTREAL ROAD, OTTAWA, ONTARIO**

project no. **OTT-00214936-B0**
date **JANUARY 2014**
drawing no. **FIG 5**

Method of Test for Sieve Analysis of Aggregate

ASTM C-136 (LS-602)

Grain Size Distribution Curve

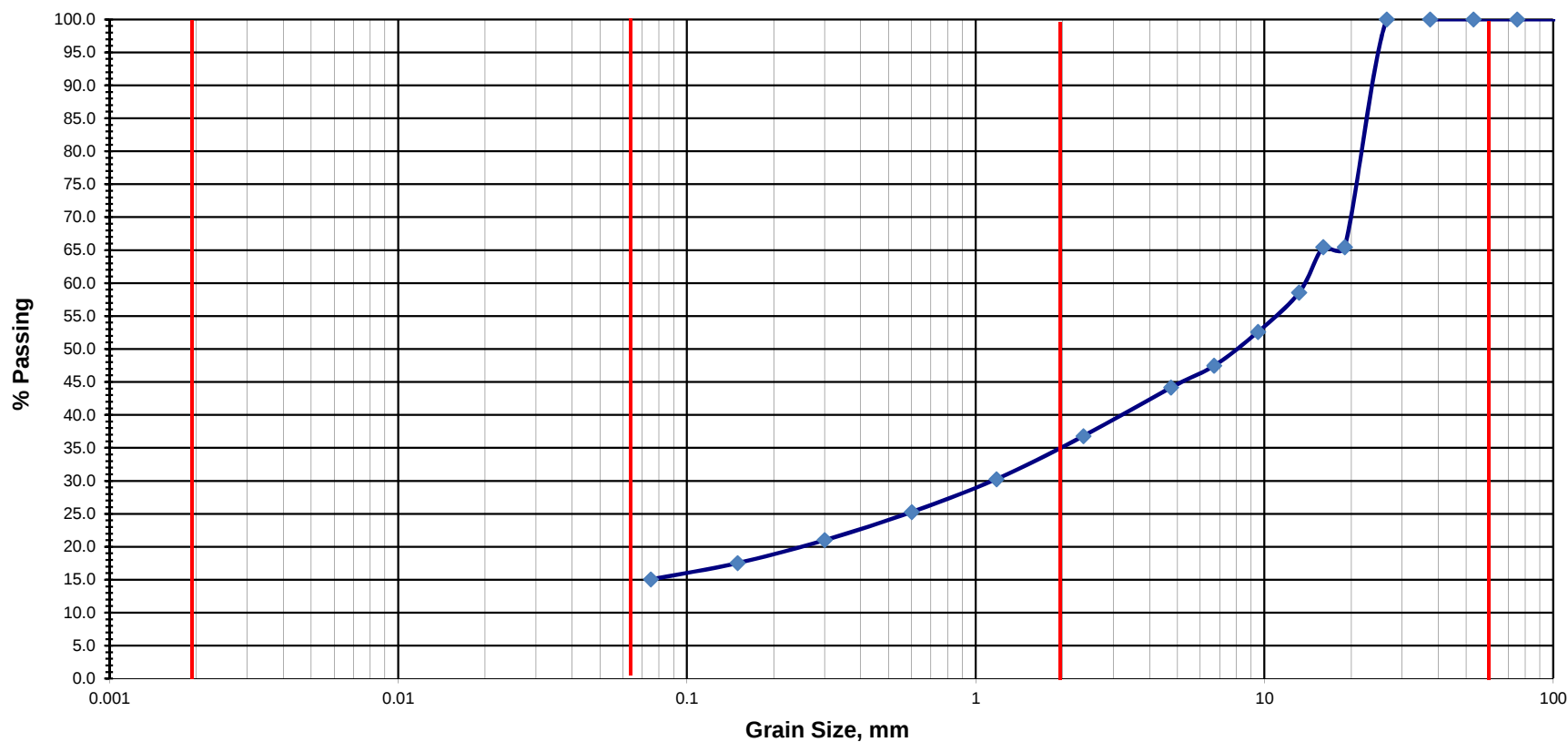


CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	SILT			SAND			GRAVEL			
Modified M.I.T. Classification										

Exp Project No.:	OTT-214936-B	Project Name :	Preliminary Geo Investigation							
Client :		Project Location :	112 Montreal rd							
Date Sampled :	October 24, 2013	Borehole No.	6	SAMPLE	SS2	Depth (m) :	0.6-1.2			
Sample Description :	Silty Sand and Gravel							Figure :		

Method of Test for Sieve Analysis of Aggregate ASTM C-136 (LS-602)

Grain Size Distribution Curve



CLAY	Fine	Medium	Coarse	Fine	Medium	Coarse	Fine	Medium	Coarse	
	SILT			SAND			GRAVEL			
Modified M.I.T. Classification										

Exp Project No.:	OTT-214936-B	Project Name :	Preliminary Geo Investigation							
Client :		Project Location :	112 Montreal rd							
Date Sampled :	October 24, 2013	Borehole No.	9	SAMPLE	SS5	Depth (m) :	1.8-2.4			
Sample Description :	Silty Sand and Gravel							Figure :		

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January 14, 2014

Appendix B: Sampling and Analysis Plan (SAAP)

1 Introduction

This appendix presents the Sampling and Analysis Plan (SAAP) that was developed in support of the Phase II Environmental Site Assessment (ESA) for the property located at 112 Montreal Road in Ottawa, Ontario (hereinafter referred to as the 'site'). The SAAP presents the procedures and measures that will be undertaken during field investigative activities to characterize the site conditions and meet the data quality objectives of the Phase II ESA.

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

2 Field Sampling Program

The field sampling program was developed to provide for the collection of samples of the surficial and subsurface soil materials and groundwater for chemical analysis of petroleum hydrocarbons (PHC), benzene, toluene, ethylbenzene and xylenes (collectively known as 'BTEX'), volatile organic compounds (VOC), and metals. The soil sampling media is to consist of the surface soils and upper overburden materials (depths up to 4.0 m of overburden beneath site). The soil sampling will be location-specific to assess for the potential presence of PHCs, BTEX, and metals based on previous observations, or the identification of potential areas of potential environmental concern. Vapour readings will also be taken in the field to determine samples to be submitted for BTEX and PHC F1-F2 analysis. The soil sample intervals will extend from the surface up to a maximum depth of approximately 4.0 m below grade.

Each of the groundwater samples will be submitted for analysis of PHC and VOC (including BTEX). The monitoring well network is to comprise of nine newly installed wells and two existing wells.

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

3 Field Methods

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

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

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

3.1 Borehole Drilling

Boreholes will be advanced at the site to facilitate the collection of soil samples for chemical analysis and geologic characterization; and, for the installation of groundwater monitoring wells. A total of nine (9) boreholes are proposed to be advanced at the site, up to a maximum overburden depth of approximately 9.0 m below grade, to provide for the collection of samples of the surficial and overburden materials beneath the site. The bedrock will be cored approximately 4.5 m at most of the boreholes for geotechnical purposes. The borehole locations will be selected to delineate the extent and magnitude of PCOC related impacts to the soils and the groundwater.

Two hand auger boreholes will be drilled to the east of the Parkway Building and shallow soil grab samples will be collected. The samples would be collected at a maximum depth of approximately 1.2 m below ground to assess the fill quality in that area of the site.

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

3.2 Soil Sampling

Soil samples will be collected for chemical analysis and geologic property characterization. The soil samples will be collected using 5 cm diameter, 60 cm long, stainless steel split-spoon sampling devices advanced ahead of the hollow stem augers at discrete 15 cm long intervals. The split spoon sampling devices will be attached to drill rods and advanced into the soil by means of a mechanically or manually driven 63.6 kg hammer dropped from a height of approximately 0.76 m, in accordance with ASTM method D-1586. Upon retrieval from the boreholes, the split-spoon samplers will be placed on a flat surface and disassembled by drilling personnel to provide access of the recovered cores. The test pit soil samples will be collected using a stainless steel hand trowel. Geologic and sampling details of the recovered cores will be logged and the samples will be assessed for the potential presence of non-aqueous phase liquids. Samples for chemical analysis will be selected on the basis of visual and olfactory evidence of impacts and at specific intervals to define the lateral and vertical extent of known impacts.

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

3.3 Monitoring Well Installation

It is proposed that all boreholes will be instrumented as groundwater monitoring wells installed with slotted screens intercepting either the native overburden material or the shallow bedrock, where the water table aquifer is expected, extending to depths of approximately 3 to 8 m below grade. A deeper interval monitoring well will be installed to assess the possible presence of VOC in groundwater associated with a former dry cleaner located west of the site. The monitoring wells will be constructed using 51 mm

diameter, Schedule 40, PVC riser pipe and number 10 slot size (0.25 mm) well screens. The base of the well screens will be sealed with threaded flush PVC end caps. All well pipe connections will be factory machined threaded flush couplings. The annular space around the well screens will be backfilled with silica sand, to an average height of 0.3 m above the top of the screen. Granular bentonite will be placed in the borehole annulus from the top of the sand pack to approximately 0.3 m below grade. The monitoring wells will be completed with flush-mounted protective steel casings cemented into place.

3.4 Monitoring Well Development

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

Standing water volumes will be determined by means of an electronic water level meter. Approximately 1 wetted well volume will be removed. Well development details will be documented on a well development log sheet or in a bound hard cover notebook. All development waters will be collected and stored in labeled, sealed containers.

3.5 Groundwater Level Measurements

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

3.6 Elevation Survey

An elevation survey will be conducted to obtain vertical control of all borehole and monitoring well locations. The top of casing and ground surface elevation of each monitoring well location will be surveyed against a known geodetic benchmark, or if unavailable, against a suitable arbitrary benchmark. Elevations measured against a benchmark with an assumed elevation will be recorded as meters above mean sea level (m AMSL). An arbitrary benchmark will be assigned an elevation of 100 m. The elevation survey will be accurate to within ± 0.3 cm.

3.7 Groundwater Sampling

Groundwater samples will be collected from all monitoring wells for chemical analysis. The wells will be sampled using a "low flow" technique whereby the wells are continuously purged using an electric pump (equipped with dedicated tubing) and parameters within the purged water are monitored using a groundwater chemistry multi-meter at 3 minute intervals. These parameters include: pH, conductivity, temperature, and salinity. Once these parameters are found to deviate less than 10% over three testing events, equilibrium is deemed to have occurred and a sample of the groundwater will be collected. The water sample collected from the deep monitoring well will be collected using a foot valve and plastic tubing. The purge water will also be continuously monitored for visual and olfactory evidence of petroleum and solvent impact (sheen and odour). The metals sample will be filtered through a 0.45 micron in line filter.

Recommended groundwater sample volumes will be collected into pre-clean laboratory-supplied vials or bottles provided with analytical test group specific preservatives, as required. The samples will be placed in an insulated cooler chilled with ice for storage and transport. Each VOC vial will be inverted and

inspected for gas bubbles prior to being placed in the cooler to ensure that no head-space is present. All groundwater samples will be assigned unique identification numbers, and the date, time, project number, company name, location and requested analyses for each sample will be documented in a bound hard cover notebook. The samples will be submitted to the contractual laboratory within analytical test group holding times under COC protocols. New disposable chemical resistant gloves will be used for each sampling location to prevent sample cross-contamination.

4 Field Quality Assurance/Quality Control Program

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

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

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

4.1 Decontamination Protocols

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

4.2 Equipment Calibration

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

4.3 Sample Preservation

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

4.4 Sample Documentation

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

4.5 Field Quality Control

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

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112 Montreal Road, Ottawa, Ontario
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January 14, 2014

Appendix C: Borehole Logs

SYMBOLS AND TERMS USED ON THE BOREHOLE AND TEST PIT RECORDS

SOIL DESCRIPTION

Behavioural properties (i.e. plasticity, permeability) take precedence over particle gradation in describing soils.

Terminology describing soil structure:

Desiccated	- having visible signs of weathering by oxidization of clay minerals, shrinkage cracks, etc.
Fissured	- having cracks, and hence a blocky structure
Varved	- composed of regular alternating layers of silt and clay
Stratified	- composed of alternating layers of different soil types, e.g. silt and sand or slit and clay
Well Graded	- having wide range in grain sizes and substantial amounts of all intermediate particle sizes
Uniformly Graded	- predominantly of one grain size

Terminology used for describing soil strata based upon the proportion of individual particle sizes present:

Trace, or occasional	less than 10%
Some	10-20%
Adjective (e.g. silty or sandy)	20-35%
And (e.g. silt and sand)	35-50%

The standard terminology to describe cohesionless soils includes the relative density, as determined by laboratory test or by the Standard Penetration Test 'N' – value: the number of blows of 140 pound (64 kg) hammer falling 30 inches (760 mm), required to drive a 2 inch (50.8 mm) O.D. split spoon sample one foot (305 mm) into the soil.

Relative Density	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>5	>85

The standard terminology to describe cohesive soils includes the consistency, which is based on undrained shear strength as measured by insitu vane tests, penetrometer tests, unconfined compression tests, or occasionally by standard penetration tests.

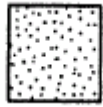
Consistency	Undrained Shear Strength		'N' Value
	kips/sq.ft.	kPa	
Very Soft	<0.25	<12.5	<2
Soft	0.25-0.5	12.5-25	2-4
Firm	0.5-1.0	25-50	4-8
Stiff	1.0-2.0	50-100	8-15
Very Stiff	2.0-4.0	100-200	15-30
Hard	>4.0	>200	>30

SYMBOLS AND TERMS CONTINUED

STATA PLOT



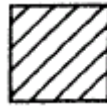
Gravel &
Boulders



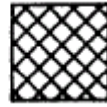
Sand



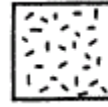
Silt



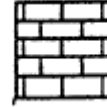
Clay



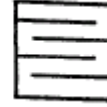
Fill



Igneous
Bedrock



Sedimentary
Bedrock

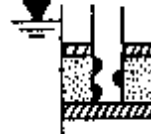


Metamorphic
Bedrock

WATER LEVEL MEASUREMENT



Borehole or
Standpipe



Piezometer

SAMPLES

SS... Split spoon sample
(obtained by performing the standard
penetration test)

ST... Shelby tube or thin wall tube

PS... Piston sample

BS... Bulk sample

WS... Wash sample

RC... Rock core

AXT, BXL. etc...

Rock core samples obtained with the
use of standard diamond drilling bits.

OTHER TESTS

G... Specific gravity

H... Hydrometer analysis

S... Sieve analysis

γ Unit weight

C.... Consolidation

CD... Consolidated drained triaxial

CU... Consolidated undrained triaxial
with pore pressure measurements

UU... Unconsolidated undrained triaxial

DS... Direct shear

P.... Field permeability

ROCK DESCRIPTION

The description of bedrock is based on the rock quality designation (RQD). The classification is based on a modified core recovery percentage in which all pieces of sound core over 100mm long are counted as recovery. The smaller pieces are considered to be due to close shearing, jointing, faulting, or weathering in the rock mass and are not counted. In most cases RQD is run on NXL core; however, it can be used on different core sizes if the bulk of the fractures caused by drilling stresses are easily distinguishable from normal insitu fractures.

RQD

90-100

75-90

50-75

25-50

0-25

ROCK QUALITY

Excellent, intact, very sound

Good, massive, moderately jointed or sound

Fair, blocky and seamy, fractured

Poor, shattered and very seamy or blocky, severely fractured

Very poor, crushed, very severely fractured

Log of Borehole 1-A



Project No: OTT-00214936-A0

Project: Phase II ESA and Geotechnical Investigation

Location: 112 Montreal Road, Ottawa Ontario

Figure No. 3

Page. 1 of 1

Date Drilled: October 23, 2013 / November 7, 2013

Drill Type: CME-75 (Truck Mount)

Datum: Geodetic

Logged by: MAD Checked by: MGM/SA

Split Spoon Sample ☒

Auger Sample ☐

SPT (N) Value ☐

Dynamic Cone Test ☐

Shelby Tube ☐

Shear Strength by
Vane Test ☐

Combustible Vapour Reading ☐

Natural Moisture Content ☒

Atterberg Limits ☐

Undrained Triaxial at
% Strain at Failure ☐

Shear Strength by
Penetrometer Test ☐

GWL	SYMBOL	SOIL DESCRIPTION	Geodetic m	Depth m	Standard Penetration Test N Value				Combustible Vapour Reading (ppm)			SAMPLES	Natural Unit Wt. kN/m³
									250	500	750		
					Shear Strength				Natural Moisture Content % Atterberg Limits (% Dry Weight)				
					kPa								
					20	40	60	80	20	40	60		
		ASPHALT ~ 50 mm	100.12	0									
		FILL Crushed limestone, sand and gravel, grey, moist, (dense)	100.0						X				
		FILL Sand, silt and gravel with some brick debris, some boulders and cobbles, dark grey with black and lighter patches, moist (loose to very loose)	99.3	1					X				
									X				
				2					X				
			97.82									Environmental	Sample
		SAND AND GRAVEL TILL Some silt with cobbles, trace clay, brown, wet (compact to very dense)	97.4	3					X				19.2
			96.5					69	X				21.6
Borehole Terminated at 3.6 m Depth													

NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A Monitoring Well with a 51mm diameter casing was installed in the borehole upon completion.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00214936-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	
7 Days	2.4	

CORE DRILLING RECORD

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

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 1/10/14

Log of Borehole 1-B



Project No: OTT-00214936-A0

Project: Phase II ESA and Geotechnical Investigation

Location: 112 Montreal Road, Ottawa Ontario

Date Drilled: October 23, 2013 / November 7, 2013

Drill Type: CME-75 (Truck Mount)

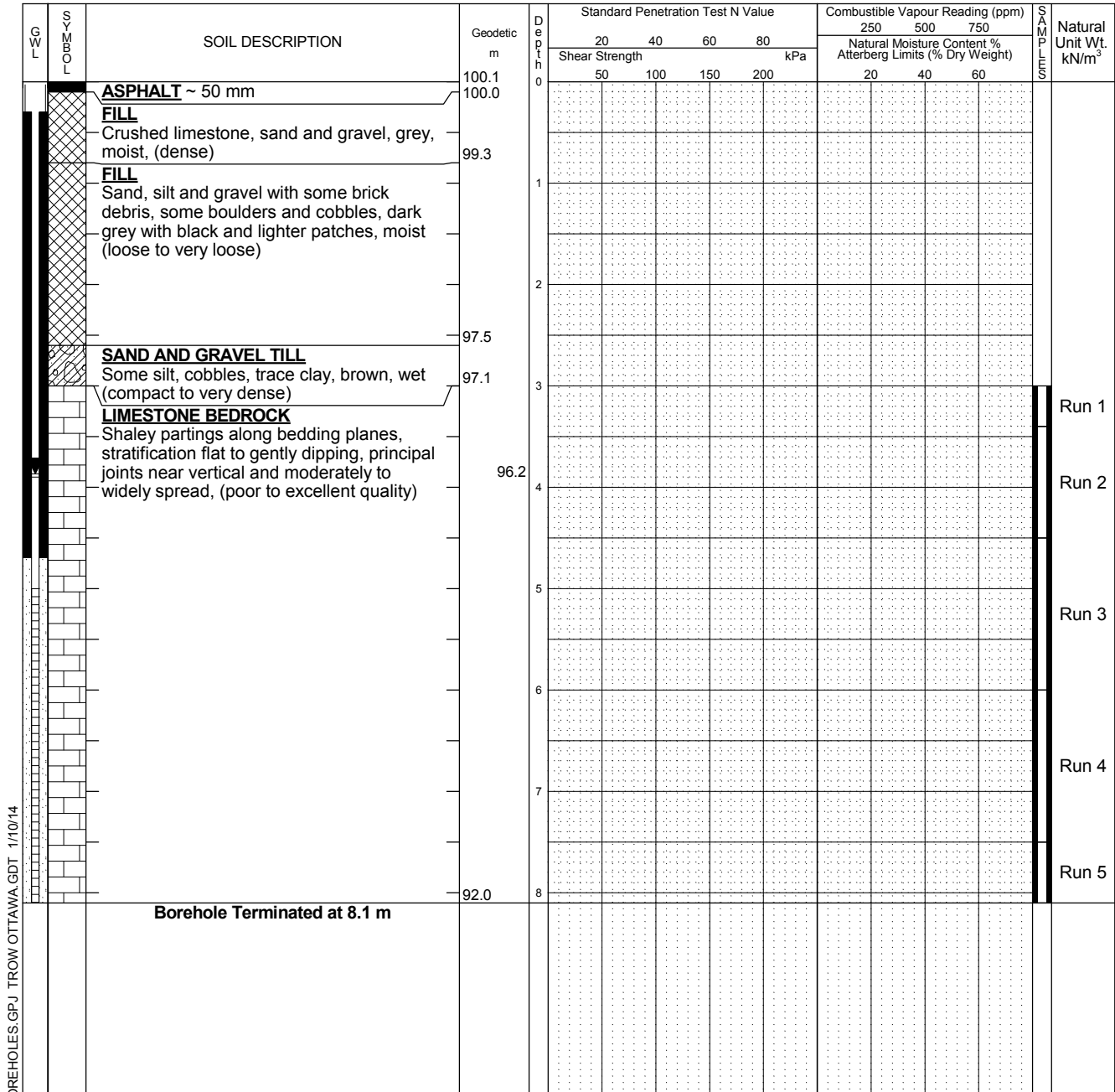
Datum: Geodetic

Logged by: MAD Checked by: MGM/SA

Figure No. 4

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 ☐
 Shelby Tube ☒ % Strain at Failure ☐
 Shear Strength by Vane Test ☐ Shear Strength by Penetrometer Test ☒



NOTES:
 1. Borehole data requires interpretation by exp. before use by others
 2. A Monitoring Well with a 51mm diameter casing was installed in the borehole upon completion.
 3. Field work was supervised by an exp representative.
 4. See Notes on Sample Descriptions
 5. This Figure is to read with exp. Services Inc. report OTT-00214936-A0

WATER LEVEL RECORDS		
Elapsed Time	Water Level (m)	Hole Open To (m)
12 Days	3.9	

CORE DRILLING RECORD			
Run No.	Depth (m)	% Rec.	RQD %
1	3 - 3.41	100	38
2	3.41 - 4.45	88	85
3	4.45 - 5.98	100	77
4	5.98 - 7.5	92	87
5	7.5 - 8.06	100	100

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 1/10/14

Log of Borehole 2



Project No: OTT-00214936-A0

Project: Phase II ESA and Geotechnical Investigation

Location: 112 Montreal Road, Ottawa Ontario

Figure No. 5

Page. 1 of 1

Date Drilled: October 24, 2013

Drill Type: CME-75 (Truck Mount)

Datum: Geodetic

Logged by: MAD Checked by: MGM/SA

Split Spoon Sample ☒

Auger Sample ☐

SPT (N) Value ☐

Dynamic Cone Test ☐

Shelby Tube ☐

Shear Strength by Vane Test ☐

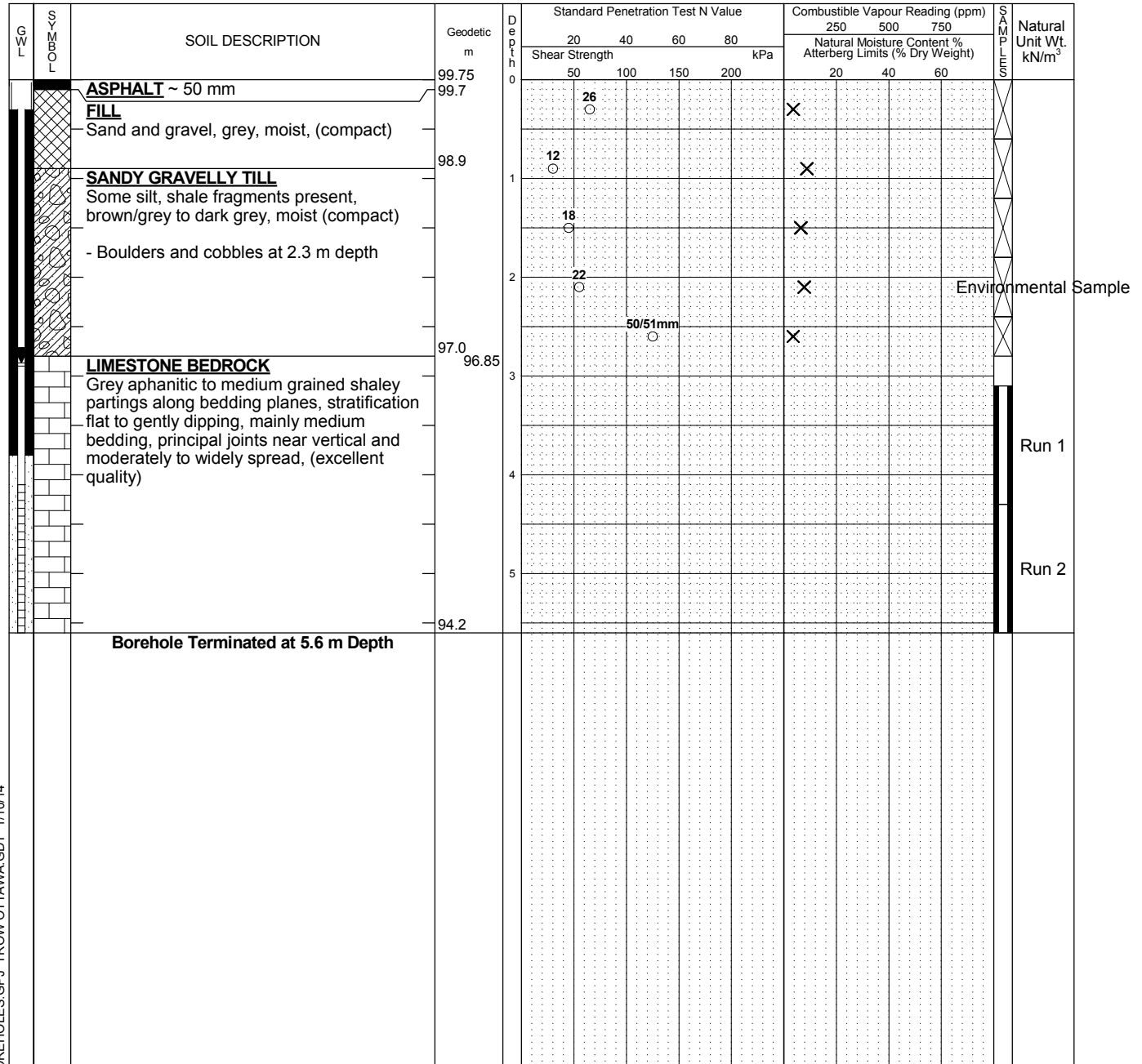
Combustible Vapour Reading ☐

Natural Moisture Content ☒

Atterberg Limits ☐

Undrained Triaxial at % Strain at Failure ☐

Shear Strength by Penetrometer Test ☐



NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A Monitoring Well with a 51mm diameter casing was installed in the borehole upon completion.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00214936-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
26 days	2.9	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	3.05 - 4.32	100	100
2	4.32 - 5.64	100	100

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 1/10/14

Log of Borehole 3



Project No: OTT-00214936-A0

Project: Phase II ESA and Geotechnical Investigation

Location: 112 Montreal Road, Ottawa Ontario

Figure No. 6

Page. 1 of 1

Date Drilled: October 23, 2013

Drill Type: CME-75 (Truck Mount)

Datum: Geodetic

Logged by: MAD Checked by: MGM/SA

Split Spoon Sample ☒

Auger Sample ☐

SPT (N) Value ☐

Dynamic Cone Test ☐

Shelby Tube ☐

Shear Strength by Vane Test ☐

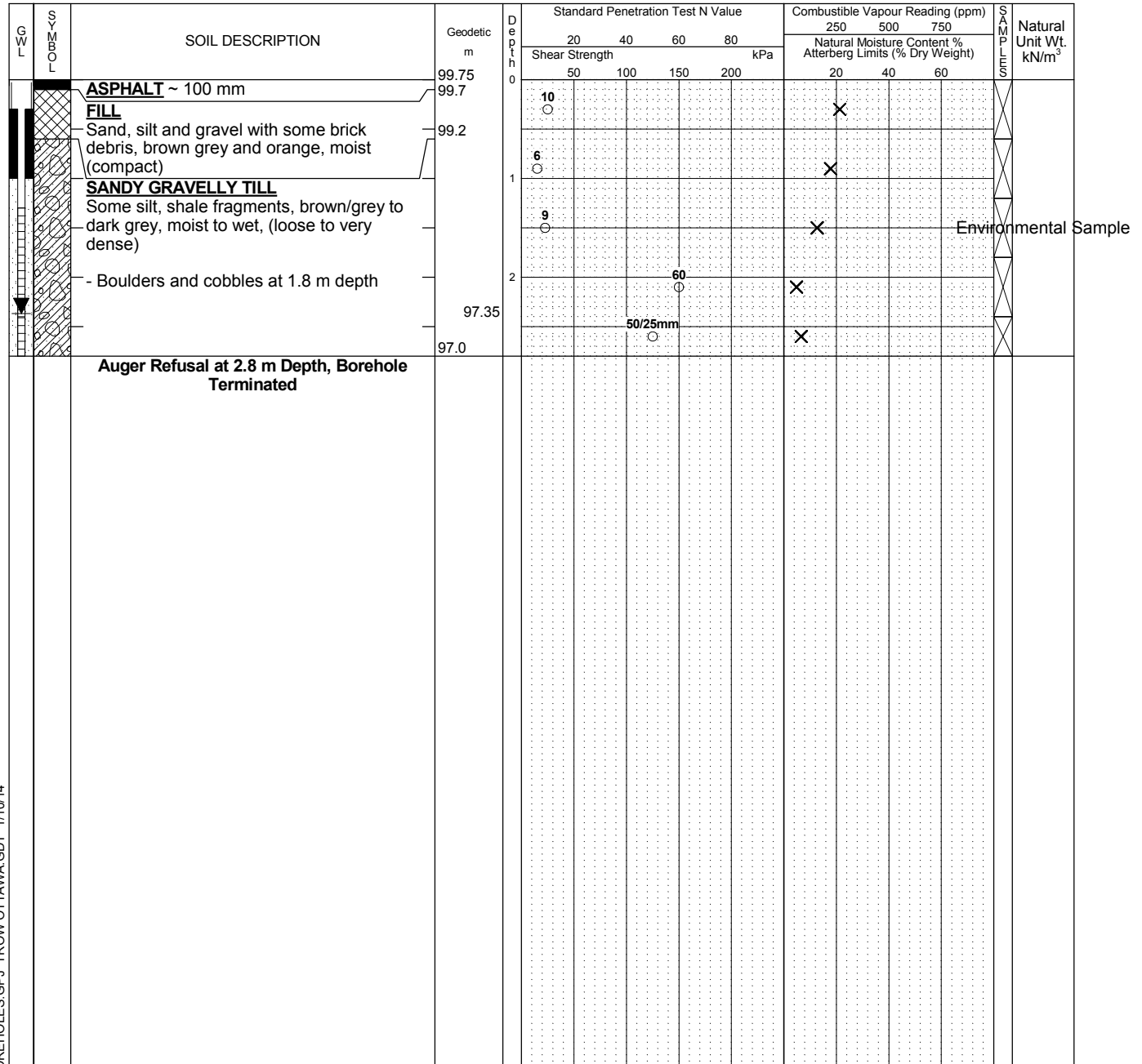
Combustible Vapour Reading ☐

Natural Moisture Content ☒

Atterberg Limits ☐

Undrained Triaxial at % Strain at Failure ☐

Shear Strength by Penetrometer Test ☐



NOTES:

1. Borehole data requires interpretation by exp. before use by others
2. A Monitoring Well with a 51mm diameter casing was installed in the borehole upon completion.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00214936-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	Dry	
1 Day	Dry	
27	2.4	

CORE DRILLING RECORD

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

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 1/10/14

Log of Borehole 4



Project No: OTT-00214936-A0

Project: Phase II ESA and Geotechnical Investigation

Location: 112 Montreal Road, Ottawa Ontario

Figure No. 7

Page. 1 of 1

Date Drilled: October 24, 2013

Drill Type: CME-75 (Truck Mount)

Datum: Geodetic

Logged by: MAD Checked by: MGM/SA

Split Spoon Sample ☒

Auger Sample ☒

SPT (N) Value ☐

Dynamic Cone Test ☐

Shelby Tube ☐

Shear Strength by
Vane Test ☐

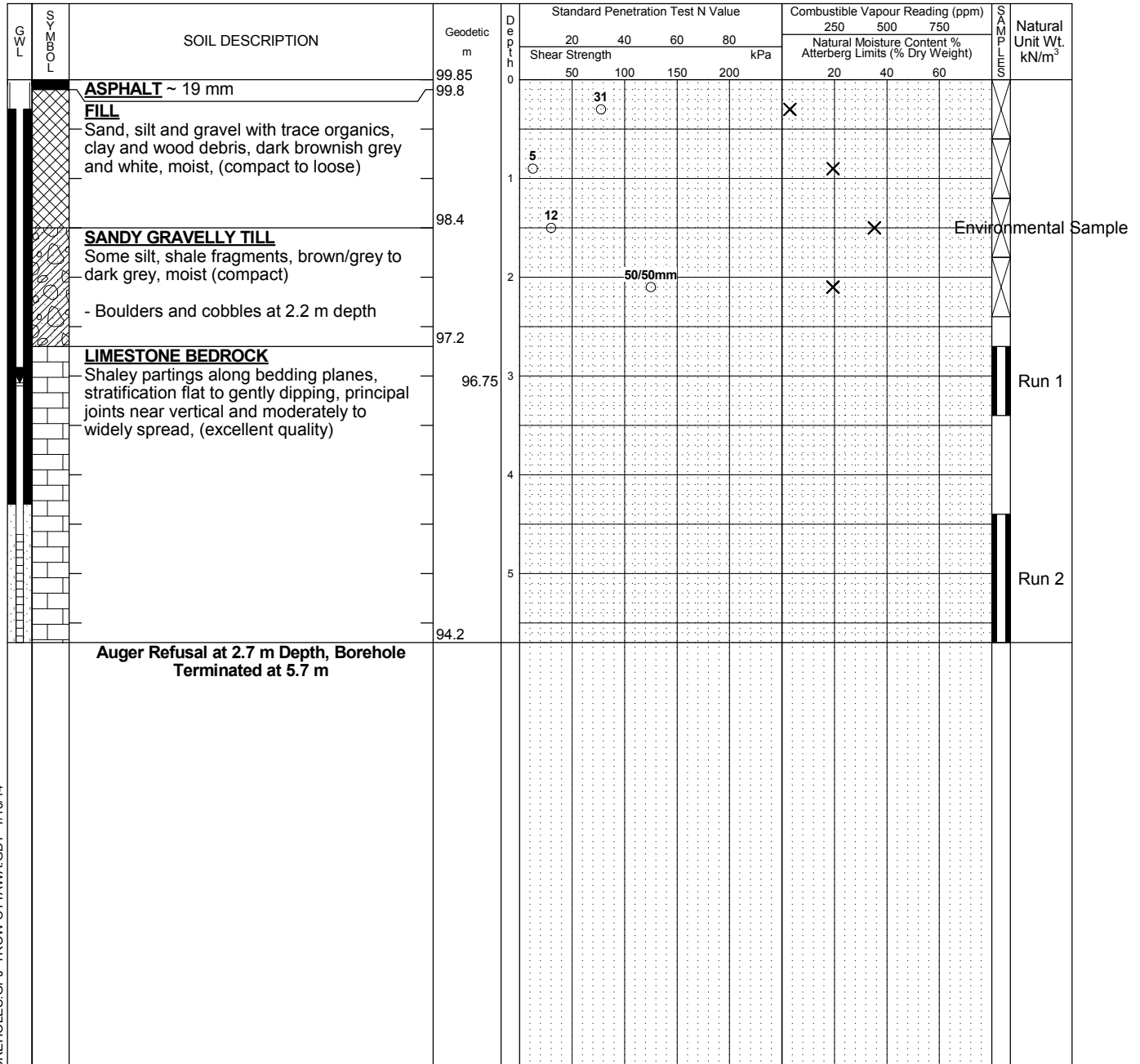
Combustible Vapour Reading ☐

Natural Moisture Content ☒

Atterberg Limits ☐

Undrained Triaxial at
% Strain at Failure ☐

Shear Strength by
Penetrometer Test ☒



NOTES:

1. Borehole data requires interpretation by exp. before use by others
2. A Monitoring Well with a 51mm diameter casing was installed in the borehole upon completion.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00214936-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
26 Days	3.1	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	2.69 - 4.35	95	95
2	4.35 - 5.74	98	96

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 1/10/14

Log of Borehole 5



Project No: OTT-00214936-A0

Project: Phase II ESA and Geotechnical Investigation

Location: 112 Montreal Road, Ottawa Ontario

Figure No. 8

Page. 1 of 1

Date Drilled: November 7, 2013

Drill Type: CME-75 (Truck Mount)

Datum: Geodetic

Logged by: MAD Checked by: MGM/SA

Split Spoon Sample ☒

Auger Sample ☒

SPT (N) Value ☐

Dynamic Cone Test ☐

Shelby Tube ☐

Shear Strength by Vane Test ☐

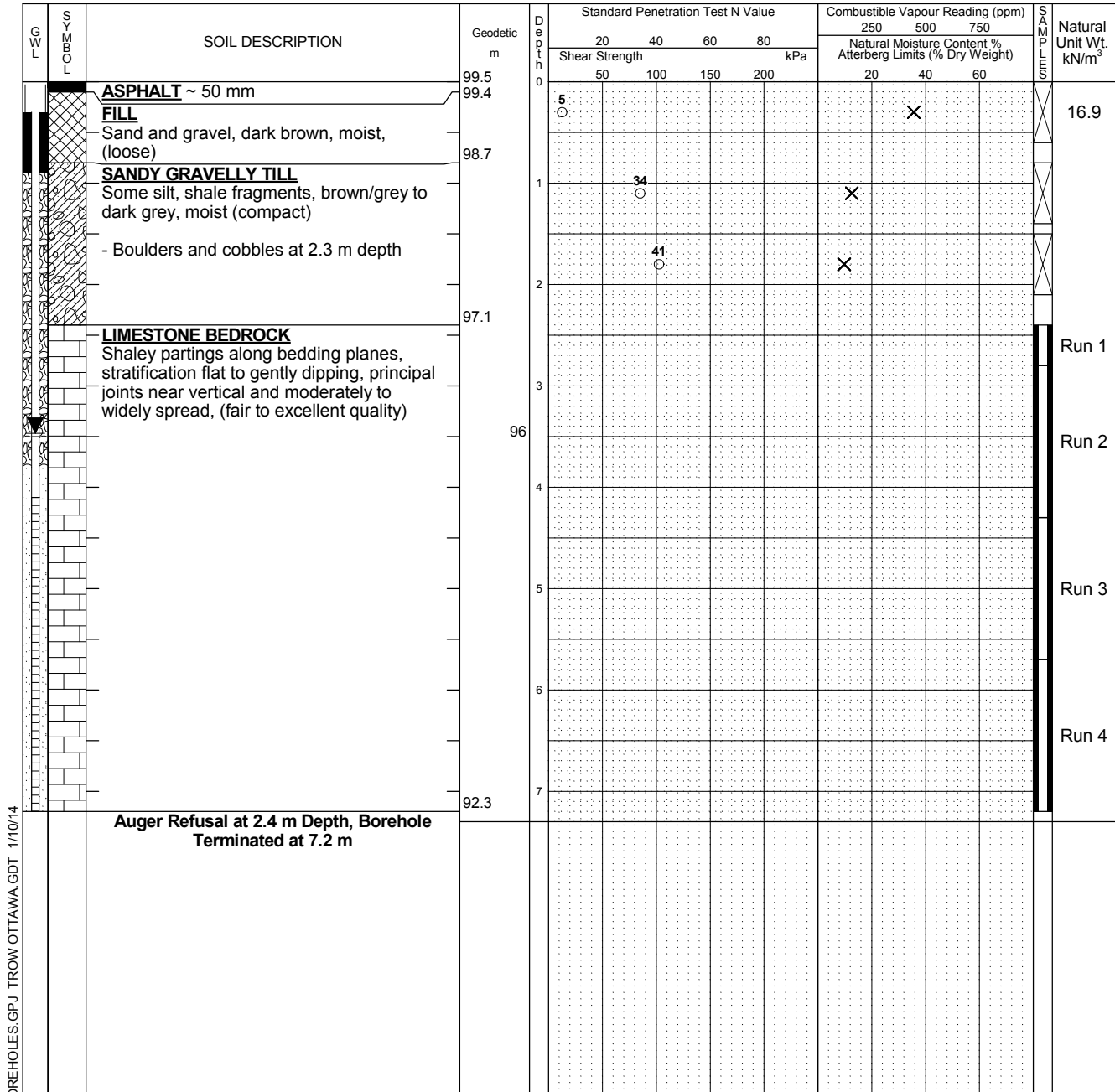
Combustible Vapour Reading ☐

Natural Moisture Content ☒

Atterberg Limits ☐

Undrained Triaxial at % Strain at Failure ☐

Shear Strength by Penetrometer Test ☒



- NOTES:
1. Borehole data requires interpretation by exp. before use by others
 2. A Piezometer with a 13mm diameter casing was installed in the borehole upon completion.
 3. Field work was supervised by an exp representative.
 4. See Notes on Sample Descriptions
 5. This Figure is to read with exp. Services Inc. report OTT-00214936-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
7 Days	3.5	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	2.42 - 2.78	85	64
2	2.78 - 4.3	100	100
3	4.3 - 5.74	93	93
4	5.74 - 7.24	100	98

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 1/10/14

Log of Borehole 6



Project No: OTT-00214936-A0

Project: Phase II ESA and Geotechnical Investigation

Location: 112 Montreal Road, Ottawa Ontario

Figure No. 9

Page. 1 of 1

Date Drilled: October 24, 2013

Drill Type: CME-75 (Truck Mount)

Datum: Geodetic

Logged by: MAD Checked by: MGM/SA

Split Spoon Sample ☒

Auger Sample ☐

SPT (N) Value ☐

Dynamic Cone Test ☐

Shelby Tube ☐

Shear Strength by
Vane Test ☐

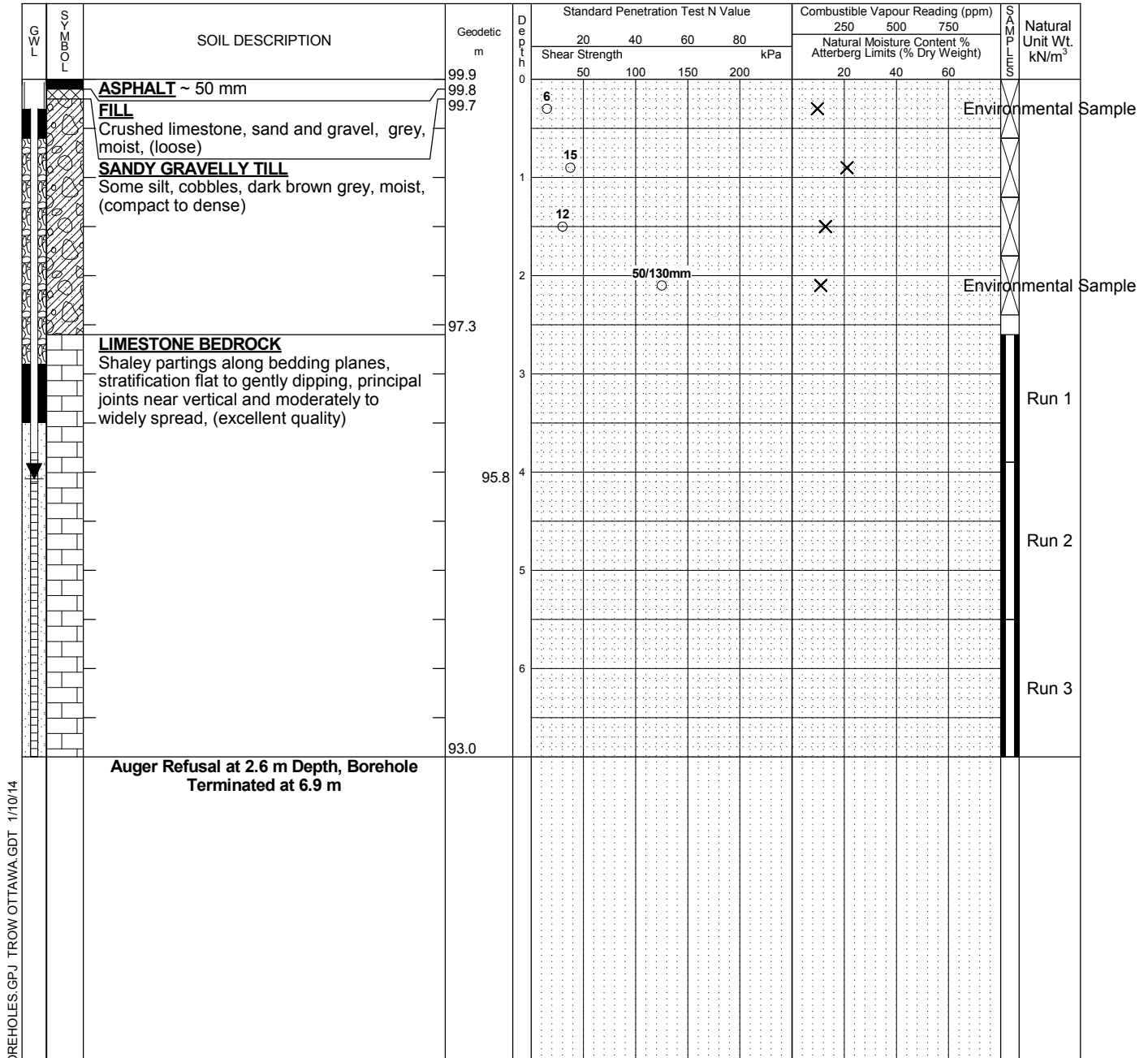
Combustible Vapour Reading ☐

Natural Moisture Content ☒

Atterberg Limits ☐

Undrained Triaxial at
% Strain at Failure ☐

Shear Strength by
Penetrometer Test ☐



- NOTES:
1. Borehole data requires interpretation by exp. before use by others
 2. A Monitoring Well with a 51mm diameter casing was installed in the borehole upon completion.
 3. Field work was supervised by an exp representative.
 4. See Notes on Sample Descriptions
 5. This Figure is to read with exp. Services Inc. report OTT-00214936-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
26 days	4.1	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	2.64 - 3.86	100	100
2	3.86 - 5.49	100	97
3	5.49 - 6.91	100	98

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 1/10/14

Page. 1 of 1

Shear Strength by Penetrometer Test



RQD %
98

Log of Borehole _8



Project No: OTT-00214936-A0

Project: Phase II ESA and Geotechnical Investigation

Location: 112 Montreal Road, Ottawa Ontario

Figure No. 11

Page. 1 of 1

Date Drilled: November 7, 2013

Drill Type: CME-75 (Truck Mount)

Datum: Geodetic

Logged by: MAD Checked by: MGM/SA

Split Spoon Sample ☒

Auger Sample ☐

SPT (N) Value ☐

Dynamic Cone Test ☐

Shelby Tube ☐

Shear Strength by
Vane Test ☐

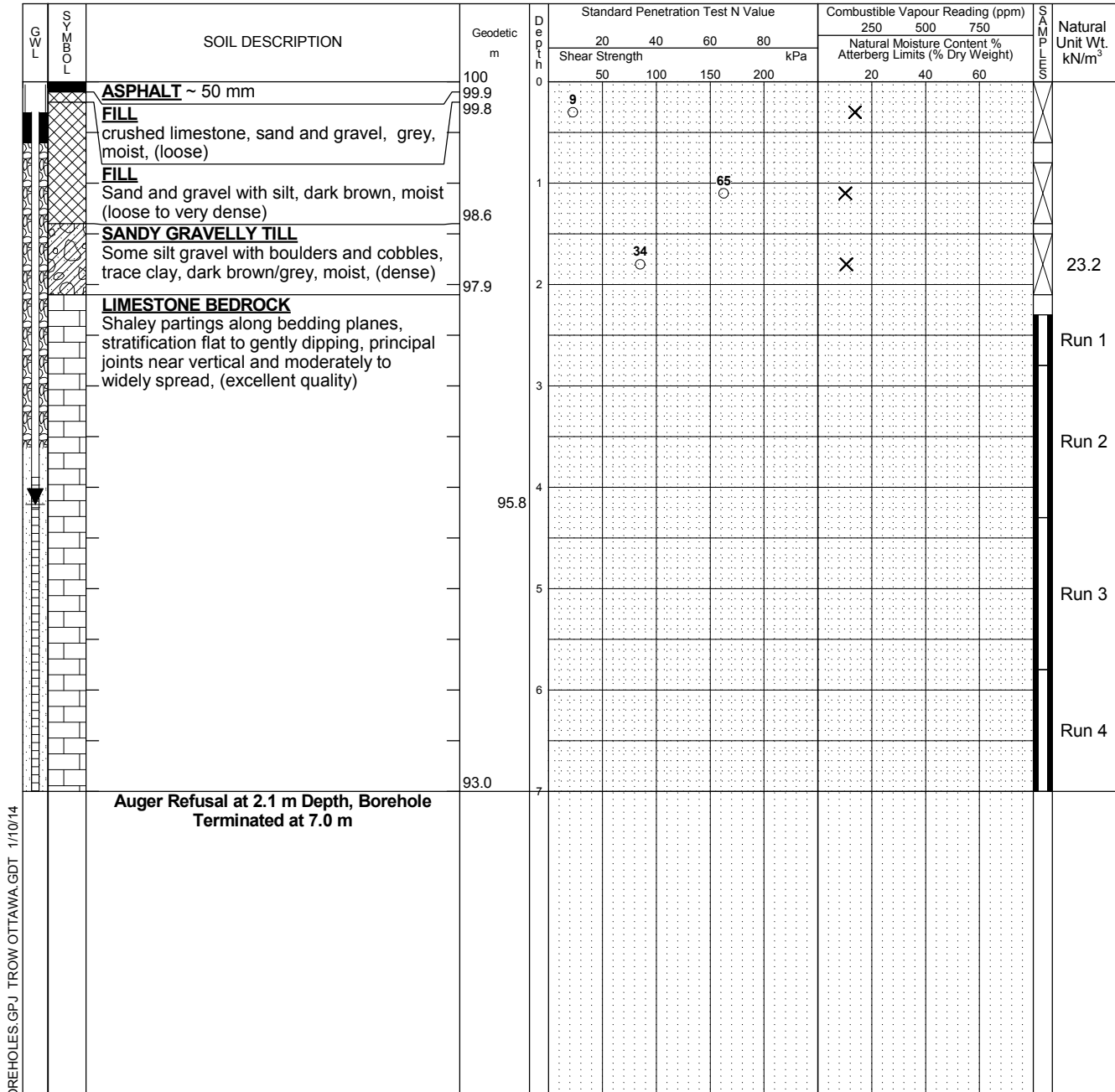
Combustible Vapour Reading ☐

Natural Moisture Content ☒

Atterberg Limits ☐

Undrained Triaxial at
% Strain at Failure ☐

Shear Strength by
Penetrometer Test ☐



NOTES:
1. Borehole data requires interpretation by exp. before use by others
2. A Piezometer with a 13mm diameter casing was installed in the borehole upon completion.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00214936-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
12 Days	4.2	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	2.24 - 2.75	89	89
2	2.75 - 4.25	100	100
3	4.25 - 5.77	100	100
4	5.77 - 7.02	100	100

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 1/10/14

Log of Borehole 9



Project No: OTT-00214936-A0

Project: Phase II ESA and Geotechnical Investigation

Location: 112 Montreal Road, Ottawa Ontario

Figure No. 12

Page. 1 of 1

Date Drilled: October 23, 2013

Drill Type: CME-75 (Truck Mount)

Datum: Geodetic

Logged by: MAD Checked by: MGM/SA

Split Spoon Sample ☒

Auger Sample ☐

SPT (N) Value ☐

Dynamic Cone Test ☐

Shelby Tube ☐

Shear Strength by
Vane Test ☐

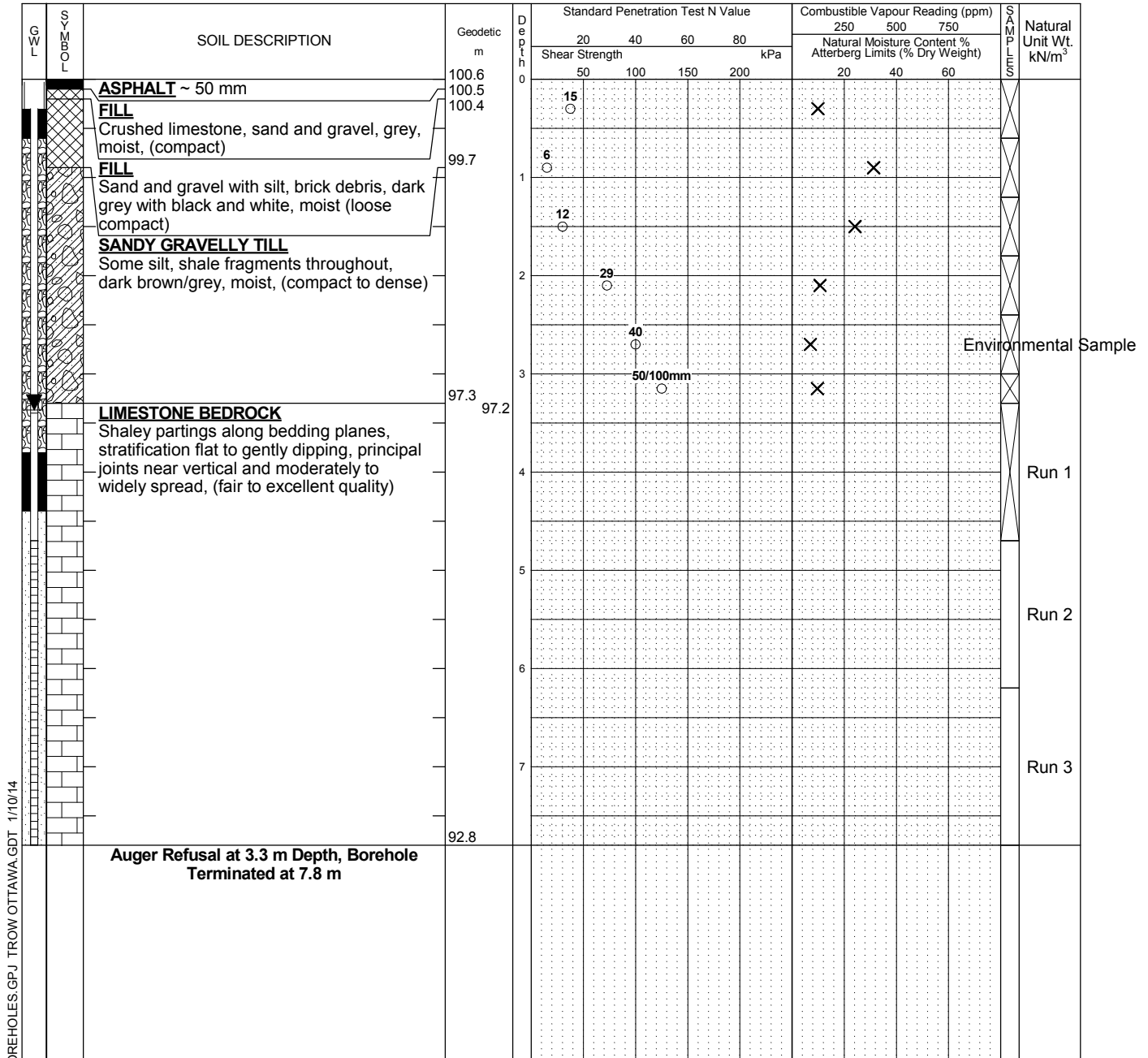
Combustible Vapour Reading ☐

Natural Moisture Content ☒

Atterberg Limits ☐

Undrained Triaxial at
% Strain at Failure ☐

Shear Strength by
Penetrometer Test ☐



NOTES:

1. Borehole data requires interpretation by exp. before use by others
2. A Monitoring Well with a 51mm diameter casing was installed in the borehole upon completion.
3. Field work was supervised by an exp representative.
4. See Notes on Sample Descriptions
5. This Figure is to read with exp. Services Inc. report OTT-00214936-A0

WATER LEVEL RECORDS

Elapsed Time	Water Level (m)	Hole Open To (m)
Completion	3.2	
1 Day	3.4	
27 Days	3.4	

CORE DRILLING RECORD

Run No.	Depth (m)	% Rec.	RQD %
1	3.28 - 4.71	73	61
2	4.71 - 6.23	59	53
3	6.23 - 7.78	100	100

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 1/10/14

Page. 1 of 1

Shear Strength by Penetrometer Test

LOG OF BOREHOLE LOGS OF BOREHOLES.GPJ TROW OTTAWA.GDT 1/10/14

RQD %

exp Services Inc.

1147310 Ontario Incorporated
Phase II Environmental Site Assessment
112 Montreal Road, Ottawa, Ontario
OTT-00214936-B0
January 14, 2014

Appendix D: Analytical Summary Tables

Table 1 - Soil Analytical Results - Petroleum Hydrocarbons
112 Montreal Road, Ottawa

Sample ID	2011 Table 3 - Non-Potable GW	2011 Table 1 - Background Concentrations	MW1 SS4 23-Oct-13 1.8 - 2.4	MW2 SS5 24-Oct-13 2.4 - 3.0	MW3 SS3 23-Oct-13 1.2 - 1.8	MW4 SS3 24-Oct-13 1.2 - 1.8	MW4 SS30 Dup. of BH4 SS3	MW6B SS1 08-Nov-13 0.15 - 0.75	MW9 SS5 23-Oct-13 1.8 - 2.4
Sample Date									
Sample Depth (m)									
Parameter (ug/g)	Residential								
Benzene	0.21	0.02	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002
Ethylbenzene	2	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Toluene	2.3	0.2	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05
Xylenes	3.1	0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	0.08
F ₁ (C ₆ -C ₁₀)	55	25	<7	<7	<7	<7	<7	<7	17
F ₂ (C ₁₀ -C ₁₆)	98	10	<4	<4	<4	<4	14	<4	<4
F ₃ (C ₁₆ -C ₃₄)	300	240	81	<8	<8	364	536	<8	<8
F ₄ (C ₃₄ -C ₅₀)	2800	120	10	<6	<6	624	1090	<6	<6

Notes:

1. MOE Table 3: Full Depth Generic Site Standards in a Non-Potable Ground Water Condition Residential Property Use July 2011 (coarse grained soil)

Shade - concentration exceeds MOE Table 3 standard

Bold- concentration exceeds MOE Table 1 standard

NV - no value

Table 2 - Soil Analytical Results - Metals
112 Montreal Road, Ottawa

Sample ID	2011 Table 3 - Non-Potable GW	2011 Table 1 - Background Concentrations	MW1 SS4	MW3 SS3	MWBH4 SS3	MW4 SS30	MW6 SS1	BH10 S2	BH11 S1
Sample Date			23-Oct-13	23-Oct-13	24-Oct-13	Dup. of BH4	08-Nov-13	31-Oct-13	31-Oct-13
Sample Depth (m)			1.8 - 2.4	1.2 - 1.8	1.2 - 1.8	SS3	0.15 - 0.75	0.6 - 0.9	0.0 - 0.4
Parameter (ug/g)	Residential								
Antimony	7.5	1.3	1.9	<1.0	<1.0	<1.0	3.8	<1.0	<1.0
Arsenic	18	18	6.0	5.8	4.1	3.9	3.9	5.7	7.6
Barium	390	220	253	71.7	87.8	77.0	177	498	119
Beryllium	4	2.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Boron	120	36	7.2	6.7	7.6	7.8	6.1	6.7	4.8
Cadmium	1.2	1.2	<0.5	<0.5	<0.5	<0.5	<0.5	0.5	0.7
Chromium (total)	160	70	20.4	11.9	15.8	14.3	21.9	26	23
Cobalt	22	21	8.3	6.9	6.4	5.8	10.8	5.3	6.1
Copper	140	92	39.8	20.1	24.7	21.3	55.6	44.8	61.6
Lead	120	120	325	12	14.7	11.1	19.8	560	218
Molybdenum	6.9	2	1.6	2.7	1.6	<1.0	1.1	1.6	1.3
Nickel	100	82	27.3	22.7	32.0	29.6	58.4	46.1	35.9
Selenium	2.4	1.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Silver	20	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Thallium	1	1	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Uranium	23	2.5	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vanadium	86	86	22.3	20.4	18.6	16.8	24.3	28.3	32.1
Zinc	340	290	177	28.1	58.5	55.0	82.3	428	375

Notes:

1. MOE Table 3: Full Depth Generic Site Standards in a Non-Potable Ground Water Condition Residential Property Use July 2011 (coarse grained soil)

Shade - concentration exceeds MOE Table 3 standard

Bold- concentration exceeds MOE Table 1 standard

NV - no value

Table 3 - Groundwater Analytical Results - Petroleum Hydrocarbons & BTEX
112 Montreal Road, Ottawa

Sample ID	2011 Table 3 - Non-Potable GW	MW13-1a	MW12-1b	MW13-2	MW13-3	MW13-4	MW13-6	MW13-60	MW13-9	BH18	BH23
Sample Date		14-Nov-13	14-Nov-13	14-Nov-13	14-Nov-13	14-Nov-13	14-Nov-13	14-Nov-13	14-Nov-13	19-Nov-13	19-Nov-13
Parameter (ug/L)	Residential							Dup of MW13-6			
Benzene	44	<0.5	<0.5	0.7	<0.5	1.0	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	2300	<0.5	7.5	3.0	<0.5	8.7	<0.5	<0.5	0.6	<0.5	<0.5
Toluene	18000	<0.5	2.9	4.4	<0.5	8.2	<0.5	<0.5	0.6	<0.5	<0.5
Xylenes	4200	<1.0	10.2	4.3	<1.0	13.2	<1.0	<1.0	0.9	<1.0	<1.0
F1 PHCs (C ₆ -C ₁₀)	750	<200	102	<200	<200	156	<200	<200	<200	<200	<200
F2 PHCs (C ₁₀ -C ₁₆)	150	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
F3 PHCs (C ₁₆ -C ₃₄)	500	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
F4 PHCs (C ₃₄ -C ₅₀)	500	<100	<100	<100	<100	<100	<100	<100	<100	<100	<100
Petroleum sheen and/or odour	No	No	No	No	No	No	No	No	No	No	No

Notes:

1. MOE Table 3: Full Depth Generic Site Standards in a Non-Potable Ground Water Condition Residential Property Use July 2011 (coarse grained soil)

Shade - concentration exceeds MOE Table 3 criteria

NV - no value

Table 4 - Groundwater Analytical Results - Volatile Organic Compounds
112 Montreal Road, Ottawa

Sample ID	2011 Table 3 - Non	MW13-1a	MW12-1b	MW13-2	MW13-3	MW13-4	MW13-6	MW13-60	MW13-9	BH18	BH23
Sample Date	Potable GW	14-Nov-13	14-Nov-13	14-Nov-13	14-Nov-13	14-Nov-13	14-Nov-13	14-Nov-13	14-Nov-13	19-Nov-13	19-Nov-13
Parameter (ug/L)	Residential							Dup of MW13-6			
Acetone	130,000	<5.0	159	142	<5.0	179	<5.0	<5.0	22.3	<5.0	<5.0
Benzene	44	<0.5	<0.5	0.7	<0.5	1	<0.5	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	85,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromoform	380	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Bromomethane	5.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.79	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	630	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Chloroform	2.4	<0.5	3.7	3.1	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	82,000	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichlorobenzene	4,600	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	9,600	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	8.0	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	4,400	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,1-Dichloroethane	320	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	16	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	5.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	2,300	<0.5	7.5	3.0	<0.5	8.7	<0.5	<0.5	0.6	<0.5	<0.5
Ethylene Dibromide	0.25	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Hexane	51	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Methylene Chloride	610	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl Isobutlyl Ketone	140,000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl Ethyl Ketone	470,000	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0	<5.0
Methyl t-butyl Ether	190	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0	<2.0
Styrene	1,300	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	3.3	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	3.2	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Toluene	18,000	<0.5	2.9	4.4	<0.5	8.2	<0.5	<0.5	0.6	<0.5	<0.5
1,1,1-Trichloroethane	640	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	4.7	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	1.6	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	2,500	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Vinyl Chloride	0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5
Xylenes, total	4,200	<0.5	10.2	4.3	<0.5	13.2	<0.5	<0.5	0.9	<0.5	<0.5

Notes:

1. MOE Table 3: Full Depth Generic Site Standards in a Non-Potable Ground Water Condition Residential Property Use July 2011 (coarse grained soil)

Shade - concentration exceeds MOE Table 3 criteria

NV - no value

exp Services Inc.

1147310 Ontario Incorporated
Phase II Environmental Site Assessment
112 Montreal Road, Ottawa, Ontario
OTT-00214936-B0
January 14, 2014

Appendix E: Laboratory Certificates of Analysis

Certificate of Analysis

exp Services Inc. (Ottawa)

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

Phone: (613) 688-1899
Fax: (613) 225-7337

Client PO:
Project: OTT00214936A0
Custody: 10001

Report Date: 31-Oct-2013
Order Date: 25-Oct-2013

Order #: 1343373

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

Paracel ID	Client ID
1343373-01	BH1 SS4
1343373-02	BH2 SS5
1343373-03	BH3 SS3
1343373-04	BH4 SS3
1343373-05	BH4 SS30
1343373-06	BH9 SS5

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 31-Oct-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 25-Oct-2013

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	25-Oct-13	30-Oct-13
MOE Metals by ICP-OES, soil Reg 153	based on MOE E3470, ICP-OES	29-Oct-13	29-Oct-13
PHC F1	CWS Tier 1 - P&T GC-FID	25-Oct-13	30-Oct-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	28-Oct-13	28-Oct-13
Solids, %	Gravimetric, calculation	28-Oct-13	28-Oct-13

Certificate of Analysis

Report Date: 31-Oct-2013

Client: **exp Services Inc. (Ottawa)**

Order Date: 25-Oct-2013

Client PO:

Project Description: OTT00214936A0

Client ID:	BH1 SS4	BH2 SS5	BH3 SS3	BH4 SS3
Sample Date:	23-Oct-13	24-Oct-13	23-Oct-13	24-Oct-13
Sample ID:	1343373-01	1343373-02	1343373-03	1343373-04
MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	81.9	93.1	91.5	80.2
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Metals

Antimony	1.0 ug/g dry	1.9	-	<1.0	<1.0
Arsenic	1.0 ug/g dry	6.0	-	5.8	4.1
Barium	1.0 ug/g dry	253	-	71.7	87.8
Beryllium	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Boron	1.0 ug/g dry	7.2	-	6.7	7.6
Cadmium	0.5 ug/g dry	<0.5	-	<0.5	<0.5
Chromium	1.0 ug/g dry	20.4	-	11.9	15.8
Cobalt	1.0 ug/g dry	8.3	-	6.9	6.4
Copper	1.0 ug/g dry	39.8	-	20.1	24.7
Lead	1.0 ug/g dry	325	-	12.0	14.7
Molybdenum	1.0 ug/g dry	1.6	-	2.7	<1.0
Nickel	1.0 ug/g dry	27.3	-	22.7	32.0
Selenium	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Silver	0.5 ug/g dry	<0.5	-	<0.5	<0.5
Thallium	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	-	<1.0	<1.0
Vanadium	1.0 ug/g dry	22.3	-	20.4	18.6
Zinc	1.0 ug/g dry	177	-	28.1	58.5

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%	109%	104%	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	81	<8	<8	364
F4 PHCs (C34-C50)	6 ug/g dry	10	<6	<6	624

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SARNIA
123 Christina St. N.
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Client PO:

Report Date: 31-Oct-2013

Order Date: 25-Oct-2013

Project Description: OTT00214936A0

Client ID:	BH4 SS30	BH9 SS5	-	-
Sample Date:	24-Oct-13	23-Oct-13	-	-
Sample ID:	1343373-05	1343373-06	-	-
MDL/Units	Soil	Soil	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	87.1	93.5	-	-
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Metals

Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	3.9	-	-	-
Barium	1.0 ug/g dry	77.0	-	-	-
Beryllium	1.0 ug/g dry	<1.0	-	-	-
Boron	1.0 ug/g dry	7.8	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	1.0 ug/g dry	14.3	-	-	-
Cobalt	1.0 ug/g dry	5.8	-	-	-
Copper	1.0 ug/g dry	21.3	-	-	-
Lead	1.0 ug/g dry	11.1	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	1.0 ug/g dry	29.6	-	-	-
Selenium	1.0 ug/g dry	<1.0	-	-	-
Silver	0.5 ug/g dry	<0.5	-	-	-
Thallium	1.0 ug/g dry	<1.0	-	-	-
Uranium	1.0 ug/g dry	<1.0	-	-	-
Vanadium	1.0 ug/g dry	16.8	-	-	-
Zinc	1.0 ug/g dry	55.0	-	-	-

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	0.07	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	0.08	-	-
Toluene-d8	Surrogate	105%	109%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g dry	<7	17	-	-
F2 PHCs (C10-C16)	4 ug/g dry	14	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	536	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	1090	<6	-	-

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Sarnia, ON N7T 5T7

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 31-Oct-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 25-Oct-2013

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						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	1.0	ug/g						
Boron	ND	1.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	1.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	1.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	1.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.5	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	1.0	ug/g						
Zinc	ND	1.0	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	7.34		ug/g		91.8	50-140			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 31-Oct-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 25-Oct-2013

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)	119	4	ug/g dry	127			6.6	30	
F3 PHCs (C16-C34)	107	8	ug/g dry	110			3.2	30	
F4 PHCs (C34-C50)	39	6	ug/g dry	ND			0.0	30	
Metals									
Antimony	ND	1.0	ug/g dry	ND				30	
Arsenic	ND	1.0	ug/g dry	1.22			0.0	30	
Barium	51.6	1.0	ug/g dry	50.9			1.3	30	
Beryllium	ND	1.0	ug/g dry	ND			0.0	30	
Boron	5.33	1.0	ug/g dry	5.56			4.3	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	8.45	1.0	ug/g dry	8.18			3.3	30	
Cobalt	2.95	1.0	ug/g dry	2.83			4.2	30	
Copper	6.39	1.0	ug/g dry	6.60			3.2	30	
Lead	3.39	1.0	ug/g dry	3.74			9.8	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	4.96	1.0	ug/g dry	4.46			10.6	30	
Selenium	ND	1.0	ug/g dry	ND				30	
Silver	ND	0.5	ug/g dry	ND				30	
Thallium	ND	1.0	ug/g dry	ND				30	
Uranium	ND	1.0	ug/g dry	ND				30	
Vanadium	15.9	1.0	ug/g dry	16.3			2.7	30	
Zinc	14.3	1.0	ug/g dry	13.8			4.2	30	
Physical Characteristics									
% Solids	92.2	0.1	% by Wt.	92.7			0.6	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	5.11		ug/g dry	ND	105	50-140			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 31-Oct-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 25-Oct-2013

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	188	7	ug/g	ND	93.8	80-120			
F2 PHCs (C10-C16)	217	4	ug/g	127	88.3	60-140			
F3 PHCs (C16-C34)	283	8	ug/g	110	82.3	60-140			
F4 PHCs (C34-C50)	104	6	ug/g	ND	74.1	60-140			
Metals									
Antimony	210		ug/L	ND	84.1	70-130			
Arsenic	235		ug/L	24.5	84.1	70-130			
Barium	1200		ug/L	1020	74.5	70-130			
Beryllium	223		ug/L	2.82	87.9	70-130			
Boron	313		ug/L	111	80.5	70-130			
Cadmium	214		ug/L	ND	85.8	70-130			
Chromium	354		ug/L	164	76.1	70-130			
Cobalt	246		ug/L	56.6	75.9	70-130			
Copper	348		ug/L	132	86.3	70-130			
Lead	275		ug/L	74.9	80.1	70-130			
Molybdenum	197		ug/L	2.09	77.9	70-130			
Nickel	277		ug/L	89.2	75.2	70-130			
Selenium	203		ug/L	ND	81.2	70-130			
Silver	208		ug/L	ND	83.2	70-130			
Thallium	201		ug/L	ND	80.5	70-130			
Uranium	246		ug/L	ND	98.4	70-130			
Vanadium	514		ug/L	327	75.2	70-130			
Zinc	454		ug/L	275	71.5	70-130			
Volatiles									
Benzene	3.64	0.02	ug/g	ND	91.0	60-130			
Ethylbenzene	4.23	0.05	ug/g	ND	106	60-130			
Toluene	3.74	0.05	ug/g	ND	93.4	60-130			
m,p-Xylenes	8.02	0.05	ug/g	ND	100	60-130			
o-Xylene	3.85	0.05	ug/g	ND	96.2	60-130			
Surrogate: Toluene-d8	7.95		ug/g		99.4	50-140			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Client PO:

Project Description: OTT00214936A0

Report Date: 31-Oct-2013

Order Date: 25-Oct-2013

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.

Certificate of Analysis

exp Services Inc. (Ottawa)

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

Phone: (613) 688-1899
Fax: (613) 225-7337

Client PO:
Project: OTT00214936A
Custody: 13610

Report Date: 6-Nov-2013
Order Date: 31-Oct-2013

Order #: 1344316

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

Paracel ID	Client ID
1344316-01	BH10-S2
1344316-02	BH11-S1

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of AnalysisClient: **exp Services Inc. (Ottawa)**

Client PO:

Project Description: OTT00214936A

Report Date: 06-Nov-2013

Order Date: 31-Oct-2013

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
MOE Metals by ICP-OES, soil Reg 153	based on MOE E3470, ICP-OES	5-Nov-13	5-Nov-13
pH	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	31-Oct-13	1-Nov-13
Solids, %	Gravimetric, calculation	1-Nov-13	1-Nov-13

Certificate of Analysis

Report Date: 06-Nov-2013

 Client: **exp Services Inc. (Ottawa)**

Order Date: 31-Oct-2013

Client PO:

Project Description: OTT00214936A

Client ID:	BH10-S2	BH11-S1	-	-
Sample Date:	31-Oct-13	31-Oct-13	-	-
Sample ID:	1344316-01	1344316-02	-	-
MDL/Units	Soil	Soil	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	83.5	78.0	-	-
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General Inorganics

pH	0.05 pH Units	7.22	-	-	-
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Metals

Antimony	1.0 ug/g dry	<1.0	<1.0	-	-
Arsenic	1.0 ug/g dry	5.7	7.6	-	-
Barium	1.0 ug/g dry	498	119	-	-
Beryllium	1.0 ug/g dry	<1.0	<1.0	-	-
Boron	1.0 ug/g dry	6.7	4.8	-	-
Cadmium	0.5 ug/g dry	0.5	0.7	-	-
Chromium	1.0 ug/g dry	26.0	23.0	-	-
Cobalt	1.0 ug/g dry	5.3	6.1	-	-
Copper	1.0 ug/g dry	44.8	61.6	-	-
Lead	1.0 ug/g dry	560	218	-	-
Molybdenum	1.0 ug/g dry	1.6	1.3	-	-
Nickel	1.0 ug/g dry	46.1	35.9	-	-
Selenium	1.0 ug/g dry	<1.0	<1.0	-	-
Silver	0.5 ug/g dry	<0.5	<0.5	-	-
Thallium	1.0 ug/g dry	<1.0	<1.0	-	-
Uranium	1.0 ug/g dry	<1.0	<1.0	-	-
Vanadium	1.0 ug/g dry	28.3	32.1	-	-
Zinc	1.0 ug/g dry	428	375	-	-

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 06-Nov-2013

Client PO:

Project Description: OTT00214936A

Order Date: 31-Oct-2013

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	1.0	ug/g						
Boron	ND	1.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	1.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	1.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	1.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.5	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	1.0	ug/g						
Zinc	ND	1.0	ug/g						

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 06-Nov-2013

Client PO:

Project Description: OTT00214936A

Order Date: 31-Oct-2013

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	8.08	0.05	pH Units	8.07			0.1	10	
Metals									
Antimony	ND	1.0	ug/g dry	ND			0.0	30	
Arsenic	5.13	1.0	ug/g dry	5.65			9.8	30	
Barium	519	10.0	ug/g dry	498			4.1	30	
Beryllium	ND	1.0	ug/g dry	ND			0.0	30	
Boron	6.70	1.0	ug/g dry	6.72			0.4	30	
Cadmium	0.54	0.5	ug/g dry	0.51			6.6	30	
Chromium	26.2	10.0	ug/g dry	26.0			1.1	30	
Cobalt	5.27	1.0	ug/g dry	5.34			1.3	30	
Copper	46.9	10.0	ug/g dry	44.8			4.5	30	
Lead	581	10.0	ug/g dry	560			3.7	30	
Molybdenum	1.64	1.0	ug/g dry	1.61			1.5	30	
Nickel	48.6	10.0	ug/g dry	46.1			5.4	30	
Selenium	ND	1.0	ug/g dry	ND				30	
Silver	ND	0.5	ug/g dry	ND			0.0	30	
Thallium	ND	1.0	ug/g dry	ND				30	
Uranium	ND	1.0	ug/g dry	ND				30	
Vanadium	29.5	10.0	ug/g dry	28.3			4.1	30	
Zinc	447	10.0	ug/g dry	428			4.3	30	
Physical Characteristics									
% Solids	84.5	0.1	% by Wt.	84.1			0.4	25	

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 06-Nov-2013

Client PO:

Project Description: OTT00214936A

Order Date: 31-Oct-2013

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	226		ug/L	ND	90.6	70-130			
Arsenic	229		ug/L	ND	91.6	70-130			
Barium	246		ug/L	ND	98.3	70-130			
Beryllium	232		ug/L	ND	92.6	70-130			
Boron	230		ug/L	ND	92.2	70-130			
Cadmium	234		ug/L	ND	93.8	70-130			
Chromium	239		ug/L	ND	95.5	70-130			
Cobalt	238		ug/L	ND	95.2	70-130			
Copper	241		ug/L	ND	96.4	70-130			
Lead	232		ug/L	ND	92.7	70-130			
Molybdenum	243		ug/L	ND	97.1	70-130			
Nickel	230		ug/L	ND	92.0	70-130			
Selenium	229		ug/L	ND	91.8	70-130			
Silver	228		ug/L	ND	91.2	70-130			
Thallium	244		ug/L	ND	97.5	70-130			
Uranium	247		ug/L	ND	99.0	70-130			
Vanadium	236		ug/L	ND	94.2	70-130			
Zinc	230		ug/L	ND	91.9	70-130			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Client PO:

Project Description: OTT00214936A

Report Date: 06-Nov-2013

Order Date: 31-Oct-2013

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.

P: 1-800-749-1947
E: PARACEL@PARACELLABS.COM

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OTTAWA
300-2319 St. Laurent Blvd.
Ottawa, ON K1G 4J8

MISSISSAUGA
6645 Kitimat Rd. Unit #27
Mississauga, ON L5N 6J3

NIAGARA FALLS
5415 Morning Glory Crt.
Niagara Falls, ON L2J 0A3

SARNIA
123 Christina St. N.
Sarnia, ON N7T 5T7

Client Name: exp Services Inc.	Project Reference: OTT-00214936-1	TAT: ☒ Regular ☐ 3 Day
Contact Name: Mark McCalla / Mark Devlin	Quote #	☐ 2 Day ☐ 1 Day
Address: 100-2650 Queensview Dr. Ottawa	PO #	Date Required:
Telephone: (613) 793 3319	Email Address:	

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☒ 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:		Matrix	Air Volume	# of Containers	Sample Taken		metals (ICP)	pH											
Sample ID/Location Name					Date	Time													
1	BH10-S2	S		3	Oct 31, 2013	10:00 pm	X	X											- 9.50ml + 9.10ml
2	BH11-S1	S		3	Oct 31, 2013	10:00 am	X												↓
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments: meth. vial wasn't needed and can be thrown out. Method of Delivery: Walkin

Relinquished By (Sign): Mark Devlin	Received by Driver/Depot:	Received at Lab: 6:00 PM	Verified By: MC
Relinquished By (Print): Mark Devlin	Date/Time: Oct 31, 2013 11:00	Date/Time: Oct 31, 2013 11:00	Date/Time: Oct 31, 2013 12:23
Date/Time: Oct 31, 2013 / 11:00 am	Temperature: °C	Temperature: 6.8 °C	pH Verified: By: N/A

Certificate of Analysis

exp Services Inc. (Ottawa)

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

Phone: (613) 688-1899
Fax: (613) 225-7337

Client PO:
Project: OTT00214936A
Custody: 11230

Report Date: 14-Nov-2013
Order Date: 11-Nov-2013

Order #: 1346015

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

Paracel ID	Client ID
1346015-01	BH6B-SS1

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 14-Nov-2013

Client PO:

Project Description: OTT00214936A

Order Date: 11-Nov-2013

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	12-Nov-13	14-Nov-13
MOE Metals by ICP-OES, soil Reg 153	based on MOE E3470, ICP-OES	13-Nov-13	13-Nov-13
PHC F1	CWS Tier 1 - P&T GC-FID	12-Nov-13	14-Nov-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	12-Nov-13	14-Nov-13
Solids, %	Gravimetric, calculation	11-Nov-13	11-Nov-13

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 14-Nov-2013

Client PO:

Project Description: OTT00214936A

Order Date: 11-Nov-2013

Client ID:	BH6B-SS1	-	-	-
Sample Date:	08-Nov-13	-	-	-
Sample ID:	1346015-01	-	-	-
MDL/Units	Soil	-	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	87.3	-	-	-
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Metals

Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	3.8	-	-	-
Barium	1.0 ug/g dry	177	-	-	-
Beryllium	1.0 ug/g dry	<1.0	-	-	-
Boron	1.0 ug/g dry	6.1	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	1.0 ug/g dry	21.9	-	-	-
Cobalt	1.0 ug/g dry	10.8	-	-	-
Copper	1.0 ug/g dry	55.6	-	-	-
Lead	1.0 ug/g dry	19.8	-	-	-
Molybdenum	1.0 ug/g dry	1.1	-	-	-
Nickel	1.0 ug/g dry	58.4	-	-	-
Selenium	1.0 ug/g dry	<1.0	-	-	-
Silver	0.5 ug/g dry	<0.5	-	-	-
Thallium	1.0 ug/g dry	<1.0	-	-	-
Uranium	1.0 ug/g dry	<1.0	-	-	-
Vanadium	1.0 ug/g dry	24.3	-	-	-
Zinc	1.0 ug/g dry	82.3	-	-	-

Volatiles

Benzene	0.02 ug/g dry	<0.02	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05	-	-	-
Toluene-d8	Surrogate	85.4%	-	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g dry	<7	-	-	-
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)**

Report Date: 14-Nov-2013

Client PO:

Project Description: OTT00214936A

Order Date: 11-Nov-2013

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						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	1.0	ug/g						
Boron	ND	1.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	1.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	1.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	1.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.5	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	1.0	ug/g						
Zinc	ND	1.0	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	2.65		ug/g		82.9	50-140			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 14-Nov-2013

Client PO:

Project Description: OTT00214936A

Order Date: 11-Nov-2013

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	12	7	ug/g dry	12			0.1	40	
F2 PHCs (C10-C16)	311	4	ug/g dry	99			103.0	30	QR-04
F3 PHCs (C16-C34)	1310	8	ug/g dry	1050			22.5	30	
F4 PHCs (C34-C50)	789	6	ug/g dry	838			6.1	30	
Metals									
Antimony	ND	1.0	ug/g dry	ND			0.0	30	
Arsenic	1.93	1.0	ug/g dry	2.07			6.9	30	
Barium	50.2	1.0	ug/g dry	49.5			1.4	30	
Beryllium	ND	1.0	ug/g dry	ND			0.0	30	
Boron	3.34	1.0	ug/g dry	3.44			2.9	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	13.4	1.0	ug/g dry	13.8			3.3	30	
Cobalt	3.19	1.0	ug/g dry	3.27			2.5	30	
Copper	25.3	1.0	ug/g dry	25.6			1.3	30	
Lead	58.7	1.0	ug/g dry	57.7			1.8	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	6.55	1.0	ug/g dry	6.46			1.3	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	ND	0.5	ug/g dry	ND			0.0	30	
Thallium	ND	1.0	ug/g dry	ND			0.0	30	
Uranium	1.15	1.0	ug/g dry	ND			0.0	30	
Vanadium	17.6	1.0	ug/g dry	18.2			3.4	30	
Zinc	99.1	1.0	ug/g dry	99.4			0.2	30	
Physical Characteristics									
% Solids	84.9	0.1	% by Wt.	69.5			20.0	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND			0.0	50	
Toluene	ND	0.05	ug/g dry	ND			0.0	50	
m,p-Xylenes	0.065	0.05	ug/g dry	0.072			9.4	50	
o-Xylene	ND	0.05	ug/g dry	ND			0.0	50	
Surrogate: Toluene-d8	3.25		ug/g dry	ND	86.1	50-140			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 14-Nov-2013

Client PO:

Project Description: OTT00214936A

Order Date: 11-Nov-2013

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	207	7	ug/g	ND	103	80-120			
F2 PHCs (C10-C16)	82	4	ug/g	ND	90.9	80-120			
F3 PHCs (C16-C34)	1220	8	ug/g	1050	78.1	60-140			
F4 PHCs (C34-C50)	867	6	ug/g	838	19.4	60-140			QM-06
Metals									
Antimony	212		ug/L	18.7	77.2	70-130			
Arsenic	265		ug/L	41.4	89.6	70-130			
Barium	1180		ug/L	990	76.0	70-130			
Beryllium	204		ug/L	0.18	81.6	70-130			
Boron	269		ug/L	68.7	80.1	70-130			
Cadmium	204		ug/L	ND	81.8	70-130			
Chromium	465		ug/L	277	75.3	70-130			
Cobalt	256		ug/L	65.4	76.2	70-130			
Copper	704		ug/L	512	77.0	70-130			
Lead	1330		ug/L	1150	72.0	70-130			
Molybdenum	199		ug/L	7.56	76.5	70-130			
Nickel	309		ug/L	129	71.9	70-130			
Selenium	191		ug/L	ND	76.5	70-130			
Silver	197		ug/L	ND	79.0	70-130			
Thallium	183		ug/L	ND	73.2	70-130			
Uranium	226		ug/L	ND	90.3	70-130			
Vanadium	551		ug/L	364	75.0	70-130			
Zinc	228		ug/L	ND	91.2	70-130			
Volatiles									
Benzene	2.44	0.02	ug/g	ND	61.0	60-130			
Ethylbenzene	3.53	0.05	ug/g	ND	88.3	60-130			
Toluene	3.93	0.05	ug/g	ND	98.1	60-130			
m,p-Xylenes	8.10	0.05	ug/g	ND	101	60-130			
o-Xylene	4.03	0.05	ug/g	ND	101	60-130			
Surrogate: Toluene-d8	2.68		ug/g		83.7	50-140			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Client PO:

Project Description: OTT00214936A

Report Date: 14-Nov-2013

Order Date: 11-Nov-2013

Qualifier Notes:

QC Qualifiers :

QM-06 : Due to noted non-homogeneity of the QC sample matrix, the spike recoveries were out side the accepted range. Batch data accepted based on other QC.

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.

Client Name: EXP	Project Reference: 011-00214936-A	TAT: ☒ Regular ☐ 3 Day ☐ 2 Day ☐ 1 Day Date Required: _____
Contact Name: MARK MCCULLAGH / MARK DEVLIN	Quote #	
Address: 100-2650 Queensview Dr, Ottawa	PO #	
Telephone: 613 688 1829	Email Address: MARK.MCCULLAGH@EXP.COM Daniel Mark.Deulin@exp.com	

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ 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

Parcel Order Number: 1346015		Matrix	Air Volume	# of Containers	Sample Taken		PHC	BTEx	Metals, ICP										
Sample ID/Location Name					Date	Time													
1	BH 68-SS 1	S		2	Nov 8/13	7:45am	X	X	X										- 850ml + 1 vial
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:	Method of Delivery: Parcel Courier
-----------	---

Relinquished By (Sign): [Signature]	Received by Driver/Depot: [Signature]	Received at Lab: SUNEZ PORN	Verified By: [Signature]
Relinquished By (Print): Daniel Clark	Date/Time: 11/11/13 9:16AM	Date/Time: NOV 11 2013 09:45	Date/Time: NOV 11 2013 9:16
Date/Time: NOV 11/13 9:30AM	Temperature: _____ °C	Temperature: 3.2 °C	pH Verified ☐ By: _____

Certificate of Analysis

exp Services Inc. (Ottawa)

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

Phone: (613) 688-1899
Fax: (613) 225-7337

Client PO:
Project: OTT00214936A0
Custody: 12925

Report Date: 18-Nov-2013
Order Date: 14-Nov-2013

Order #: 1346314

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

Paracel ID	Client ID
1346314-01	MW13-1a
1346314-02	MW13-1b
1346314-03	MW13-2
1346314-04	MW13-3
1346314-05	MW13-4
1346314-06	MW13-6
1346314-07	MW13-9
1346314-08	MW13-60
1346314-09	Trip Blank
1346314-10	Trip Spike

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of AnalysisClient: **exp Services Inc. (Ottawa)**

Client PO:

Project Description: OTT00214936A0

Report Date: 18-Nov-2013

Order Date: 14-Nov-2013

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	15-Nov-13	16-Nov-13
PHC F1	CWS Tier 1 - P&T GC-FID	15-Nov-13	16-Nov-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	15-Nov-13	16-Nov-13
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	15-Nov-13	16-Nov-13

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5415 Morning Glory Crt.
Niagara Falls, ON L2J 0A3

SARNIA
123 Christina St. N.
Sarnia, ON N7T 5T7

Certificate of Analysis

Report Date: 18-Nov-2013

 Client: **exp Services Inc. (Ottawa)**

Order Date: 14-Nov-2013

Client PO:

Project Description: OTT00214936A0

Client ID:	MW13-1a	MW13-1b	MW13-2	MW13-3
Sample Date:	14-Nov-13	14-Nov-13	14-Nov-13	14-Nov-13
Sample ID:	1346314-01	1346314-02	1346314-03	1346314-04
MDL/Units	Water	Water	Water	Water

Volatiles

Acetone	5.0 ug/L	<5.0	159	142	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	0.7	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Chloroform	0.5 ug/L	<0.5	3.7	3.1	<0.5
Chloromethane	3.0 ug/L	<3.0	<3.0	<3.0	<3.0
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	7.5	3.0	<0.5
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	<10.0	<10.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0

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 Niagara Falls, ON L2J 0A3

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 Sarnia, ON N7T 5T7

Certificate of Analysis

Report Date: 18-Nov-2013

Order Date: 14-Nov-2013

Client: **exp Services Inc. (Ottawa)**

Client PO:

Project Description: OTT00214936A0

	Client ID: Sample Date: Sample ID:	MW13-1a 14-Nov-13 1346314-01 Water	MW13-1b 14-Nov-13 1346314-02 Water	MW13-2 14-Nov-13 1346314-03 Water	MW13-3 14-Nov-13 1346314-04 Water
	MDL/Units				
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	2.9	4.4	<0.5
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	8.1	3.3	<0.5
o-Xylene	0.5 ug/L	<0.5	2.1	1.0	<0.5
Xylenes, total	0.5 ug/L	<0.5	10.2	4.3	<0.5
4-Bromofluorobenzene	Surrogate	113%	105%	106%	107%
Dibromofluoromethane	Surrogate	97.2%	100%	102%	98.9%
Toluene-d8	Surrogate	105%	106%	105%	105%

Hydrocarbons

F1 PHCs (C6-C10)	25 ug/L	<25	102	<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

Certificate of Analysis

Report Date: 18-Nov-2013

Client: **exp Services Inc. (Ottawa)**

Order Date: 14-Nov-2013

Client PO:

Project Description: OTT00214936A0

	Client ID:	MW13-4	MW13-6	MW13-9	MW13-60
	Sample Date:	14-Nov-13	14-Nov-13	14-Nov-13	14-Nov-13
	Sample ID:	1346314-05	1346314-06	1346314-07	1346314-08
	MDL/Units	Water	Water	Water	Water
Volatiles					
Acetone	5.0 ug/L	179	<5.0	22.3	<5.0
Benzene	0.5 ug/L	1.0	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloromethane	3.0 ug/L	<3.0	<3.0	<3.0	<3.0
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	8.7	<0.5	0.6	<0.5
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	<10.0	<10.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0

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Sarnia, ON N7T 5T7

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 18-Nov-2013

Order Date: 14-Nov-2013

Client PO:

Project Description: OTT00214936A0

	Client ID: Sample Date: Sample ID:	MW13-4 14-Nov-13 1346314-05 Water	MW13-6 14-Nov-13 1346314-06 Water	MW13-9 14-Nov-13 1346314-07 Water	MW13-60 14-Nov-13 1346314-08 Water
	MDL/Units				
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	8.2	<0.5	0.6	<0.5
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	9.7	<0.5	0.7	<0.5
o-Xylene	0.5 ug/L	3.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	13.2	<0.5	0.9	<0.5
4-Bromofluorobenzene	Surrogate	105%	106%	106%	107%
Dibromofluoromethane	Surrogate	100%	96.8%	98.8%	97.9%
Toluene-d8	Surrogate	106%	107%	106%	107%

Hydrocarbons

F1 PHCs (C6-C10)	25 ug/L	156	<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	156	<125	<125	<125
F3 + F4 PHCs	200 ug/L	<200	<200	<200	<200

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 18-Nov-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 14-Nov-2013

	Client ID:	Trip Blank	Trip Spike	-	-
	Sample Date:	13-Nov-13	13-Nov-13	-	-
	Sample ID:	1346314-09	1346314-10	-	-
	MDL/Units	Water	Water	-	-

Volatiles

Benzene	0.5 ug/L	<0.5	35.4 [1]	-	-
Ethylbenzene	0.5 ug/L	<0.5	37.0 [1]	-	-
Toluene	0.5 ug/L	<0.5	38.1 [1]	-	-
m,p-Xylenes	0.5 ug/L	<0.5	75.7 [1]	-	-
o-Xylene	0.5 ug/L	<0.5	43.4 [1]	-	-
Xylenes, total	0.5 ug/L	<0.5	119 [1]	-	-
Toluene-d8	Surrogate	107%	77.2% [1]	-	-

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 18-Nov-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 14-Nov-2013

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									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dibromoethane	ND	0.2	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloroethylene, total	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,2,4-Trichlorobenzene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	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: 4-Bromofluorobenzene	90.2		ug/L		113	50-140			
Surrogate: Dibromofluoromethane	73.1		ug/L		91.3	50-140			
Surrogate: Toluene-d8	91.6		ug/L		115	50-140			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 18-Nov-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 14-Nov-2013

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	91.6		ug/L		115	50-140			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Client PO:

Project Description: OTT00214936A0

Report Date: 18-Nov-2013

Order Date: 14-Nov-2013

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									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	0.70	0.5	ug/L	0.92			27.2	30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroethane	ND	1.0	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dibromoethane	ND	0.2	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND			0.0	30	
1,2,4-Trichlorobenzene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	0.70	0.5	ug/L	0.76			8.2	30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	85.4		ug/L	ND	107	50-140			
Surrogate: Dibromofluoromethane	79.2		ug/L	ND	99.1	50-140			
Surrogate: Toluene-d8	86.5		ug/L	ND	108	50-140			
Benzene	0.70	0.5	ug/L	0.92			27.2	30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND			0.0	30	
m,p-Xylenes	0.70	0.5	ug/L	0.76			8.2	30	
o-Xylene	ND	0.5	ug/L	ND				30	

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 18-Nov-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 14-Nov-2013

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: Toluene-d8	86.5		ug/L	ND	108	50-140			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 18-Nov-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 14-Nov-2013

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1960	25	ug/L	ND	97.8	68-117			
F2 PHCs (C10-C16)	1770	100	ug/L	ND	98.2	60-140			
F3 PHCs (C16-C34)	3540	100	ug/L	ND	95.1	60-140			
F4 PHCs (C34-C50)	2280	100	ug/L	ND	92.0	60-140			
Volatiles									
Acetone	68.7	5.0	ug/L	ND	68.7	50-140			
Benzene	37.9	0.5	ug/L	ND	94.7	60-130			
Bromodichloromethane	35.2	0.5	ug/L	ND	88.1	60-130			
Bromoform	34.3	0.5	ug/L	ND	85.7	60-130			
Bromomethane	21.2	0.5	ug/L	ND	52.9	50-140			
Carbon Tetrachloride	35.0	0.2	ug/L	ND	87.5	60-130			
Chlorobenzene	32.7	0.5	ug/L	ND	81.8	60-130			
Chloroethane	36.2	1.0	ug/L	ND	90.6	50-140			
Chloroform	35.2	0.5	ug/L	ND	87.9	60-130			
Chloromethane	22.9	3.0	ug/L	ND	57.3	50-140			
Dibromochloromethane	32.4	0.5	ug/L	ND	81.0	60-130			
Dichlorodifluoromethane	23.4	1.0	ug/L	ND	58.4	50-140			
1,2-Dibromoethane	32.9	0.2	ug/L	ND	82.3	60-130			
1,2-Dichlorobenzene	34.4	0.5	ug/L	ND	85.9	60-130			
1,3-Dichlorobenzene	35.0	0.5	ug/L	ND	87.4	60-130			
1,4-Dichlorobenzene	36.6	0.5	ug/L	ND	91.4	60-130			
1,1-Dichloroethane	37.9	0.5	ug/L	ND	94.8	60-130			
1,2-Dichloroethane	34.4	0.5	ug/L	ND	86.0	60-130			
1,1-Dichloroethylene	33.9	0.5	ug/L	ND	84.7	60-130			
cis-1,2-Dichloroethylene	36.1	0.5	ug/L	ND	90.3	60-130			
trans-1,2-Dichloroethylene	33.7	0.5	ug/L	ND	84.4	60-130			
1,2-Dichloropropane	36.3	0.5	ug/L	ND	90.8	60-130			
cis-1,3-Dichloropropylene	35.5	0.5	ug/L	ND	88.8	60-130			
trans-1,3-Dichloropropylene	37.5	0.5	ug/L	ND	93.8	60-130			
Ethylbenzene	43.0	0.5	ug/L	ND	107	60-130			
Hexane	36.7	1.0	ug/L	ND	91.7	60-130			
Methyl Ethyl Ketone (2-Butanone)	98.4	5.0	ug/L	ND	98.4	50-140			
Methyl Butyl Ketone (2-Hexanone)	91.9	10.0	ug/L	ND	91.9	50-140			
Methyl Isobutyl Ketone	90.4	5.0	ug/L	ND	90.4	50-140			
Methyl tert-butyl ether	86.9	2.0	ug/L	ND	86.9	50-140			
Methylene Chloride	30.9	5.0	ug/L	ND	77.3	60-130			
Styrene	35.5	0.5	ug/L	ND	88.7	60-130			
1,1,1,2-Tetrachloroethane	33.2	0.5	ug/L	ND	82.9	60-130			
1,1,2,2-Tetrachloroethane	35.7	0.5	ug/L	ND	89.3	60-130			
Tetrachloroethylene	32.9	0.5	ug/L	ND	82.2	60-130			
Toluene	36.6	0.5	ug/L	ND	91.6	60-130			
1,2,4-Trichlorobenzene	35.4	0.5	ug/L	ND	88.6	60-130			
1,1,1-Trichloroethane	33.7	0.5	ug/L	ND	84.2	60-130			
1,1,2-Trichloroethane	35.3	0.5	ug/L	ND	88.2	60-130			
Trichloroethylene	33.1	0.5	ug/L	ND	82.8	60-130			
Trichlorofluoromethane	33.8	1.0	ug/L	ND	84.6	60-130			
1,3,5-Trimethylbenzene	30.8	0.5	ug/L	ND	77.1	60-130			
Vinyl chloride	29.9	0.5	ug/L	ND	74.8	50-140			
m,p-Xylenes	68.8	0.5	ug/L	ND	86.0	60-130			

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Niagara Falls, ON L2J 0A3

SARNIA
123 Christina St. N.
Sarnia, ON N7T 5T7

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 18-Nov-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 14-Nov-2013

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	36.1	0.5	ug/L	ND	90.3	60-130			
Surrogate: 4-Bromofluorobenzene	75.0		ug/L		93.7	50-140			
Benzene	37.9	0.5	ug/L	ND	94.7	60-130			
Ethylbenzene	43.0	0.5	ug/L	ND	107	60-130			
Toluene	36.6	0.5	ug/L	ND	91.6	60-130			
m,p-Xylenes	68.8	0.5	ug/L	ND	86.0	60-130			
o-Xylene	36.1	0.5	ug/L	ND	90.3	60-130			

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Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Client PO:

Project Description: OTT00214936A0

Report Date: 18-Nov-2013

Order Date: 14-Nov-2013

Qualifier Notes:

Sample Qualifiers :

- 1 : VOC Trip Spike prepared at 40 ug/L for all parameters, except for m/p-Xylene which is at 80 ug/L and ketones at 100 ug/L.

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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SARNIA
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Sarnia, ON N7T 5T7

Client Name: <u>EXP Services Inc.</u>	Project Reference: <u>OTT-00214936-A0.</u>	TAT: ☒ Regular ☐ 3 Day ☐ 2 Day ☐ 1 Day Date Required: _____
Contact Name: <u>Mark McCalla</u>	Quote # _____	
Address: <u>2650 Queensview Drive, Ottawa</u>	PO # _____	
Telephone: <u>613-688-1899</u>	Email Address: <u>mark.mccalla@exp.com.</u>	

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ 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

Parcel Order Number:					Matrix	Air Volume	# of Containers	Sample Taken		PHC (f, f _h)	VOC	BTEX								
Sample ID/Location Name								Date	Time											
1	MW13-1a					GW		3	14 Nov 2013		X	X								
2	MW13-1b										X	X								
3	MW13-2										X	X								
4	MW13-3										X	X								
5	MW13-4										X	X								
6	MW13-6										X	X								
7	MW13-9										X	X								
8	MW13-60					✓		✓			X	X								
9	Trip blank					0		1						X						
10	Trip spike					0		1						X						

Comments:

Method of Delivery:

Walkin

Relinquished By (Sign): <u>[Signature]</u>	Received by Driver/Depot:	Received at Lab: <u>M/C [Signature]</u>	Verified By: <u>M/C [Signature]</u>
Relinquished By (Print): <u>DARRAGH KILROY</u>	Date/Time: _____	Date/Time: <u>Nov 14/13 5:00</u>	Date/Time: <u>Nov 14/13 5:36</u>
Date/Time: <u>14 Nov 2013 17:00</u>	Temperature: _____ °C	Temperature: <u>9.3</u> °C	pH Verified [] By: <u>N/A</u>

Certificate of Analysis

exp Services Inc. (Ottawa)

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

Phone: (613) 688-1899
Fax: (613) 225-7337

Client PO:
Project: OTT00214936A0
Custody: 12815

Report Date: 25-Nov-2013
Order Date: 19-Nov-2013

Order #: 1347114

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

Paracel ID	Client ID
1347114-01	BH18
1347114-02	BH23

Approved By:



Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Any use of these results implies your agreement that our total liability in connection with this work, however arising shall be limited to the amount paid by you for this work, and that our employees or agents shall not under circumstances be liable to you in connection with this work

Certificate of AnalysisClient: **exp Services Inc. (Ottawa)**

Client PO:

Project Description: OTT00214936A0

Report Date: 25-Nov-2013

Order Date: 19-Nov-2013

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	20-Nov-13	22-Nov-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	23-Nov-13	23-Nov-13
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	20-Nov-13	22-Nov-13

Certificate of Analysis

Report Date: 25-Nov-2013

Client: **exp Services Inc. (Ottawa)**

Order Date: 19-Nov-2013

Client PO:

Project Description: OTT00214936A0

Client ID:	BH18	BH23	-	-
Sample Date:	19-Nov-13	19-Nov-13	-	-
Sample ID:	1347114-01	1347114-02	-	-
MDL/Units	Water	Water	-	-

Volatiles

Acetone	5.0 ug/L	<5.0	<5.0	-	-
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
Chloroethane	1.0 ug/L	<1.0	<1.0	-	-
Chloroform	0.5 ug/L	<0.5	<0.5	-	-
Chloromethane	3.0 ug/L	<3.0	<3.0	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Hexane	1.0 ug/L	<1.0	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	-

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Certificate of Analysis

Report Date: 25-Nov-2013

Order Date: 19-Nov-2013

 Client: **exp Services Inc. (Ottawa)**

Client PO:

Project Description: OTT00214936A0

	Client ID: Sample Date: Sample ID:	BH18 19-Nov-13 1347114-01 Water	BH23 19-Nov-13 1347114-02 Water	-	-
	MDL/Units				
Styrene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	-	-
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	-	-
4-Bromofluorobenzene	Surrogate	119%	118%	-	-
Dibromofluoromethane	Surrogate	99.5%	99.1%	-	-
Toluene-d8	Surrogate	120%	114%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	25 ug/L	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-
F1 + F2 PHCs	125 ug/L	<125	<125	-	-
F3 + F4 PHCs	200 ug/L	<200	<200	-	-

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 25-Nov-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 19-Nov-2013

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									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dibromoethane	ND	0.2	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloroethylene, total	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,2,4-Trichlorobenzene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	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: 4-Bromofluorobenzene	92.8		ug/L		116	50-140			
Surrogate: Dibromofluoromethane	78.6		ug/L		98.2	50-140			
Surrogate: Toluene-d8	92.4		ug/L		115	50-140			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 25-Nov-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 19-Nov-2013

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									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroethane	ND	1.0	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dibromoethane	ND	0.2	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	44.1	0.5	ug/L	50.0			12.7	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	46.0	0.5	ug/L	52.1			12.4	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			0.0	30	
trans-1,2-Dichloroethylene	0.56	0.5	ug/L	0.63			11.8	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,2,4-Trichlorobenzene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	59.8	0.5	ug/L	67.8			12.7	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	1.58	0.5	ug/L	1.80			13.0	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND				30	
Vinyl chloride	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: 4-Bromofluorobenzene	92.0		ug/L	ND	115	50-140			
Surrogate: Dibromofluoromethane	81.1		ug/L	ND	101	50-140			
Surrogate: Toluene-d8	92.2		ug/L	ND	115	50-140			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 25-Nov-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 19-Nov-2013

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	2100	25	ug/L	ND	105	68-117			
F2 PHCs (C10-C16)	1240	100	ug/L	ND	68.8	60-140			
F3 PHCs (C16-C34)	2510	100	ug/L	ND	67.5	60-140			
F4 PHCs (C34-C50)	1520	100	ug/L	ND	61.3	60-140			
Volatiles									
Acetone	68.8	5.0	ug/L	ND	68.8	50-140			
Benzene	50.4	0.5	ug/L	ND	126	60-130			
Bromodichloromethane	41.9	0.5	ug/L	ND	105	60-130			
Bromoform	37.8	0.5	ug/L	ND	94.4	60-130			
Bromomethane	34.6	0.5	ug/L	ND	86.4	50-140			
Carbon Tetrachloride	38.0	0.2	ug/L	ND	95.0	60-130			
Chlorobenzene	40.0	0.5	ug/L	ND	99.9	60-130			
Chloroethane	26.5	1.0	ug/L	ND	66.3	50-140			
Chloroform	46.8	0.5	ug/L	ND	117	60-130			
Chloromethane	30.8	3.0	ug/L	ND	77.0	50-140			
Dibromochloromethane	36.7	0.5	ug/L	ND	91.8	60-130			
Dichlorodifluoromethane	27.4	1.0	ug/L	ND	68.4	50-140			
1,2-Dibromoethane	41.0	0.2	ug/L	ND	102	60-130			
1,2-Dichlorobenzene	47.8	0.5	ug/L	ND	119	60-130			
1,3-Dichlorobenzene	44.2	0.5	ug/L	ND	110	60-130			
1,4-Dichlorobenzene	45.2	0.5	ug/L	ND	113	60-130			
1,1-Dichloroethane	49.5	0.5	ug/L	ND	124	60-130			
1,2-Dichloroethane	41.0	0.5	ug/L	ND	102	60-130			
1,1-Dichloroethylene	29.1	0.5	ug/L	ND	72.7	60-130			
cis-1,2-Dichloroethylene	50.3	0.5	ug/L	ND	126	60-130			
trans-1,2-Dichloroethylene	30.0	0.5	ug/L	ND	75.0	60-130			
1,2-Dichloropropane	51.0	0.5	ug/L	ND	127	60-130			
cis-1,3-Dichloropropylene	42.6	0.5	ug/L	ND	106	60-130			
trans-1,3-Dichloropropylene	38.6	0.5	ug/L	ND	96.6	60-130			
Ethylbenzene	40.5	0.5	ug/L	ND	101	60-130			
Hexane	36.1	1.0	ug/L	ND	90.3	60-130			
Methyl Ethyl Ketone (2-Butanone)	127	5.0	ug/L	ND	127	50-140			
Methyl Butyl Ketone (2-Hexanone)	112	10.0	ug/L	ND	112	50-140			
Methyl Isobutyl Ketone	114	5.0	ug/L	ND	114	50-140			
Methyl tert-butyl ether	91.3	2.0	ug/L	ND	91.3	50-140			
Methylene Chloride	34.6	5.0	ug/L	ND	86.6	60-130			
Styrene	43.5	0.5	ug/L	ND	109	60-130			
1,1,1,2-Tetrachloroethane	35.5	0.5	ug/L	ND	88.8	60-130			
1,1,2,2-Tetrachloroethane	41.0	0.5	ug/L	ND	102	60-130			
Tetrachloroethylene	38.9	0.5	ug/L	ND	97.2	60-130			
Toluene	43.6	0.5	ug/L	ND	109	60-130			
1,2,4-Trichlorobenzene	42.1	0.5	ug/L	ND	105	60-130			
1,1,1-Trichloroethane	38.7	0.5	ug/L	ND	96.7	60-130			
1,1,2-Trichloroethane	49.8	0.5	ug/L	ND	125	60-130			
Trichloroethylene	43.3	0.5	ug/L	ND	108	60-130			
Trichlorofluoromethane	28.6	1.0	ug/L	ND	71.4	60-130			
1,3,5-Trimethylbenzene	41.5	0.5	ug/L	ND	104	60-130			
Vinyl chloride	30.4	0.5	ug/L	ND	76.1	50-140			
m,p-Xylenes	81.2	0.5	ug/L	ND	101	60-130			

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Niagara Falls, ON L2J 0A3

SARNIA
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Sarnia, ON N7T 5T7

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Report Date: 25-Nov-2013

Client PO:

Project Description: OTT00214936A0

Order Date: 19-Nov-2013

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	42.1	0.5	ug/L	ND	105	60-130			
Surrogate: 4-Bromofluorobenzene	85.3		ug/L		107	50-140			

Certificate of Analysis

Client: **exp Services Inc. (Ottawa)**

Client PO:

Project Description: OTT00214936A0

Report Date: 25-Nov-2013

Order Date: 19-Nov-2013

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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Client Name: EXP	Project Reference: OTT-00214936-A0	TAT: ☒ Regular ☐ 3 Day
Contact Name: Mark McCalla	Quote #	☐ 2 Day ☐ 1 Day
Address: 2650 Queensview Drive	PO #	Date Required:
Telephone: 613-688-1899	Email Address: mark.mccalla@exp.com	

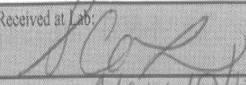
Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

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:		Matrix	Air Volume	# of Containers	Sample Taken		PHC (F ₁ -F ₄)	VOC											
Sample ID/Location Name					Date	Time													
1	BH18	GV		3	19 Nov 2013		X	X											
2	BH23	↓		↓	↓		X	X											
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:	Method of Delivery: Walk-in
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Relinquished By (Sign): 	Received by Driver/Depot: SUNDEPORN	Received at Lab: 	Verified By: M/C
Relinquished By (Print): DARRAGH KILROY	Date/Time: Nov 19, 2013 09:38	Date/Time: Nov 19/13	Date/Time: Nov 19/13 4:38
Date/Time: 19 Nov 2013 12:35 pm	Temperature: 9.9 °C	Temperature: 8.3 °C	pH Verified [] By: N/A