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Phase II-Environmental Site Assessment

333 Montreal Road
Ottawa, Ontario

Prepared For

The Salvation Army

January 11, 2017

Report: PE3908-2

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EXECUTIVE SUMMARY

Assessment

A Phase II - Environmental Site Assessment (ESA) was conducted for 333 Montreal Road, in the City of Ottawa, Ontario. The purpose of the Phase II-ESA was to address the APECs identified in the Phase I-ESA conducted for the site.

Soil

Seven (7) boreholes were advanced on the property, two (2) of which were instrumented with groundwater monitoring wells. Previous investigations conducted by other consultants have also included the placement of boreholes (some with groundwater monitoring wells) as well.

Five (5) soil/fill samples collected during the Phase II-ESA were submitted for a combination of metals, PAHs, PHCs and VOCs. Analytical test results determined the presence of elevated concentrations of PAHs and lead, exceeding the applicable site standards for the property. The exceedances were noted within a specific fill layer located across the majority of the parking lot area of the site. The impacted fill material consisted of brown silty sand with traces of demolition debris (concrete, brick, glass, etc.). The thickness of the impacted fill material was found to range between 0.97 m and 1.74 m.

Groundwater

Groundwater samples were collected from the two (2) groundwater monitoring wells installed during the Phase II-ESA, and an additional two (2) groundwater samples were collected from wells installed previously. The groundwater samples were submitted for analysis of VOCs, PHCs and/or PAHs. A review of the most recent analytical data from previous reports was also conducted. None of the analytical test parameters were found to exceed the site standards for the property. No contaminated groundwater was identified on site.

Recommendations

Remediation Program

Soil/Fill

All contaminated fill material should be removed from the property. The most economical time to remove the impacted fill would be in conjunction with the site redevelopment. Any impacted soil/fill removed from the site will require disposal at an approved waste disposal facility. A leachate analysis in accordance with Ontario Regulation (O.Reg.) 347/558 must be conducted prior to disposal at a licensed waste disposal facililty. It is recommended that Paterson personnel be present onsite during the soil excavation program, to direct excavation activities in the areas where impacted material has been identified or is expected to exist.

Based on our current information, the deleterious fill layer appears to range in thickness from 0.97 m to 1.74 m (1.22 m on average) and covers the majority of the parking lot area. The volume of the deleterious fill is estimated to range from approximately 4,900 m^3 to 5,500 m^3.

Groundwater Monitoring Wells

If the groundwater monitoring wells on the property are not going to by used in the future, they must be decommissioned according to Ontario Regulation 903-Wells. Further information in this regard can be provided upon request.

1.0 INTRODUCTION

At the request of The Salvation Army, Paterson Group Inc. (Paterson) conducted a Phase II - Environmental Site Assessment (ESA) of the property located at 333 Montreal Road, in the City of Ottawa, Ontario. The purpose of the Phase II-ESA was to address the areas of potential environmental concern (APEC) identified in the Phase I-ESA conducted by Paterson in December 2016.

This report has been prepared specifically and solely for the above noted project which is described herein. It contains all of our findings and results of the environmental conditions at this site.

1.1 Site Description

Address:	333 Montreal Road, Ottawa, Ontario.
Parcel Identification Number:	04232-0011 04232-0020 04232-0021 04232-0022 04232-0023
Legal Description:	Lots 25 to 31 (both inclusive), Lot 35, 40 to 46 (both inclusive), Part of 36, Part of 47 and 48, Part of Reginald Street (Closed by Judge's Order Inst. NS47356), Registered Plan 346, City of Ottawa

Site Description:

Configuration/Area:	Irregular / 0.76 ha (approximate).
Zoning:	Traditional mainstreet.
Current Use:	The site is currently used as a motel, a tavern (basement) and a Salvation Army Thrift Store. A vacant commercial unit is located in the southeast corner of the building.
Services:	The site and neighborhood are serviced with municipal utilities.

1.2 Property Ownership

The registered owner of the property is 1278311 Ontario Ltd, represented by Mr. Lou Malouf. Paterson was engaged to conduct this Phase II – ESA by Ms. Michaela Jones with The Salvation Army, the prospective buyers of the site. Ms. Jones can be reached by telephone at (416) 422-6155.

1.3 Current and Proposed Future Uses

The site is occupied by a single storey motel and commercial retail space, with a tavern in a basement below.

The proposed development will consist of several buildings which will be utilized for various community programs. Based on the intended use, there will be no change in land use to a more sensitive use as a result of the proposed redevelopment.

1.4 Applicable Site Condition Standard

The remediation standards for the subject property were obtained from Table 3 of the document entitled “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”, prepared by the Ontario Ministry of Environment and Climate Change (MOECC), April 15, 2011. The MOECC Table 3 Standards are based on the following considerations:

- ❏ Coarse grained soil conditions.
- ❏ Surface soil and groundwater conditions.
- ❏ Full depth conditions.
- ❏ Non-potable groundwater situation.
- ❏ Community (same as commercial) land use.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The portion of the subject site not occupied by the subject buildings is covered with asphaltic concrete or grass.

Catch basins were present on the subject property, which discharge to the municipality's combined storm sewer system. At the time of the site visit, ice and snow were observed on the property.

The site topography is relatively flat, however certain areas slope towards the on-site catch basins. The regional topography slopes down to the north

2.2 Past Investigations

The following environmental report was reviewed as a part of this assessment:

- Phase II Environmental Site Assessment, 333 Montreal Road, Ottawa, Ontario, prepared by DST Consulting Engineers, dated July, 2016.

  A Phase II-ESA was conducted on the subject property in July 2016 by DST Consulting Engineers. The above Phase II-ESA was based on information collected from prior Phase II-ESA investigations, conducted by DST and Golder Asssociates between 1997 and 2013.

  Two (2) environmental concerns were identified prior to the Phase II-ESA; a former retail fuel outlet in the southwest corner of the subject site, and a former retail fuel outlet adjacent to the southeast corner of the subject site.

  These areas of environmental concern were addressed in previous subsurface investigations, as mentioned above. In 1997, Golder placed five (5) boreholes, four (4) of which were instrumented with groundwater monitoring wells. The boreholes were placed in locations to address both former retail fuel outlets. In 2003, Golder placed one (1) more borehole and six (6) test pits in the southeast corner of the property to address concerns of questionable fill material. Hydrocarbons and polycyclic aromatic hydrocarbons (PAHs) were identified in the soil at concentrations exceeding the applicable site condition standards at the time. Lead had also been identified in the fill material.

As part of DST's 2016 Phase II-ESA, three (3) boreholes were placed on the property, each instrumented with a groundwater monitoring well. Soil samples from the new boreholes were submitted for analysis of petroleum hydrocarbons (PHCs), benzene, toluene, ethylbenzene, xylenes (BTEX), PAHs and lead. All analytical test results were found to be in compliance with the applicable site standards.

Groundwater samples were also collected from the newly installed wells, as well as existing monitoring wells installed during previous investigations (Golder 1997). Exceedances of several PAH parameters and the F2 fraction of PHCs were detected in the water sample from BHMW1-2010 and the F3 PHC fraction in BH97-3.

DST further completed a groundwater monitoring program of these two monitoring wells to assess the groundwater quality over a period of time. Three (3) additional sampling events were conducted at BHMW1-2010 and two (2) were conducted at BH97-3. All analytical parameters from the additional sampling events were found to be in compliance with the site condition standards.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted on December 6 and 15, 2016, and consisted of the placement of seven (7) boreholes (BH1 to BH7). All exterior boreholes, with the exception of two, were advanced using a truck mounted drill rig under the full time supervision of Paterson personnel. Two boreholes were advanced using a portable drilling system. Coring of the bedrock was carried out at BH5 to facilitate the installation of a groundwater monitoring well. A second groundwater monitoring well was installed in BH7. The borehole locations are illustrated on Drawing No. PE3908-3 - Test Hole Location Plan in the Figures section following the text.

3.2 Media Investigated

During the subsurface investigation, soil samples and groundwater samples were obtained and submitted for laboratory analysis. The rationale for sampling and analysing these media is based on the Contaminants of Potential Concern (CPCs) identified during the Phase I-ESA: benzene, ethylbenzene, toluene and xylene (BTEX), PHCs, Volatile Organic Compounds (VOCs), Polycyclic Aromatic Hydrocarbons (PAHs), and metals in the soil and/or groundwater.

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

The Geological Survey of Canada website on the Urban Geology of the National Capital Area was consulted as part of this assessment. Based on the information from Natural Resources Canada, bedrock in the area of the site consists of shale of the Billings Formation, with overburden thickness between 3 and 5 m.

Contaminants of Potential Concern

The following CPCs were identified at the time of the Phase I-ESA:

- Petroleum Hydrocarbons, fractions 1 through 4 - PHCs (F_1-F_4) were selected as CPCs for the Phase I-ESA property based the historical operation of retail fuel outlets in the southwest corner of the property and on the property adjacent to the subject site to the southeast. Gasoline (F_1) and diesel (F_2) are commonly used motor vehicle fuels and diesel-fraction hydrocarbons were commonly used as heating oil. Heavy oils (F_3/F_4) may be present in the form of lubricants and transmission fluids present in vehicles. PHC fractions F3 and F4 were identified in the soils during previous investigations as well as in free or dissolved phase in the groundwater system.

- Volatile Organic Compounds (VOCs) - this suite of parameters includes benzene, toluene, ethylbenzene and xylenes (BTEX) associated with gasoline, as well as solvents associated with automotive de-greasing which are typically toluene-based. These parameters were selected as CPCs for the Phase I-ESA property, due to the presence of a former cleaners located across Montreal Road.

- Polycyclic Aromatic Hydrocarbons (PAHs) - this suite of parameters encompasses various complex hydrocarbons, commonly associated with coal and/or combustion of heavy-fraction hydrocarbons such as hydraulic or crankcase oil. PAHs were selected as a CPC for the site based on the presence of fill material at the subject site. PAHs may be present in the soil matrix or dissolved in site groundwater.

- Metals - this suite of parameters encompasses various metals for which MOECC standards exist. Metals may be present in the soil matrix or dissolved in site groundwater. Metals were selected as a CPCs for the property based on the presence of fill material previously identified as containing elevated metals concentrations.

The mechanisms of contaminant transport within the groundwater system include advection, dispersion and diffusion. Advection and dispersion will be the dominant mechanisms of contaminant transport in soils with higher hydraulic conductivities, such as sands, gravels, silts, some glacial till soils and highly fractured bedrock, whereas diffusion will dominate in soils with lower hydraulic conductivity, such as clays and more competent bedrock.

Existing Buildings and Structures

The site is occupied by a single storey motel and commercial retail space, with a tavern in a basement below.

Water Bodies

No creeks, rivers, streams, lakes or any other water body was identified in the Phase I-ESA study area.

Areas of Natural and Scientific Interest (ANSI)

According to the Ministry of Natural Resources' (MNR) electronic mapping website, the subject property is not listed as an area of natural and scientific interest. Properties located within the 250 m Phase I-ESA study area are also not identified as ANSIs.

Drinking Water Wells

A search of the MOECC's website for all drilled well records within 250 m of the subject site was conducted on December 7, 2016.

The search returned one well record pertaining to a drinking water well located at the southern edge of the study area. The well was reportedly drilled in 1959. Due to the presence of municipal drinking water in the area, it is considered likely that the potable well is no longer in use.

Groundwater Monitoring Wells

In total, 25 well records were identified in the study area. Two (2) monitoring well records were identified on the subject property, Others were located on adjacent properties, and further within the search radius.

Neighbouring Land Use

Neighbouring lands in the Phase I-ESA study area are predominantly used for commercial purposes along Montreal Road and residential purposes to the east, west and north. Twelve potentially contaminating activities (PCAs) were identified within the Phase I-ESA study area at the time of the Phase I-ESA site assessment. Of those, five (5) were considered to be Areas of Potential Environmentl Concern (APECs) to the subject property. Neighbouring land use within the Phase I-ESA study area is depicted on Drawing: PE3908-2 - Surrounding Land Use Plan, provided in the Phase I ESA (2016).

Areas of Potential Environmental Concern and Potentially Contaminating Activities

Potentially contaminating activities identified in the study area, which resulted in areas of potential environmental concern on the subject property at the time of the site assessment, as per Column A of Table 2, from O.Reg.153/04, amended by O.Reg. 296/11 include the following:

Table 1
Areas of Potential Environmental Concern

Area of Potential Environmental Concern (APEC)	Location of APEC on Phase One Property	Potentially Contaminating Activities (PCA)	Location of PCA	Contaminants of Potential concern (CPC)	Media Potentially Impacted (Groundwater Soil and/or Sediment)
Former retail fuel outlet	Southwest corner of property	Item 28 - Gasoline and associated product storage in fixed tanks	On-site	PHC F1-F4, BTEX	Soil, Groundwater
Fill material	Parking lot of property	Item 30 - Importation of fill material of unknown quality	On-site	PHC F1-F4, PAH, Metals (including Hg, Cr VI, Boron HWS)	Soil, Groundwater
Former retail fuel outlet (327 Montreal Road)	Southeast corner of property	Item 28 - Gasoline and associated product storage in fixed tanks	On-site	PHC F1-F4, BTEX	Soil, Groundwater
Former cleaners (330 Montreal Road)	Southern property boundary	Item 37 - Operation of dry cleaning equipment	Off-site	VOCs (including THMs and BTEX)	Groundwater
Former garage (255 Ste. Anne Avenue)	Northwest corner of property	Item 52 - Storage, maintenance, fuelling, and repair of equipment, vehicles, and material used to maintain transportation systems	Off-site	PHC F1-F4, BTEX	Soil, Groundwater

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of the Phase I-ESA, is considered sufficient to conclude that there are areas of potential environmental concern on the subject site and neighbouring properties, which have or have had the potential to impact the subject property. The presence of potentially contaminating activities was confirmed by a variety of independent sources, including in some cases, observations made during the Phase I-ESA site visit.

As such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Impediments

No impediments were encountered at the time of the Phase II-ESA.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was conducted on December 6 and December 15, 2016 and consisted of the placement of five (5) boreholes (BH1 to BH5) within the parking lot area, followed by another two (BH6 and BH7) in the southwest corner and lane way. Groundwater monitoring wells were installed in boreholes BH5 and BH7. The borehole locations are illustrated on Drawing No. PE3908-3 - Test Hole Location Plan. Boreholes BH1 to BH5 were advanced using a truck mounted drill rig, and boreholes BH6 and BH7 using a portable drilling unit, all under the full time supervision of Paterson personnel.

4.2 Soil Sampling

The boreholes were sampled to depths ranging from 3.66 to 5.39 m below ground surface. Bedrock was cored at Borehole BH5. Upon recovery, all samples were immediately sealed in appropriate containers to facilitate the preliminary screening procedure. The depths at which the split spoon samples and rock cores were obtained from the boreholes are shown as "**SS**" and "**RC**", respectively, on the Soil Profile and Test Data sheet in the Appendix.

Soil sampling protocols were followed using the MOECC document titled “Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario”, dated May 1996.

The samples were recovered using a stainless steel split spoon, using protective gloves (changed after each sample). The samples were placed into plastic bags. If significant contamination was encountered, the samples were placed into glass jars. Sampling equipment was washed in soapy water and rinsed with methylhydrate after each split spoon to prevent cross contamination of the samples. Samples were stored in coolers to reduce analyte volatilization during transportation.

4.3 Field Screening Measurements

An MiniRae Photo Ionization Detector (PID) was used to measure the vapour concentrations in the headspace of the soil samples recovered from the boreholes. The instrument is calibrated regularly using hexane. The detection limit is 0.1 ppm, with a precision of +/- 0.1 ppm.

The soil samples recovered from the boreholes were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to room temperature prior to conducting the vapour survey, ensuring consistency of readings between samples.

To measure the soil vapours, the analyser probe was inserted into the nominal headspace above the soil sample. The sample was agitated/manipulated gently as the measurement was taken. The peak reading registered within the first 15 seconds was recorded as the vapour measurement. The parts per million (ppm) scale was used to measure concentrations of organic/combustible vapours.

Vapour readings for the soil samples were measured as high as 12.6 ppm. The vapour readings are not considered to be representative of elevated concentrations of volatile substances. Vapour readings cannot be used to identify the presence of heavier hydrocarbon products such as engine oil. The results of the vapour survey are presented on the Soil Profile and Test Data sheets appended to this report.

4.4 Groundwater Monitoring Well Installations

As part of the Phase II-ESA investigation, the groundwater monitoring well at BH5 was installed on the subject property by George Downing Estate Drilling of Hawkesbury,

Ontario, and the well at BH7 was installed by CCC Geotechnical and Environmental Drilling Ltd., both other under the full-time supervision of Paterson personnel. All of the monitoring wells consisted of 31 mm diameter, Schedule 40 threaded PVC risers and screens. A sand pack consisting of silica sand was placed around the screen and a bentonite seal was placed above the screen to minimize cross-contamination. Monitoring well construction details installed by Paterson are provided in the borehole logs in the Appendix. Groundwater samples were also collected from two additional wells installed by others (BH97-5 and BHMW3-2010).
A summary of monitoring well construction details is provided below in Table 2.

Table 2
Monitoring Well Construction Details

Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH5	59.4	4.8	3.20 - 4.80	2.73 - 4.80	0 - 2.73	Flushmount
BH7	58.85	4.03	2.50 - 4.03	2.10 - 4.03	0 - 2.10	Flushmount
BH97-5	59.31	4.2	2.75 - 4.03	2.60 - 4.03	1.80 - 2.6	Flushmount
BHMW3-2010	59.6	8.4	3.64 - 8.40	3.35 - 8.40	0.05 - 3.35	Flushmount

Notes: ❑ m BGS - metres below ground surface

4.5 Field Measurement of Water Quality Parameters

Prior to groundwater sampling, water quality parameters were measured in the field using a multi-parameter analyzer. Parameters measured in the field included temperature, electrical conductivity, and pH. Wells were purged prior to sampling until at least three well volumes had been removed or until the well was purged dry. Field parameter values prior to sampling are summarized below in Table 3.

Table 3
Field Measurement of Water Quality Parameters (December 20, 2016)

Parameter	BH5-GW1	BH7-GW1	BH97-5	BHMW3-2010
Temperature (°C)	11.7	11.9	10.7	9.7
Electrical Conductivity (µS/cm)	271	441	906	178
pH	7.74	7.3	7.54	7.42

4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MOECC document entitled "Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario", dated May, 1996. Groundwater samples were obtained from the monitoring wells installed in BH5, BH7, BH97-5 and BHMW3-2010 using dedicated sampling equipment as part of this current Phase II-ESA. To ensure low sediment and non-stagnant water was sampled, when possible, approximately three (3) well volumes were purged prior to the collection of groundwater samples. The monitoring wells were also purged after installation, during the field drilling program. Samples were stored in coolers to reduce analyte volatilization during transportation. Details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan in the Appendix.

4.7 Analytical Testing

Paracel Laboratories (Paracel), of Ottawa, Ontario performed the laboratory analysis on the samples submitted for analytical testing as part of the current Phase II-ESA. Paracel is a member of the Standards Council of Canada/Canadian Association for Environmental Analytical Laboratories (SCC/CAEL). Paracel is accredited and certified by SCC/CAEL for specific tests registered with the association. Soil and groundwater samples submitted for analytical testing are presented in Tables 4 and 5 below.

Table 4
Soil Samples Submitted for Analytical Testing - Paterson, 2016

Sample ID	Sample Depth/ Stratigraphic Unit or Screened Interval	Parameters Analyzed				Rationale
		PAH	Metals	PHC - F1-F4	VOC	
BH2-SS2	0.76 - 1.66 m, fill	X	X			Assessment of previously identified fill material
BH3-SS2	0.76 - 1.66 m, fill	X	X			Assessment of previously identified fill material
BH5-SS2	0.76 - 1.66 m, fill	X	X			Assessment of previously identified fill material
BH6-SS7	3.66 - 4.03 m, glacial till			X	X	Assessment of soil in vicinity of former retail fuel outlet
BH7-SS6	3.53 - 3.86 m, glacial till			X	X	Assessment of soil in vicinity of former dry cleaners

Table 5
Groundwater Samples Submitted for Analytical Testing

Sample ID	Sample Depth/ Stratigraphic Unit or Screened Interval	Parameters Analyzed				Rationale
		BTEX PHCs	VOC	Lead	PAH	
Paterson, 2016						
BH5-GW1	screened interval - 3.20 - 4.8 m; Black shale	X	X		X	Assessment of groundwater in APEC of former truck garage
BH7-GW1	screened interval - 2.50 - 4.03 m; peat/glacial till	X	X			Assessment of groundwater in APEC of former drycleaners and former retail fuel outlet
BH97-5-GW1	screened interval - 2.75 - 4.2 m; glacial till/weathered shale	X	X			Assessment of groundwater in APEC of former retail fuel outlet
BHMW3-2012-GW1	screened interval - 3.64 - 8.40 m; glacial till/weathered shale				X	Assessment of groundwater in APEC of fill material
DST, Phase II-ESA (2016)						
BH97-1	screened interval - 1.50 - 4.57 m; fill/shale	X		X	X	Assessment of groundwater in APEC of former retail fuel outlet
BH97-3	screened interval - 2.60 - 5.79 m; Glacial till/shale	X		X	X	Assessment of groundwater in APEC of former retail fuel outlet
BH97-4	screened interval - 2.05 - 5.18 m; peat/glacial till/shale	X		X	X	Assessment of groundwater in APEC of former retail fuel outlet
BHMW1 (2010)	screened interval - 1.47 - 4.60 m; clay/black shale	X		X	X	Assessment of groundwater in APEC of fill material
BHMW2-2010-GWS1	screened interval - 1.70 - 6.70 m; clay/black shale	X		X	X	Assessment of groundwater in APEC of fill material

4.8 Residue Management

Soil cuttings, fluids from equipment cleaning and purge water resulting from Paterson's Phase II-ESA were retained on site.

4.9 Elevation Surveying

Borehole elevations were surveyed using a laser level. Elevations were surveyed relative to the top of spindle of a fire hydrant located at the intersection of Montreal Road and Ste. Anne Avenue. The elevation of the top of spindle is 60.42 metres above sea level (m ASL) based on a survey plan prepared by Annis, O'Sullivan, Vollebekk Ltd. in 2016. The location of the benchmark is shown on Drawing: PE3908-3 - Test Hole Location Plan.

4.10 Quality Assurance and Quality Control Measures

A summary of quality assurance and quality control (QA/AC) measures, including sampling containers, preservation, labelling, handling and custody, equipment cleaning procedures, and field quality control measurements are provided in the Sampling and Analysis Plan in the Appendix.

5.0 REVIEW AND EVALUATION

5.1 Geology

The soil profile encountered at the borehole locations consisted of fill material (mainly sand and gravel, some with demolition debris), followed by peat in some locations, then glactial till over black shale. Weathered shale bedrock was encountered as shallow as 1.9 m below grade. Specific details of the soil profile at the test hole locations can be seen on the Soil Profile and Test Data sheets in the Appendix.

One borehole was cored into bedrock; BH5 was terminated at 4.80 m within black shale. Site stratigraphy is shown on Drawing PE3908-6 - Cross Section A-A'.

5.2 Groundwater Elevations, Flow Direction and Hydraulic Gradient

Groundwater levels were measured on December 20, 2016 using an electronic water level meter. Elevations are relative to the top of fire hydrant spindle located at the corner of Montreal Road and Ste. Anne Avenue. The top of spindle has a geodetic elevation of 60.42 m, as indicated on the survey plan prepared by Annis, O'Sullivan, Vollebekk. Groundwater elevations are summarized below in Table 6.

Table 6
Groundwater Level Measurements

Monitoring Well	Water Level (m below grade)	Water Level Elevation (m ASL)	Screened Interval (m below grade)	Date of Measurement
BH5	2.64	56.76	3.20 - 4.80	December 20, 2016
BH7	1.96	56.89	2.50 - 4.03	December 20, 2016
BH97-5	3.69	55.62	2.75 - 4.20	December 20, 2016
BHMW3-2010	1.42	58.18	3.64 - 8.40	December 20, 2016

The above water level measurements were used to determine groundwater flow direction. The groundwater flow was determined to be in a southern direction, with a hydraulic gradient of 0.02 m/m, as shown on Drawing PE3908-3-Test Hole Location Plan.

5.3 Soil Texture

Based on field soil observations, coarse-grained soil conditions are applicable to the subject site.

5.4 Soil Field Screening

A MiniRae Photoionization Detector was used to measure the combustible vapour concentrations in the headspace of the soil samples recovered from the boreholes. The technical protocol was obtained from Appendix C of the MOECC document titled "Interim Guidelines for the Remediation of Petroleum Contamination at Operating Retail and Private Fuel Outlets in Ontario", dated March 1992.

Soil samples recovered at the time of sampling were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to room temperature prior to conducting the vapour survey, ensuring consistency of readings between samples. To measure the soil vapours, the analyser probe is inserted into the nominal headspace above the soil sample. The sample is agitated/manipulated gently as the measurement is taken. The peak reading registered within the first 15 seconds is recorded as the vapour measurement. The parts per million (ppm) scale is used to measure concentrations of combustible vapours.

Combustible vapour readings for all of the soil samples did not exceed 12.6 ppm. These vapour readings are not considered to be representative of elevated concentrations of highly volatile substances such as gasoline. Vapour readings cannot be used to identify the presence of heavier hydrocarbon products such as engine oil.

The results of the vapour survey are presented on the Soil Profile and Test Data sheets appended to this report.

5.5 Soil Quality

Five (5) soil samples were submitted for analysis as part of the Phase II-ESA. The results of all soil analyses are presented in Tables 7 to 10. Copies of the laboratory certificates of analysis are included in the Appendix.

Table 7
Analytical Test Results - Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MOECC Table 3 Standards Community Land Use (µg/g)
		BH2-SS2	BH3-SS2	BH5-SS2	
Antimony	1.0	nd	nd	nd	40
Arsenic	1.0	11.7	nd	7.2	18
Barium	1.0	203	124	123	670
Beryllium	1.0	nd	nd	nd	8
Boron	1.0	11.8	8.1	12.4	120
Boron available	0.5	1.2	0.6	1.4	2
Cadmium	0.5	0.6	nd	nd	1.9
Chromium	1.0	51.8	19.5	23.9	160
Chromium VI	0.2	nd	nd	nd	8
Cobalt	1.0	7.4	5.8	8.8	80
Copper	1.0	39.8	24.9	38.1	230
Lead	1.0	**664**	**186**	48.9	120
Mercury	0.1	0.6	0.1	nd	3.9
Molybdenum	1.0	nd	nd	2.0	40
Nickel	1.0	23.6	13.3	21.8	270
Selenium	1.0	nd	nd	nd	5.5
Silver	0.5	nd	nd	nd	40
Thallium	1.0	nd	nd	nd	3.3
Uranium	1.0	nd	nd	nd	33
Vanadium	1.0	27.4	32.1	28.5	86
Zinc	1.0	199	126	84.1	340

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (< MDL)
- nt - not tested for this parameter
- **Bold & Underline** values exceed MOECC Table 3 Standards

All metals parameters were detected at concentrations in compliance with the MOECC Table 3 standards with the exception of lead in Samples BH2-SS2 and BH3-SS2.

Table 8
Analytical Test Results - Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MOECC Table 3 Standards Community Land Use (µg/g)
		BH2-SS2	BH3-SS2	BH5-SS2	
Acenaphthene	0 .02	7.46	nd	0.05	96
Acenaphthylene	0 .02	**1.82**	0.12	**0.34**	0.15
Anthracene	0 .02	**16.4**	0.14	0.32	0.67
Benzo[a]anthracene	0 .02	**31.4**	0.27	0.86	0.96
Benzo[a]pyrene	0 .02	**29.6**	**0.35**	**0.92**	0.3
Benzo[b]fluoranthene	0 .02	**31.6**	0.39	**1.07**	0.96
Benzo[g,h,i]perylene	0 .02	**17.0**	0.29	0.57	9.6
Benzo[k]fluoranthene	0 .02	**18.6**	0.21	0.62	0.96
Chrysene	0 .02	**31.6**	0.24	0.90	9.6
Dibenzo[a,h]anthracene	0 .02	**5.14**	0.08	**0.19**	0.1
Fluoranthene	0 .02	**80.6**	0.55	2.04	9.6
Fluorene	0 .02	8.12	0.04	0.09	62
Indeno[1,2,3-pyrene	0 .02	**16.7**	0.27	0.60	0.76
Methylnaphthalene	0 .04	4.32	0.05	0.05	76
Naphthalene	0 .01	4.88	0.02	0.04	9.6
Phenanthrene	0 .02	**65.2**	0.28	0.42	12
Pyrene	0 .02	68.9	0.47	1.74	96

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (< MDL)
- nt - not tested for this parameter
- **Bold & Underline** values exceed MOECC Table 3 Standards

Table 9
Analytical Test Results - Soil
VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g)		MOECC Table 3 Standards Community Land Use (µg/g)
		BH6-SS7	BH7-SS6	
Acetone	0 .50	nd	nd	16
Benzene	0 .02	nd	nd	0.32
Bromodichloromethane	0 .05	nd	nd	18
Bromoform	0 .05	nd	nd	0.61
Bromomethane	0 .05	nd	nd	0.05
Carbon Tetrachloride	0 .05	nd	nd	0.21
Chlorobenzene	0 .05	nd	nd	2.4
Chloroform	0 .05	nd	nd	0.47
Dibromochloromethane	0 .05	nd	nd	13
Dichlorodifluoromethane	0 .05	nd	nd	16
1,2-Dichlorobenzene	0 .05	nd	nd	6.8
1,3-Dichlorobenzene	0 .05	nd	nd	9.6
1,4-Dichlorobenzene	0 .05	nd	nd	0.2
1,1-Dichloroethylene	0 .05	nd	nd	17
cis-1,2-Dichloroethylene	0 .05	nd	nd	55
trans-1,2-	0 .05	nd	nd	1.3
1,2-Dichloropropane	0 .05	nd	nd	0.16
1,3-Dichloropropene	0 .05	nd	nd	0.18
Ethylbenzene	0 .05	nd	nd	9.5
Ethylene dibromide	0 .05	nd	nd	0.05
Hexane	0 .05	nd	nd	46
Methyl Ethyl Ketone	0 .50	nd	nd	70
Methyl Isobutyl Ketone	0 .50	nd	nd	31
Methyl tert-butyl ether	0 .05	nd	nd	11
Methylene Chloride	0 .05	nd	nd	1.6
Styrene	0 .05	nd	nd	34

Notes:
- ❑ MDL - Method Detection Limit
- ❑ nd - Not Detected (< MDL)
- ❑ **Bold & Underline** values exceed MOECC Table 3 Standards

Table 9 - Continued
Analytical Test Results - Soil
VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g)		MOECC Table 3 Standards Community Land Use (µg/g)
		BH6-SS7	BH7-SS6	
1,1,1,2-Tetrachloroethane	0.05	nd	nd	0.087
1,1,2,2-Tetrachloroethane	0.05	nd	nd	0.05
Tetrachloroethylene	0 .05	nd	nd	4.5
Toluene	0 .05	nd	nd	68
1,1,1-Trichloroethane	0 .05	nd	nd	6.1
1,1,2-Trichloroethane	0 .05	nd	nd	0.05
Trichloroethylene	0 .05	nd	nd	0.91
Trichlorofluoromethane	0 .05	nd	nd	4
Vinyl Chloride	0 .02	nd	nd	0.032
Xylenes	0 .05	0.39	nd	26

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (< MDL)
- **Bold & Underline** values exceed MOECC Table 3 Standards

None of the VOC parameters were detected above the laboratory detection limits with the exception of xylenes in Samples BH6-SS7. All parameter concentrations were found to be in compliance with the MOECC Table 3 standards.

Table 10
Analytical Test Results - Soil
PHCs F1-F4

Parameter	MDL (µg/g)	Soil Samples (µg/g)		MOECC Table 3 Standards Community Land Use (µg/g)
		BH6-SS7	BH7-SS6	
PHC F1	7	15	nd	55
PHC F2	4	9	15	230
PHC F3	8	13	14	1700
PHC F4	6	nd	nd	3300

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (< MDL)
- nt - not tested for this parameter
- **Bold & Underline** values exceed MOECC Table 3 Standards

All detected parameter concentrations were found to be in compliance with the MOECC Table 3 standards.

5.6 Groundwater Quality

Groundwater samples were collected from the monitoring wells installed in BH5 and BH7, as well as BH97-5 and BHMW3-2010. Groundwater samples were submitted for a combination of VOCs, PAH, and PHCs. Past analytical testing conducted by DST included PHCs, BTEX, PAHs and lead. The results of the analytical testing, and the selected remediation standards are presented in Tables 11 to 15. The laboratory reports are included in the Appendix.

Table 11
Analytical Test Results - Groundwater
PHCs (Fractions 1 to 4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MOECC Table 3 Standards Community Land Use (µg/L)
		BH5-GW1	BH7-GW1	BH97-5-GW1	
F_1 PHCs (C_6-C_{10})	25	nd	nd	nd	750
F_2 PHCs (C_{10}-C_{16})	100	nd	nd	nd	150
F_3 PHCs (C_{16}-C_{34})	100	nd	nd	nd	500
F_4 PHCs (C_{34}-C_{50})	100	nd	nd	nd	500

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (< MDL)
- **Bold & Underline** values exceed selected MOECC Standards

No PHC parameters were detected in the groundwater samples. All parameters are in compliance with MOECC Table 3 standards.

Table 12
Analytical Test Results - Groundwater
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MOECC Table 3 Standards Community Land Use (µg/L)
		BH5-GW1	BH7-GW1	BH97-5-GW1	
Acetone	5	nd	nd	nd	130000
Benzene	0.5	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	85000
Bromoform	0.5	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	630
Chloroform	0.5	nd	1.4	nd	2.4
Dibromochloromethane	0.5	nd	nd	nd	82000
Dichlorodifluoromethane	1	nd	nd	nd	4400
1,2-Dichlorobenzene	0.5	nd	nd	nd	4600
1,3-Dichlorobenzene	0.5	nd	nd	nd	9600
1,4-Dichlorobenzene	0.5	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	16
cis-1,3-Dichloropropylene	0.5	nd	nd	nd	N/V
trans-1,3-Dichloropropylene	0.5	nd	nd	nd	N/V
1,3-Dichloropropene	0.5	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	2300
Ethylene dibromide	0.2	nd	nd	nd	0.25

Notes:
- MDL - Method Detection Limit
- nd - not detected above the MDL
- N/V - no value provided by the MOE
- **Bold & Underline** values exceed MOECC Table 7 Standards

Table 12-Continued
Analytical Test Results - Groundwater
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MOECC Table 3 Standards Community Land Use (µg/L)
		BH5-GW1	BH7-GW1	BH97-5-GW1	
Hexane	1	nd	nd	nd	51
Methyl Ethyl Ketone	5	nd	nd	nd	470000
Methyl Isobutyl Ketone	5	nd	nd	nd	140000
Methyl tert-butyl ketone	2	nd	nd	nd	190
Methylene Chloride	5	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	1300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	1.6
Toluene	0.5	0.7	nd	nd	18000
1,1,1-Trichloroethane	0.5	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	1.6
Trichlorofluoromethane	1	nd	nd	nd	2500
Vinyl chloride	0.5	nd	nd	nd	0.5
Xylenes, total	0.5	1.6	nd	nd	4200

Notes:
- ❑ MDL - Method Detection Limit
- ❑ nd - not detected above the MDL
- ❑ N/V - no value provided by the MOE
- ❑ **Bold & Underline** values exceed MOECC Table 3 Standards

No VOC parameters were detected above the laboratory detection limits in Sample BH97-5-GW1. All other detected parameters in the groundwater samples were found to be in compliance with the MOECC Table 3 standards.

Table 13
Analytical Test Results - Groundwater
Polycyclic Aromatic Hydrocarbons (PAHs)

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)		MOECC Table 3 Standards Community Land Use (µg/L)
		BH5-GW1	BHMW3-2012-GW1	
Acenaphthene	0.05	nd	nd	17
Acenaphthylene	0.05	nd	nd	1
Anthracene	0.01	nd	0.04	1
Benzo[a]anthracene	0.01	nd	0.12	1.8
Benzo[a]pyrene	0.01	nd	0.12	0.81
Benzo[b]fluoranthene	0.05	nd	0.15	0.75
Benzo[ghi]perylene	0.05	nd	0.1	0.2
Benzo[k]fluoranthene	0.05	nd	0.09	0.4
Biphenyl	0.05	nd	nd	1000
Chrysene	0.05	nd	0.13	0.7
Dibenzo[a,h]anthracene	0.05	nd	nd	0.4
Fluoranthene	0.05	nd	0.25	44
Fluorene	0.01	nd	nd	290
Indeno[1,2,3-cd]pyrene	0.05	nd	0.09	0.2
Methylnaphthalene (1&2)	0.1	nd	nd	1500
Naphthalene	0.05	nd	nd	7
Phenanthrene	0.05	nd	0.15	9600
Pyrene	0.01	nd	0.23	5.7

Notes:
- MDL - Method Detection Limit
- nd - not detected above the MDL
- N/V - no value provided by the MOE
- **Bold & Underline** values exceed MOECC Table 7 Standards

PAH parameter results are in compliance with the MOECC Table 3 Standards.

Table 14
Analytical Test Results - Groundwater (DST, 2016)
BTEX and PHCs (Fractions 1 to 4)

Parameter	Groundwater Samples (µg/L)					MOECC Table 3 Standards Community Land Use (µg/L)
	BH97-1	BH97-3	BH97-4	BHMW1 (2010)	BHMW2-2010-GWS1	
Benzene	< 0.20	< 0.20	< 0.20	< 0.20	1.0	44
Toluene	< 0.20	< 0.20	< 0.20	< 0.20	1.4	18,000
Ehtylbenzene	< 0.20	< 0.20	< 0.20	< 0.20	< 0.20	2,300
Xylene	< 0.40	< 0.40	< 0.40	< 0.40	2.3	4,200
F_1 PHCs (C_6-C_{10})	< 100	< 25	< 100	< 25	< 100	750
F_2 PHCs (C_{10}-C_{16})	< 100	< 100	< 100	< 100	< 100	150
F_3 PHCs (C_{16}-C_{34})	< 100	< 100	< 100	< 100	120	500
F_4 PHCs (C_{34}-C_{50})	< 100	< 100	< 100	< 100	< 100	500

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (< MDL)
- **Bold & Underline** values exceed selected MOECC Standards

All of the most recent PHC and BTEX parameters included in the DST Phase II-ESA report (2016) are in compliance with the MOECC Table 3 standards.

Table 15
Analytical Test Results - Groundwater (DST, 2016)
Polycyclic Aromatic Hydrocarbons (PAHs)

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)					MOECC Table 3 Standards (µg/L)
		BH97-1	BH97-3	BH97-4	BHMW1 (2010)	BHMW2	
Acenaphthene	0.05	< 0.5	< 0.05	< 0.05	< 0.05	0.17	17
Acenaphthylene	0.05	< 0.5	< 0.05	< 0.05	< 0.05	0.09	1
Anthracene	0.01	< 0.5	< 0.05	0.18	< 0.05	0.55	1
Benzo[a]anthracene	0.01	0.6	< 0.05	< 0.05	< 0.05	0.23	1.8
Benzo[a]pyrene	0.01	0.6	< 0.01	0.03	< 0.01	0.06	0.81
Benzo[b]fluoranthene	0.05	0.7	< 0.05	< 0.05	< 0.05	0.11	0.75
Benzo[ghi]perylene	0.05	< 1	< 0.05	< 0.1	< 0.05	< 0.1	0.2
Benzo[k]fluoranthene	0.05	< 0.5	< 0.05	< 0.05	< 0.05	<0.05	0.4
Chrysene	0.05	0.6	< 0.05	0.07	< 0.05	0.47	0.7
Dibenzo[a,h]anthracene	0.05	< 1	< 0.05	< 0.1	< 0.05	< 0.1	0.4
Fluoranthene	0.05	1.6	< 0.05	0.07	< 0.05	1.5	44
Fluorene	0.01	< 0.5	< 0.05	0.14	< 0.05	1.8	290
Indeno[1,2,3-cd]pyrene	0.05	< 1	< 0.05	< 0.1	< 0.05	<0.1	0.2
Methylnaphthalene (1&2)	0.1	NA	< 0.071	NA	< 0.071	NA	1500
Naphthalene	0.05	< 0.5	< 0.05	< 0.05	< 0.05	0.85	7
Phenanthrene	0.05	1.1	< 0.03	0.27	< 0.03	11	9600
Pyrene	0.01	1.5	< 0.05	0.12	< 0.05	1.9	5.7

Notes:
- ❑ MDL - Method Detection Limit
- ❑ nd - not detected above the MDL
- ❑ N/V - no value provided by the MOE
- ❑ **Bold & Underline** values exceed MOECC Table 7 Standards

All of the most recent PAH parameters included in the DST Phase II-ESA report (2016) are in compliance with the MOECC Table 3 standards.

5.7 Quality Assurance and Quality Control Measures

All samples submitted as part of this Phase II-ESA were handled in accordance with the Analytical Protocol, with respect to holding time, preservation method, storage requirement and container type.

As per Subsection 47(3) of O.Reg 153/04 as amended by O.Reg 269/11, a Certificate of Analysis has been received for each sample submitted for analytical testing. All Certificates of Analysis are appended to this report.

Overall the quality of the field data collected during this Phase II-ESA, is considered to be sufficient to meet the overall objects of this assessment.

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 269/11 amending O.Reg. 153/04 - Record of Site Condition regulation, made under the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

SITE DESCRIPTION

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Column A of Table 2 outlined in Ontario Regulation 153/04 and amended by O.Reg. 269/11, PCAs resulting in APECs include the following:

- ❏ A former retail fuel outlet located in the southwest corner of the property (item 28)
- ❏ Fill material located across the parking lot (item 30)
- ❏ A former retail fuel outlet (339 Montreal Road) (item 28)
- ❏ A former cleaners (330 Montreal Road) (item 37)
- ❏ A former truck garage (255 Ste. Anne Avenue) (item 52)

The PCAs noted above are outlined and numbered in green on Drawing PE3908-2 - Surrounding Land Use Plan, provided in the Phase I-ESA (2016).

Potential contaminants of concern associated with the aforementioned APECs include a combination of BTEX, VOCs, PHCs, PAHs and/or metals (lead).

Subsurface Structures and Utilities

Subsurface structures and utilities on site include private sewer services as well as natural gas and municipal water services. Combined sanitary storm sewer services are located within the parking area and exit the property at Montreal Road.

Potable Water Source

The subject property is serviced with municipal water, as are all properties within the Phase-II study area.

PHYSICAL SETTING

Site Stratigraphy

The soil profile generally consisted of a layer of fill material, followed by peat (in certain locations) followed by glacial till then black shale bedrock. Specific details of the soil profile at the test hole location can be seen on the Soil Profile and Test Data sheets in the Appendix.

The site stratigraphy from ground surface to the deepest aquifer investigated, is illustrated on Drawing PE3908-6 - Cross Section A-A'. The stratigraphy consists of the following:

- **Fill material** was encountered below the granular surface at all borehole locations. Generally, the fill consisted of brown silty sand, with traces of gravel, crushed stone and/or clay to depths up to 3.83 m, however some fill material in certain boreholes (e.g. BH2, BH3, BH4, BH5) was noted to contain demolition debris such as wood, glass brick, and concrete. The fill containing debris was noted between 0.15 m and 1.85 m below grade. Groundwater was encountered in this unit in BH7.

- **Glacial till** was encountered throughout the site at depths ranging between 1.42 and 3.83 m below grade. In certain locations (e.g BH2, BH3, BH5 and BH7) peat was encountered immediately above the till.

- **Bedrock**: black shale bedrock was confirmed in BH5 at 1.96 m below grade, however it was generally encountered deeper. Groundwater was encountered within this unit at BH5.

Hydrogeological Characteristics

Groundwater was encountered in the upper shale bedrock unit at borehole BH5, and in the fill at BH7. Based on a review of previous investigations, similar findings were encountered, where groundwater was noted either within the bedrock, or the fill material, depending on the borehole location. Groundwater levels measured during the present Phase II-ESA were found to range between 1.42 m and 3.69 m below surrounding grade.

Based on the groundwater elevations from the monitoring event conducted on December 20, 2016, groundwater contours for the property were completed and the horizontal hydraulic gradient for the subject site was calculated. Groundwater flow at the subject property appeared to be in a southern direction with a hydraulic gradient of approximately 0.02 m/m. Groundwater contours are illustrated on Drawing PE3908-3 - Test Hole Location Plan.

Approximate Depth to Bedrock

The approximate depth to bedrock at the subject site varied between 1.96 and 5.39 m below ground surface. Bedrock was cored at Borehole location BH5, where rock was encountered at 1.96 m below ground surface.

Approximate Depth to Water Table

As discussed above, the depth to the water table at the subject site varies between approximately 1.42 m to 3.69 m below ground surface.

Sections 41 and 43.1 of the Regulation

Section 41 of the Regulation (Site Condition Standards, Environmentally Sensitive Areas) does not apply to the subject site.

Section 43.1 of the Regulation does not apply to the subject site, as the subject site is not a shallow soil property. It is also not located within 30 m of a body of water.

Fill Placement

Fill placement has occurred throughout the majority of the subject site, notably in the parking lot area.

Proposed Buildings and Other Structures

Several community use buildings are proposed for the subject property.

Existing Buildings and Structures

The subject property is currently occupied by a single building; which consists in part of a single storey motel structure, and a single storey commercial area (with a basement). The location of the subject structures are depicted on Drawing: PE3908-3 - Test Hole Location Plan.

Water Bodies

There are no water bodies on the subject site or in the Phase I-ESA study area.

Areas of Natural Significance

No areas of natural significance were identified on or in the immediate vicinity of the property.

ENVIRONMENTAL CONDITION PRIOR TO REMEDIATION

Areas Where Contaminants are Present

Based on the results of the Phase II ESA, areas where contaminants are present at concentrations greater than the applicable site condition standards (MOECC Table 3 Standards) are generally located within the parking area of the property, within the fill layer.

Types of Contaminants

Based on the potentially contaminating activities identified at the subject site and on the results of the Phase II-ESA, the types of contaminants identified in the soil include metals (specifically lead) and various PAH parameters. No contaminants were noted in the groundwater samples collected.

Contaminated Media

Based on the results of the Phase II-ESA, PAH impacts were identified in the fill in concentrations exceeding MOECC Table 3 Standards. Lead impacts were also identified in the fill material during previous subsurface investigations. Groundwater was not found to have been impacted.

What Is Known About the Area Where Contaminants are Present

Soil

Impacted fill material was encountered during the Phase II-ESA, as well as during past investigations. Impacts in the fill were PAH and lead related. The source of the impacts appear to be related to the importation of fill material of questionable quality, where building demolition debris was mixed with soil. No other potential sources of these contaminants were noted during a review of Phase I-ESA material.

Groundwater

All groundwater concentrations from the current and past sampling events were found to be in compliance with the MOECC Table 3 standards.

Distribution of Contaminants

The distribution of contaminants appears to be limited to the fill material located beneath the parking lot area of the property. Deleterious fill (fill material noted to contain demolition debris) was noted in several borehole locations during the Phase II-ESA (e.g. BH2, BH3, BH4, BH5). This fill was encountered between 0.15 m and 0.60 m below grade at the top to 1.17 m and 1.83 m below grade at the bottom.

Discharge of Contaminants

Lead and PAHs

Lead and PAH impacts are considered to have been discharge to the site via importation of soil material mixed with demolition debris.

Migration of Contaminants

Metals impacts are not considered to have migrated beyond the fill layer as metals are not highly soluble resulting in a low potential for transport. Furthermore, lead was not identified above site standards in the groundwater during previous investigations.

PAHs are not considered to have migrated to the water table, as no PAH parameters were identified above site condition standards within the groundwater samples collected.

Climatic and Meteorological Conditions

Two (2) ways by which climatic and meteorological conditions may affect contaminant distribution include the following:

- ❏ downward leaching of contaminants by means of the infiltration of precipitation
- ❏ the migration of contaminants via temporal changes in groundwater levels and/or groundwater flow, both of which may fluctuate seasonally.

Based on groundwater levels, which were identified within the bedrock, and not in the fill material where the soil impacts were identified, the migration is considered to be minimal.

Potential for Vapour Intrusion

The contaminated media encountered during the Phase II-ESA included PAH and lead impacted fill material. These contaminants are not considered to readily enter the vapour state, and as a result are not considered to pose a vapour risk to existing or proposed buildings. Furthermore, it is expected that contaminated material will be remediated as part of the site redevelopment program.

6.0 CONCLUSION

Assessment

A Phase II - Environmental Site Assessment (ESA) was conducted for 333 Montreal Road, in the City of Ottawa, Ontario. The purpose of the Phase II-ESA was to address the APECs identified in the Phase I-ESA conducted for the site.

Soil

Seven (7) boreholes were advanced on the property, two (2) of which were instrumented with groundwater monitoring wells. Previous investigations conducted by other consultants have also included the placement of boreholes (some with groundwater monitoring wells) as well.

Five (5) soil/fill samples collected during the Phase II-ESA were submitted for a combination of metals, PAHs, PHCs and VOCs. Analytical test results determined the presence of elevated concentrations of PAHs and lead, exceeding the applicable site standards for the property. The exceedances were noted within a specific fill layer located across the majority of the parking lot area of the site. The impacted fill material consisted of brown silty sand with traces of demolition debris (concrete, brick, glass, etc.). The thickness of the impacted fill material was found to range between 0.97 m and 1.74 m.

Groundwater

Groundwater samples were collected from the two (2) groundwater monitoring wells installed during the Phase II-ESA, and an additional two (2) groundwater samples were collected from wells installed previously. The groundwater samples were submitted for analysis of VOCs, PHCs and/or PAHs. A review of the most recent analytical data from previous reports was also conducted. None of the analytical test parameters were found to exceed the site standards for the property. No contaminated groundwater was identified on site.

Recommendations

Remediation Program

Soil/Fill

All contaminated fill material should be removed from the property. The most economical time to remove the impacted fill would be in conjunction with the site redevelopment. Any impacted soil/fill removed from the site will require disposal at an approved waste disposal facility. A leachate analysis in accordance with Ontario Regulation (O.Reg.) 347/558 must be conducted prior to disposal at a licensed waste disposal facililty. It is recommended that Paterson personnel be present onsite during the soil excavation program, to direct excavation activities in the areas where impacted material has been identified or is expected to exist.

Based on our current information, the deleterious fill layer appears to range in thickness from 0.97 m to 1.74 m (1.22 m on average) and covers the majority of the parking lot area. The volume of the deleterious fill is estimated to range from approximately 4,900 m^3 to 5,500 m^3.

Groundwater Monitoring Wells

If the groundwater monitoring wells on the property are not going to by used in the future, they must be decommissioned according to Ontario Regulation 903-Wells. Further information in this regard can be provided upon request.

7.0 STATEMENT OF LIMITATIONS

This Phase II-ESA report has been prepared in general accordance with Ontario Regulation 269/11 amending O.Reg. 153/04 and meets the requirements of CSA Z768-00. The conclusions presented herein are based on information gathered from a limited sampling and testing program. The test results represent conditions at specific test locations at the time of the field program. Should any conditions be encountered at the subject site that differ from our findings, we request that we be notified immediately in order to allow for a reassessment.

The client should be aware that any information pertaining to soils and all test hole logs are furnished as a matter of general information only and test hole descriptions or logs are not to be interpreted as descriptive of conditions at locations other than those described by the test holes themselves.

This report was prepared for the sole use of The Salvation Army. Permission and notification from the abovenoted party and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.

Adrian Menyhart, P.Eng.

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FIGURES

FIGURE 1 - KEY PLAN

DRAWING PE3908-3 - TEST HOLE LOCATION PLAN

DRAWING PE3908-4 - ANALYTICAL TESTING PLAN-SOIL

DRAWING PE3908-5 - ANALYTICAL TESTING PLAN-GROUNDWATER

DRAWING PE3908-6 - CROSS-SECTION A-A`

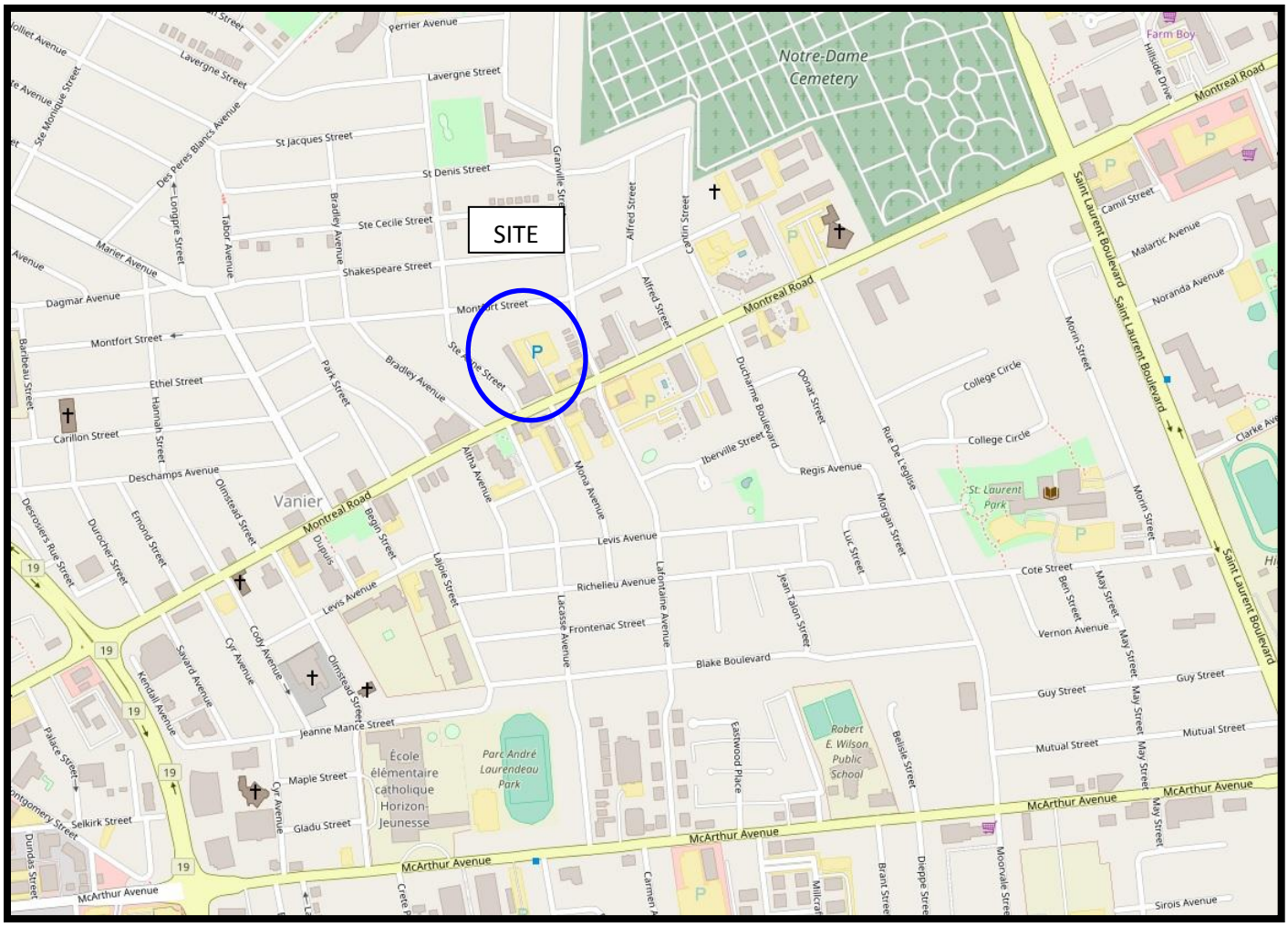

FIGURE 1

KEY PLAN

#258-272 GRANVILLE ROAD
RESIDENTIAL

#343 MONTREAL ROAD
RESTAURANT/PUB

MONTFORT STREET

#336-346 MONTFORT STREET
RESIDENTIAL

PARKING

BH 3
59.64
[55.83]

BH 2
59.24
[53.85]

TP03-4

TP03-5

TP03-6

TP03-2

BHMW1-2010

BH3-01

TP03-7

#343 MONTREAL ROAD
RESTAURANT
(GABRIEL'S PIZZA)

BHMW3-2010
59.60
(58.18)

ASPHALTIC CONCRETE
PARKING

C.B.

58.00

57.75

57.50

57.25

57.00

56.75

56.50

56.25

56.00

BH 4
59.61
[56.05]

BHMW3

TP03-3

BH97-3

BH97-2

BH97-1

A'

MH

MH

MH

MH

BH 7
58.85
(56.89)

(0.02m/m)

BH 1
59.21
[55.10]

BH1

BH2

BHMW2-2010

#325 MONTREAL ROAD
SALVATION ARMY
(CONCORDE & TAVERN
BELOW)

GRASSED

MOTEL ROOMS

A

BH 5
59.40
[57.44]
(56.76)

MOTEL ROOMS

NATURAL GAS

APPROXIMATE
BOILER ROOM
AREA

BH 6
59.42
[55.38]

BH97-4

GRASSED

BH97-5
59.31
(55.62)

#314-334 MONTFORT STREET
RESIDENTIAL

#245-273 STE. ANNE AVENUE
RESIDENTIAL

STE. ANNE AVENUE

TOP SPINDLE OF FIRE
HDYRANT. GEODETIC
ELEVATION = 60.42m.

MONTREAL ROAD

#322 MONTREAL ROAD
RESIDENTIAL APARTMENTS/
COMMERCIAL

MONA AVENUE

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE/MONITORING WELL LOCATION BY DST CONSULTING
- BOREHOLE/MONITORING WELL LOCATION BY GOLDER AND ASSOCIATES
- TEST PIT LOCATION BY GOLDER AND ASSOC.
- 59.40 GROUND SURFACE ELEVATION (m)
- [57.44] INFERRED BEDROCK ELEVATION (m)
- (56.72) GROUNDWATER SURFACE ELEVATION (m)
- STORM-SANITARY SEWER LINES
- A — A' CROSS-SECTION LOCATION
- 56.76 GROUNDWATER CONTOUR
- (0.02m/m) APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

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NO.	REVISIONS	DATE	INITIAL
0			

THE SALVATION ARMY

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
333 MONTREAL ROAD

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:500	Date: 01/2017
Drawn by: RCG	Report No.: PE3908-2
Checked by: AM	Dwg. No.: PE3908-3
Approved by: MSD	Revision No.: 0

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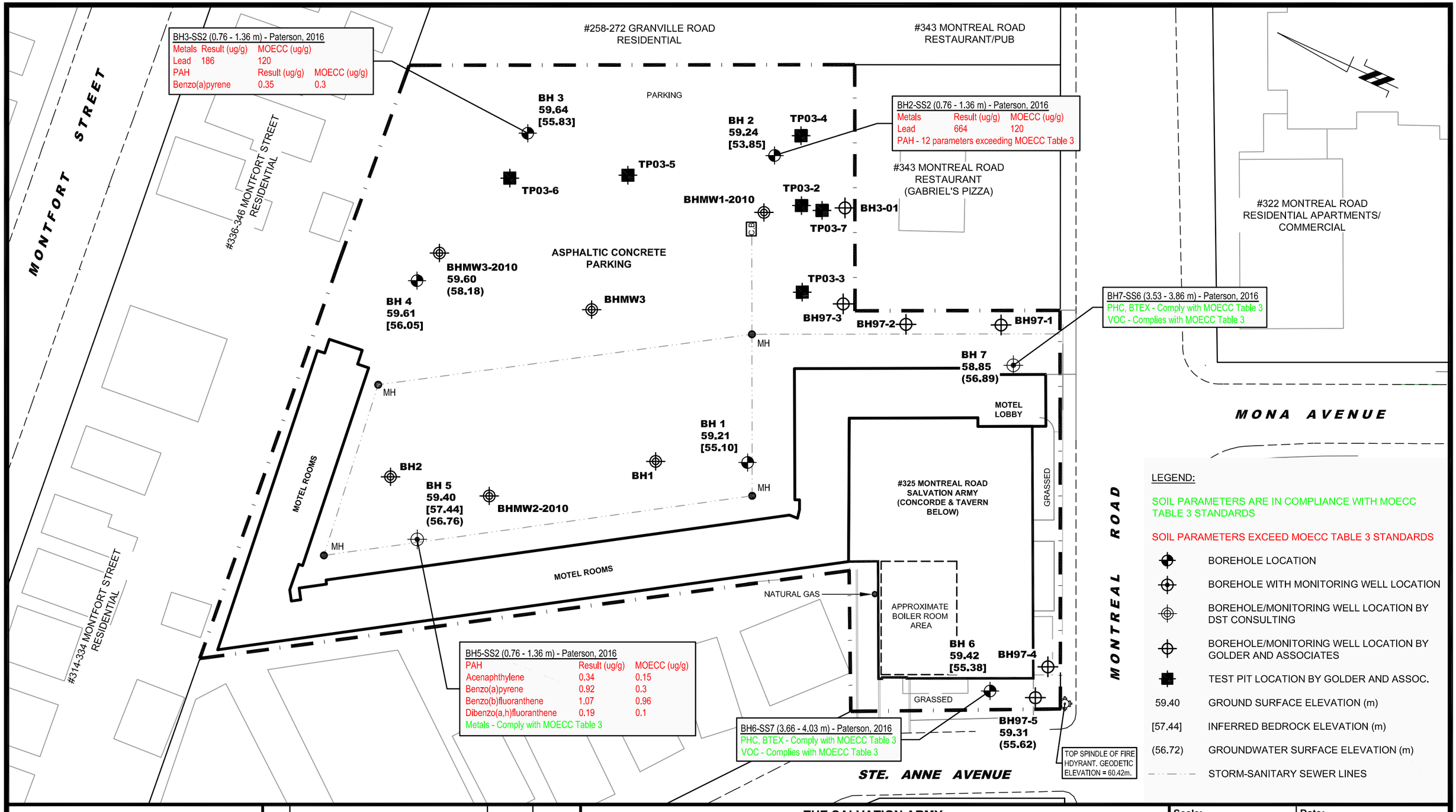

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NO.	REVISIONS	DATE	INITIAL
0			

THE SALVATION ARMY

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
333 MONTREAL ROAD

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL

Scale: 1:500	Date: 01/2017
Drawn by: RCG	Report No.: PE3908-2
Checked by: AM	Dwg. No.: PE3908-4
Approved by: MSD	Revision No.: 0

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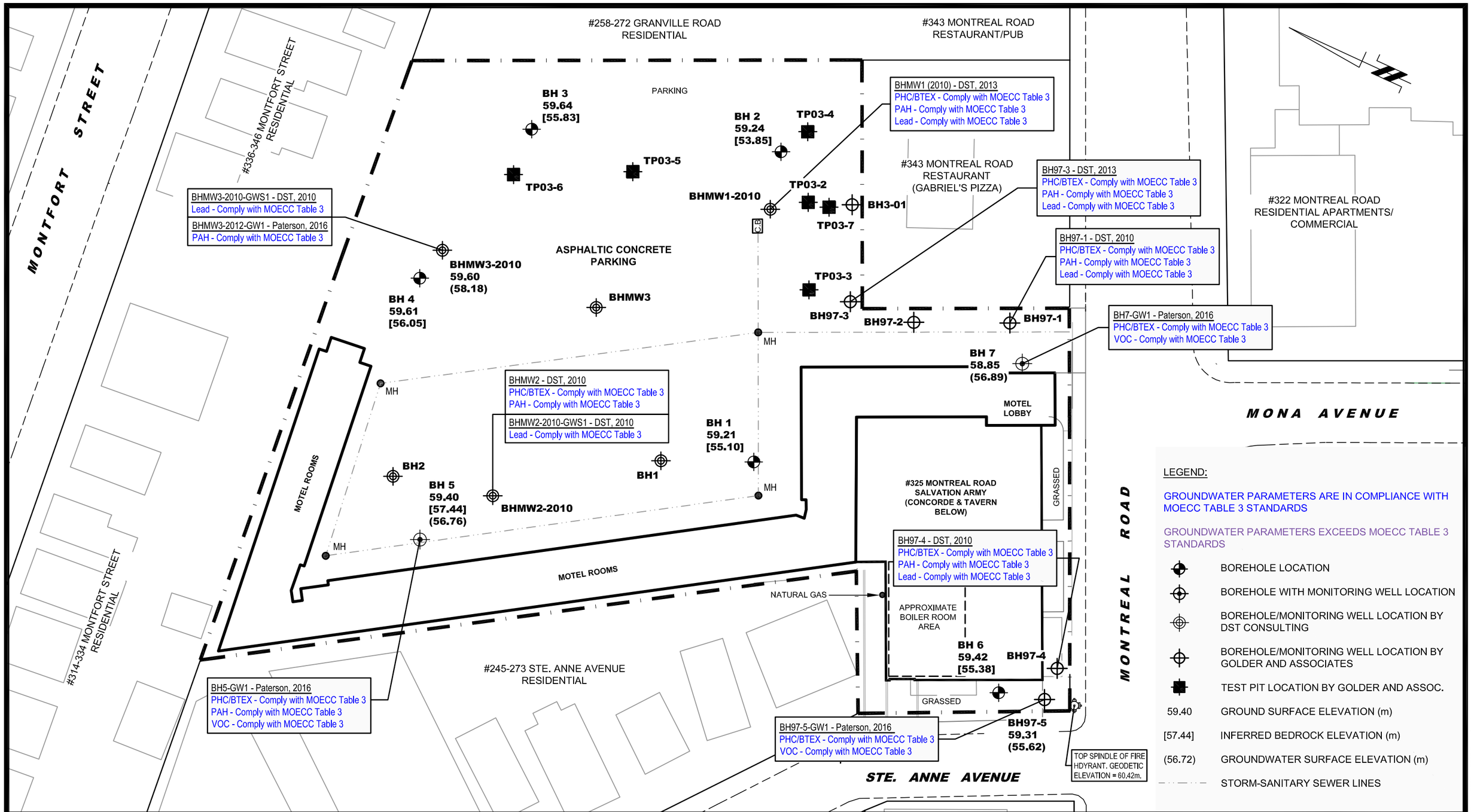

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NO.	REVISIONS	DATE	INITIAL
0			

THE SALVATION ARMY

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
333 MONTREAL ROAD
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - GROUNDWATER

Scale: 1:500	Date: 01/2017
Drawn by: RCG	Report No.: PE3908-2
Checked by: AM	Dwg. No.: PE3908-5
Approved by: MSD	Revision No.: 0

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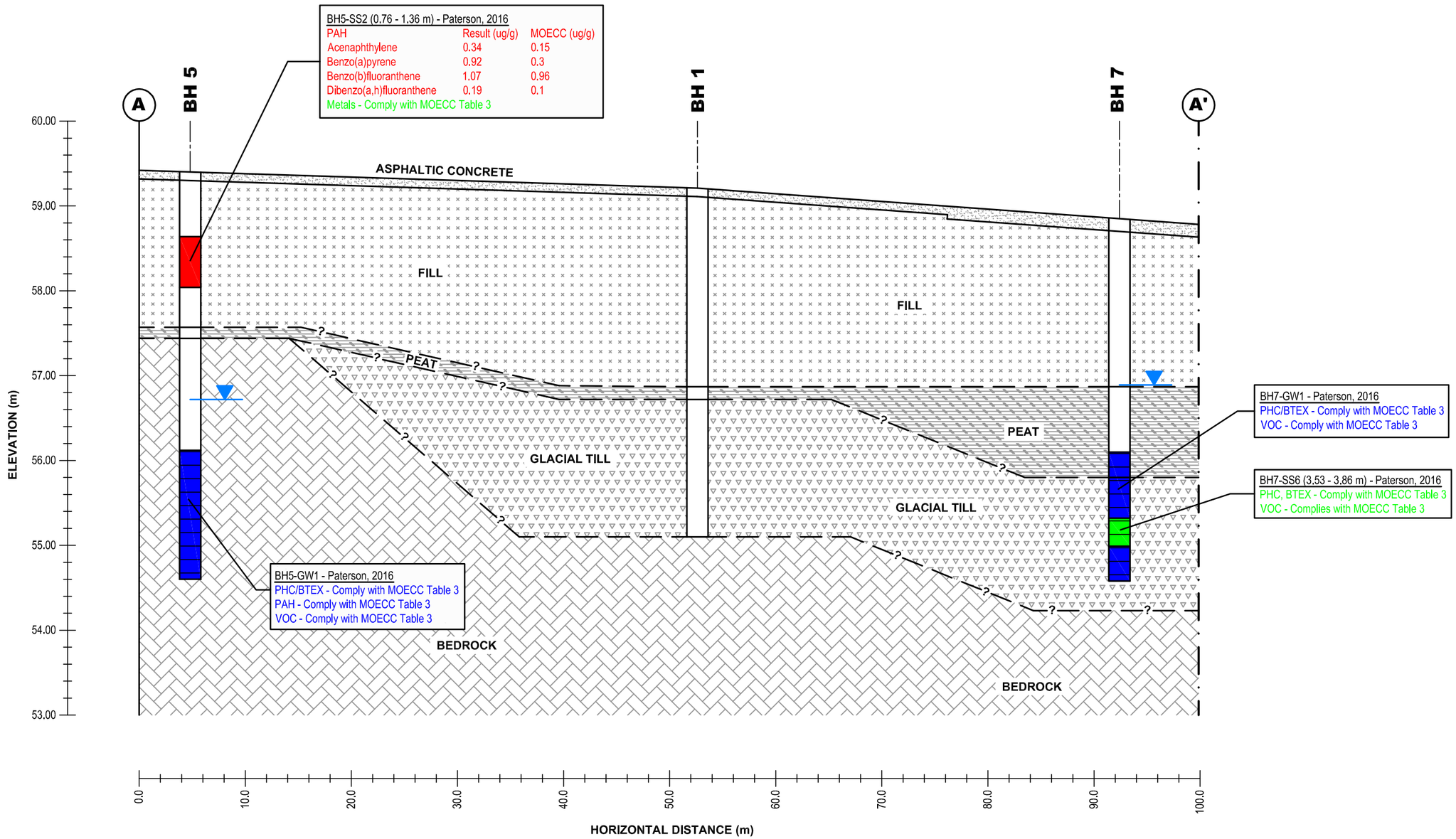

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NO.	REVISIONS	DATE	INITIAL
0			

THE SALVATION ARMY

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
333 MONTREAL ROAD

OTTAWA, ONTARIO

Title:

CROSS-SECTION A-A'

Scale: AS SHOWN	Date: 01/2017
Drawn by: MPG	Report No.: PE3908-2
Checked by: AM	Dwg. No.: PE3908-6
Approved by: MSD	Revision No.: 0

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

SURVEY OF PHASE II PROPERTY

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

Paterson Group Inc.

Consulting Engineers
154 Colonnade Road South
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Sampling and Analysis Plan

333 Montreal Road
Ottawa, Ontario

Prepared For

The Salvation Army

December, 2016

Report: PE3908-SAP.01

Table of Contents

1.0 Sampling Program

Paterson Group (Paterson) was commissioned by The Salvation Army to conduct a Phase II ESA for the property located at 333 Montreal Road, in the City of Ottawa, Ontario.

The following subsurface investigation program was developed to address areas of potential environmental concern and is conducted in conjunction with a geotechnical investigation:

Test Hole	Location and Rationale	Proposed Depth and Rationale
BH1	Located for general coverage and to address APEC resulting from on-site fill material.	Drilled to bedrock to assess fill and overburden.
BH2	Located for general coverage and to address APEC resulting from on-site fill material.	Drilled to bedrock to assess fill and overburden.
BH3	Located for general coverage and to address APEC resulting from on-site fill material.	Drilled to bedrock to assess fill and overburden.
BH4	Located for general coverage and to address APEC resulting from on-site fill material.	Drilled to bedrock to assess fill and overburden.
BH5	Located to address APEC resulting from off-site former garage	Drilled into bedrock to intercept groundwater table and install well
BH6	Located to address APEC resulting from former retail fuel outlet	Drilled to bedrock to assess fill and overburden.
BH7	Located to address APEC resulting from former retail fuel outlet and former dry cleaners	Drilled to intercept groundwater table and install well

Borehole locations are shown on the Test Hole Location Plan appended to the main report.

At each borehole, split spoon of overburden soils will be obtained at 0.76 m (2'6'') intervals until spoon refusal is encountered. Grab samples will be obtained from each stratigraphic unit encountered in the test pits. All soil samples will be retained, and samples will be selected for submission following a preliminary screening analysis.

If it is considered necessary to drill into bedrock to intercept the groundwater table, boreholes will be advanced into bedrock as required using diamond coring equipment. Rock core samples will be retained for review.

Following borehole drilling, monitoring wells will be installed in selected boreholes for the measurement of water levels and the collection of groundwater samples.

2.0 Analytical Testing Program

The analytical testing program for soil at the subject site is based on the following general considerations:

- In borehole where there is visual or olfactory evidence of contamination, or where photoionization detector (PID) readings indicate the presence of contamination, the 'worst-case' sample from each test pit should be submitted for comparison with MOECC site condition standards.
- In boreholes with evidence of contamination as described above, a sample should be submitted from the stratigraphic unit below the 'worst-case' sample to determine whether the contaminant(s) have migrated vertically downward.
- At least one sample from each borehole should be submitted to delineate the horizontal extent of contamination across the site.
- Parameters analyzed should be consistent with the contaminants of potential concern identified in the Phase II-ESA.
- Samples will be submitted for analysis of VOC parameters.

3.0 Standard Operating Procedures

3.1 Environmental Drilling Procedure

Purpose

The purpose of environmental boreholes is to assess the soil conditions and facilitate the installation of groundwater monitoring wells.

Equipment

The following is a list of equipment that is in addition to regular equipment stated in the geotechnical drilling SOP:

- Glass soil sample jars
- Plastic sample bags two buckets
- Cleaning brush (toilet brush works well)
- Dish detergent

- Methyl hydrate
- Water (if not available on site - water jugs available in trailer)
- Latex or nitrile gloves (depending on suspected contaminant)
- RKI Eagle organic vapour meter or MiniRae photoionization detector (depending on contamination suspected)

Determining Borehole and Test pit Locations

If conditions on site are not as suspected, and planned borehole/test pit locations cannot be excavated, **call the office to discuss**. Alternative borehole/test pit locations will be determined in conversation with the field technician, supervising engineer and the site superintended.

After drilling/excavation is completed a plan with the borehole/test pit locations must be provided. Distances and orientations of test pits with respect to site features (buildings, roadways, etc.) must be provided. Distances should be measured using a measuring tape or wheel rather than paced off. Ground surface elevations at each borehole should be surveyed relative to a geodetic benchmark, if one is available, or a temporary site benchmark which can be tied in at a later date if necessary.

Drilling Procedure

The actual drilling procedure for environmental boreholes is the same as geotechnical boreholes (see SOP for drilling and sampling) with a few exceptions as follows:

- Continuous split spoon samples (every 0.6 m or 2') or semi-continuous (every 0.76 m or 2'6") are required. Sleeve samples are to be collected when utilizing GeoProbe direct push drill.
- Make sure samples are well sealed in plastic bags with no holes prior to screening and are kept cool but unfrozen.
- If sampling for VOCs, BTEX, or PHCs F1, a soil core from each soil sample which may be analyzed must be taken and placed in the laboratory-provided methanol vial.
- Note all and any odours or discolouration of samples.
- Split spoon samplers must be washed between samples. Sleeves are disposable and will not require washing.
- If obvious contamination is encountered, continue sampling until vertical extent of contamination is delineated.

- As a general rule, environmental boreholes should be deep enough to intercept the groundwater table (unless this is impossible/impractical - call project manager to discuss).
- If at all possible, soil samples should be submitted to a preliminary screening procedure on site, either using a RKI Eagle, PID, visual observations, etc. depending on type of suspected contamination.

Spoon Washing Procedure

All sampling equipment (spilt spoons, etc.) must be washed between samples in order to prevent cross contamination of soil samples.

- Obtain two buckets of water (preferably hot if available)
- Add a small amount of dish soap to one bucket
- Scrub spoons with brush in soapy water, inside and out, including tip
- Rinse in clean water
- Apply a small amount of methyl hydrate to the inside of the spoon. (A spray bottle or water bottle with a small hole in the cap works well)
- Allow to dry (takes seconds)
- Rinse with distilled water, a spray bottle works well.

The methyl hydrate eliminates any soap residue that may be on the spoon, and is especially important when dealing with suspected VOCs.

The spoon-washing procedure may be bypassed if a GeoProbe direct-push drill rig with disposable plastic sampling tubes is used.

3.2 Monitoring Well Installation Procedure

Equipment

- 1.5 m x 5 cm threaded sections of Schedule 40 PVC slotted well screen (1.5 m x 3.2 cm if installing in cored hole in bedrock)
- 1.5 m x 5 cm threaded sections of Schedule 40 PVC riser pipe (1.5 m x 3.2 cm if installing in cored hole in bedrock)
- Threaded end-cap
- Slip-cap or J-plug
- Asphalt cold patch or concrete
- Silica Sand
- Bentonite chips (Holeplug)
- Steel flushmount casing

Procedure

- Drill borehole to required depth, using drilling and sampling procedures described above.
- If borehole is deeper than required monitoring well, backfill with bentonite chips to required depth. This should only be done on wells where contamination is not suspected, in order to prevent downward migration of contamination.
- Only one monitoring well should be installed per borehole.
- Monitoring wells should not be screened across more than one stratigraphic unit to prevent potential migration of contaminants between units.
- Where LNAPLs are the suspected contaminants of concern, monitoring wells should be screened straddling the water table in order to capture any free product floating on top of the water table.
- Thread the end cap onto a section of screen. Thread second section of screen if required. Thread risers onto screen. Lower into borehole to required depth. Ensure slip-cap or J-plug is inserted to prevent backfill materials entering well.
- As drillers remove augers, backfill borehole annulus with silica sand until the level of sand is approximately 0.3 m above the top of the screen.
- Backfill with holeplug until at least 0.3 m of holeplug is present above the top of the silica sand.
- Backfill remainder of borehole with holeplug or with auger cuttings (if contamination is not suspected).
- Install flushmount casing. Seal space between flushmount and borehole annulus with concrete, cold patch, or holeplug to match surrounding ground surface.

3.3 Monitoring Well Sampling Procedure

Equipment

- Water level metre or interface probe on hydrocarbon/LNAPL sites
- Spray bottles containing water and methanol to clean water level tape or interface probe
- Peristaltic pump
- Polyethylene tubing for peristaltic pump
- Flexible tubing for peristaltic pump
- Latex or nitrile gloves (depending on suspected contaminant)
- Allen keys and/or 9/16” socket wrench to remove well caps

- Graduated bucket with volume measurements
- Portable pH/Temperature/Conductivity analyzer
- Laboratory-supplied sample bottles

Sampling Procedure

- Locate well and use socket wrench or Allan key to open metal flush mount protector cap. Remove plastic well cap.
- Measure water level, with respect to existing ground surface, using water level meter or interface probe. If using interface probe on suspected NAPL site, measure the thickness of free product.
- Measure total depth of well.
- Clean water level tape or interface probe using methanol and water. Change gloves between wells.
- Calculate volume of standing water within well and record.
- Insert polyethylene tubing into well and attach to peristaltic pump. Turn on peristaltic pump and purge into graduated bucket. Purge at least three well volumes of water from the well. Measure and record field chemistry. Continue to purge, measuring field chemistry after every well volume purged, until appearance or field chemistry stabilizes.
- Note appearance of purge water, including colour, opacity (clear, cloudy, silty), sheen, presence of LNAPL, and odour. Note any other unusual features (particulate matter, effervescence (bubbling) of dissolved gas, etc.).
- Fill required sample bottles. If sampling for metals, attach 75-micron filter to discharge tube and filter metals sample. If sampling for VOCs, use low flow rate to ensure continuous stream of non-turbulent flow into sample bottles. Ensure no headspace is present in VOC vials.
- Replace well cap and flushmount casing cap.

Instrument Washing Procedure

All sampling equipment (shovels, trowels, spatulas, etc.) must be washed between samples in order to prevent cross contamination of soil samples.

- Obtain two buckets of water (preferably hot if available)
- Add a small amount of dish soap to one bucket
- Scrub instrument with brush in soapy water, inside and out, including tip
- Rinse in clean water
- Apply a small amount of methyl hydrate to the exposed faces of the instrument. (A spray bottle or water bottle with a small hole in the cap works well)

- Allow to dry (takes seconds)
- Rinse with distilled water, a spray bottle works well.

The methyl hydrate eliminates any soap residue that may be on the equipment, and is especially important when dealing with suspected VOCs.

Screening Procedure

The RKI Eagle is used to screen most soil samples, particularly where petroleum hydrocarbon contamination is suspected. The MiniRae is used when VOCs are suspected, however it also can be useful for detecting petroleum. These tools are for screening purposes only and cannot be used in place of laboratory testing. Vapour results obtained from the RKI Eagle and the PID are relative and must be interpreted.

Screening equipment should be calibrated on an approximately monthly basis, more frequently if heavily used.

- Samples should be brought to room temperature; this is specifically important in colder weather. Soil must not be frozen.
- Turn instrument on and allow to come to zero - calibrate if necessary
- If using RKI Eagle, ensure instrument is in methane elimination mode unless otherwise directed.
- Ensure measurement units are ppm (parts per million) initially. RKI Eagle will automatically switch to %LEL (lower explosive limit) if higher concentrations are encountered.
- Break up large lumps of soil in the sample bag, taking care not to puncture bag.
- Insert probe into soil bag, creating a seal with your hand around the opening.
- Gently manipulate soil in bag while observing instrument readings.
- Record the highest value obtained in the first 15 to 25 seconds
- Make sure to indicate scale (ppm or LEL); also note which instrument was used (RKI Eagle 1 or 2, or MiniRae).
- Jar samples and refrigerate as per Sampling and Analysis Plan.

4.0 Quality Assurance/Quality Control (QA/QC)

The QA/QC program for this subsurface investigation is as follows:

- All non-dedicated sampling equipment (shovels, split spoons, etc.) will be decontaminated according to the SOPs listed above.
- Approximately one field duplicate will be submitted for every ten samples submitted for laboratory analysis. A minimum of one field duplicate per project will be submitted. Field duplicates will be submitted for soil and groundwater samples where possible.
- Where multi-parameter analyzers are used to measure field chemistry, they will be calibrated on an approximately monthly basis, according to frequency of use.

5.0 Physical Impediments to Sampling and Analysis Plan

Physical impediments to the Sampling and Analysis plan may include:

- The location of underground utilities
- Shallow bedrock or limited presence of fill
- Insufficient groundwater volume for groundwater samples (if encountered)
- Breakage of sampling containers following sampling or while in transit to the laboratory
- Elevated detection limits due to matrix interference (generally related to soil colour or presence of organic material)
- Elevated detection limits due to high concentrations of certain parameters, necessitating dilution of samples in laboratory
- Mechanical Equipment breakdowns
- Winter conditions
- Other site-specific impediments

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
333 Montreal Road
Ottawa, Ontario

DATUM Benchmark (BM) - Top spindle of fire hydrant at the southwest corner of subject property. Geodetic elevation = 60.42m, provided by Annis, O'Sullivan, Vollebekk Ltd.

REMARKS

FILE NO. PE3908

HOLE NO. BH 1

BORINGS BY CME 55 Power Auger **DATE** December 6, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.10						0	59.21		
FILL: Crushed stone 0.60		AU	1						
FILL: Brown silty sand 1.52		SS	2	62	10	1	58.21		
FILL: Crushed stone 1.83		SS	3	67	16				
FILL: Grey silty clay, trace gravel 2.34						2	57.21		
PEAT 2.49		SS	4	33	5				
GLACIAL TILL: Dark brown sand and gravel with shale		SS	5	100	18	3	56.21		
4.11		SS	6	100	50+	4	55.21		
End of Borehole									
Inferred bedrock depth at 4.11m depth									

Photo Ionization Detector: ● Volatile Organic Rdg. (ppm); ○ Lower Explosive Limit %

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
333 Montreal Road
Ottawa, Ontario

DATUM Benchmark (BM) - Top spindle of fire hydrant at the southwest corner of subject property. Geodetic elevation = 60.42m, provided by Annis, O'Sullivan, Vollebekk Ltd.

REMARKS

FILE NO. PE3908

HOLE NO. BH 2

BORINGS BY CME 55 Power Auger **DATE** December 6, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.05						0	59.24
FILL: Crushed stone		AU	1				
0.60							
FILL: Dark brown sandy silt, some gravel, wood and concrete, trace brick		SS	2	54	5	1	58.24
1.65							
PEAT 1.83		SS	3	75	11	2	57.24
		SS	4	50	31		
						3	56.24
GLACIAL TILL: Brown silty clay with sand, gravel and shale		SS	5	100	69		
		SS	6	100	26	4	55.24
		SS	7	100	63		
						5	54.24
5.39		SS	8	100	50+		
End of Borehole							
Inferred bedrock depth at 5.39m depth							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
333 Montreal Road
Ottawa, Ontario

DATUM Benchmark (BM) - Top spindle of fire hydrant at the southwest corner of subject property. Geodetic elevation = 60.42m, provided by Annis, O'Sullivan, Vollebekk Ltd.

REMARKS

FILE NO. PE3908

HOLE NO. BH 3

BORINGS BY CME 55 Power Auger **DATE** December 6, 2016

SOIL DESCRIPTION	Depth (m)	Elev. (m)	Strata Plot	Sample Type	Sample Number	% Recovery	N Value or RQD
GROUND SURFACE	0	59.64					
Asphaltic concrete	0.05						
FILL: Crushed stone	0.20			AU	1		
FILL: Brown sand, some concrete and brick				SS	2	42	8
	1.17	58.64					
PEAT	1.37			SS	3	50	11
		57.64					
GLACIAL TILL: Dark brown silty clay with shale, trace sand				SS	4	83	35
		56.64		SS	5	58	41
	3.81			SS	6	80	50+
		55.64					
BEDROCK: Weathered black shale							
	4.65			SS	7	50	50+
End of Borehole							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
333 Montreal Road
Ottawa, Ontario

DATUM Benchmark (BM) - Top spindle of fire hydrant at the southwest corner of subject property. Geodetic elevation = 60.42m, provided by Annis, O'Sullivan, Vollebekk Ltd.

REMARKS

FILE NO. PE3908

HOLE NO. BH 4

BORINGS BY CME 55 Power Auger **DATE** December 6, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	59.61		
Asphaltic concrete 0.05									
FILL: Crushed stone 0.15		AU	1						
FILL: Dark brown sand, some gravel, trace wood and brick		SS	2	25	8	1	58.61		
1.42									
		SS	3	92	16	2	57.61		
GLACIAL TILL: Dark brown clayey silt, some shale and gravel, occasional boulders		SS	4	83	31				
		SS	5	90	27	3	56.61		
3.56									
Inferred shale **BEDROCK** 3.66									
End of Borehole									

Photo Ionization Detector: ● Volatile Organic Rdg. (ppm); ○ Lower Explosive Limit %

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
333 Montreal Road
Ottawa, Ontario

DATUM Benchmark (BM) - Top spindle of fire hydrant at the southwest corner of subject property. Geodetic elevation = 60.42m, provided by Annis, O'Sullivan, Vollebekk Ltd.

REMARKS

FILE NO. PE3908

HOLE NO. BH 5

BORINGS BY CME 55 Power Auger **DATE** December 6, 2016

SOIL DESCRIPTION		STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							0	59.40
Asphaltic concrete	0.10							
FILL: Crushed stone	0.41		AU	1				
FILL: Brown silty sand	0.76							
FILL: Dark brown silty clay, some shale, gravel, wood, glass and concrete			SS	2	79	13	1	58.40
	1.83		SS	3	100	9		
PEAT	1.96						2	57.40
			SS	4	0	50+		
							3	56.40
			RC	1	33	0		
BEDROCK: Black shale								
			RC	2	100	40	4	55.40
	4.80							
End of Borehole								
(GWL @ 2.64m-Dec. 20, 2016)								

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

Monitoring Well Construction

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
333 Montreal Road
Ottawa, Ontario

DATUM Benchmark (BM) - Top spindle of fire hydrant at the southwest corner of subject property. Geodetic elevation = 60.42m, provided by Annis, O'Sullivan, Vollebekk Ltd.

REMARKS

FILE NO. PE3908

HOLE NO. BH 6

BORINGS BY Portable Drill **DATE** December 15, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
TOPSOIL						0	59.42		
0.25									
		SS	1	67					
		SS	2	42		1	58.42		
		SS	3	50					
FILL: Brown fine to medium sand						2	57.42		
		SS	4	42					
		SS	5	58		3	56.42		
		SS	6	67					
3.83									
GLACIAL TILL: Brown silty clay with shale, trace sand and gravel		SS	7	100		4	55.42		
4.04									
End of Borehole									
Inferred bedrock depth at 4.04m depth									

Photo Ionization Detector: ○ Lower Explosive Limit % — 20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
333 Montreal Road
Ottawa, Ontario

DATUM Benchmark (BM) - Top spindle of fire hydrant at the southwest corner of subject property. Geodetic elevation = 60.42m, provided by Annis, O'Sullivan, Vollebekk Ltd.

REMARKS

FILE NO. PE3908

HOLE NO. BH 7

BORINGS BY Portable Drill **DATE** December 15, 2016

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	58.85
Asphaltic concrete 0.15							
FILL: Brown silty sand, some crushed stone and shale 0.71		SS	1	67			
		SS	2	75		1	57.85
FILL: Brown silty sand, some clay, trace gravel and crushed stone 1.98		SS	3	71			
		SS	4	83		2	56.85
TOPSOIL and PEAT 3.05		SS	5	100			
						3	55.85
GLACIAL TILL: Dark grey silty sand with gravel and shale, trace cobbles 4.27		SS	6	75			
						4	54.85
End of Borehole							
(GWL @ 1.96m-Dec. 20, 2016)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation 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 silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

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	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NXL size core. However, it can be used on smaller core sizes, such as BX, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic limit, % (water content above which soil behaves plastically)
PI	-	Plasticity index, % (difference between LL and PL)
Dxx	-	Grain size which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2$ / (D10 x D60)
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

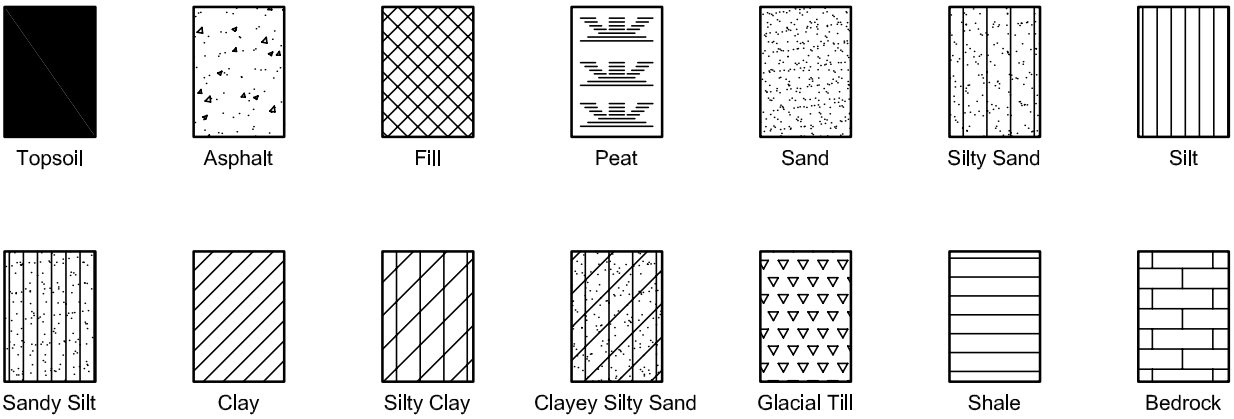
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.

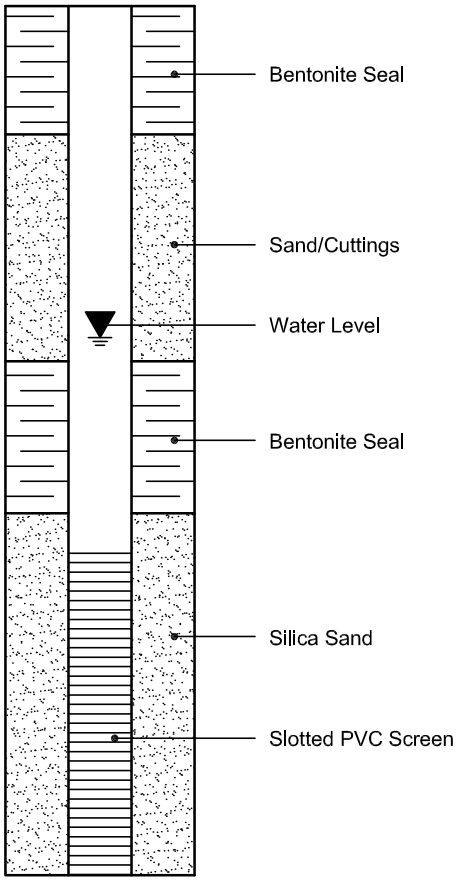
SYMBOLS AND TERMS (continued)

STRATA PLOT

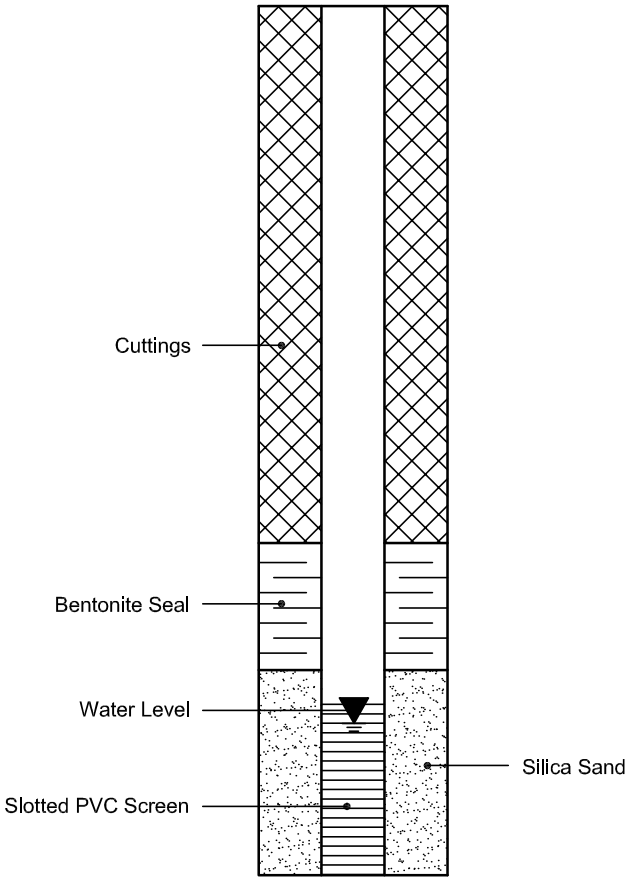


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mark D'Arcy

Client PO: 21505
Project: PE3908
Custody: 110941

Report Date: 13-Dec-2016
Order Date: 7-Dec-2016

Order #: 1650242

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

Paracel ID	Client ID
1650242-01	BH2-SS2
1650242-02	BH3-SS2
1650242-03	BH5-SS2

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 21505

Report Date: 13-Dec-2016
Order Date: 7-Dec-2016
Project Description: PE3908

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.7 - ICP-OES	8-Dec-16	8-Dec-16
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	6-Dec-16	13-Dec-16
Mercury by CVAA	EPA 7471B - CVAA, digestion	8-Dec-16	8-Dec-16
REG 153: Metals by ICP/OES, soil	based on MOE E3470, ICP-OES	8-Dec-16	8-Dec-16
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	8-Dec-16	12-Dec-16
Solids, %	Gravimetric, calculation	10-Dec-16	10-Dec-16

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 21505

Report Date: 13-Dec-2016

Order Date: 7-Dec-2016

Project Description: PE3908

	Client ID:	BH2-SS2	BH3-SS2	BH5-SS2	-
	Sample Date:	06-Dec-16	06-Dec-16	06-Dec-16	-
	Sample ID:	1650242-01	1650242-02	1650242-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	82.4	77.8	81.5	-
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Arsenic	1.0 ug/g dry	11.7	<1.0	7.2	-
Barium	1.0 ug/g dry	203	124	123	-
Beryllium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Boron	1.0 ug/g dry	11.8	8.1	12.4	-
Boron, available	0.5 ug/g dry	1.2	0.6	1.4	-
Cadmium	0.5 ug/g dry	0.6	<0.5	<0.5	-
Chromium	1.0 ug/g dry	51.8	19.5	23.9	-
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	<0.2	-
Cobalt	1.0 ug/g dry	7.4	5.8	8.8	-
Copper	1.0 ug/g dry	39.8	24.9	38.1	-
Lead	1.0 ug/g dry	664	186	48.9	-
Mercury	0.1 ug/g dry	0.6	0.1	<0.1	-
Molybdenum	1.0 ug/g dry	<1.0	<1.0	2.0	-
Nickel	1.0 ug/g dry	23.6	13.3	21.8	-
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	27.4	32.1	28.5	-
Zinc	1.0 ug/g dry	199	126	84.1	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	7.46	<0.02	0.05	-
Acenaphthylene	0.02 ug/g dry	1.82	0.12	0.34	-
Anthracene	0.02 ug/g dry	16.4	0.14	0.32	-
Benzo [a] anthracene	0.02 ug/g dry	31.4	0.27	0.86	-
Benzo [a] pyrene	0.02 ug/g dry	29.6	0.35	0.92	-
Benzo [b] fluoranthene	0.02 ug/g dry	31.6	0.39	1.07	-
Benzo [g,h,i] perylene	0.02 ug/g dry	17.0	0.29	0.57	-
Benzo [k] fluoranthene	0.02 ug/g dry	18.6	0.21	0.62	-
Chrysene	0.02 ug/g dry	31.6	0.24	0.90	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	5.14	0.08	0.19	-
Fluoranthene	0.02 ug/g dry	80.6	0.55	2.04	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 21505

Report Date: 13-Dec-2016

Order Date: 7-Dec-2016

Project Description: PE3908

	Client ID:	BH2-SS2	BH3-SS2	BH5-SS2	-
	Sample Date:	06-Dec-16	06-Dec-16	06-Dec-16	-
	Sample ID:	1650242-01	1650242-02	1650242-03	-
	MDL/Units	Soil	Soil	Soil	-
Fluorene	0.02 ug/g dry	8.12	0.04	0.09	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	16.7	0.27	0.60	-
1-Methylnaphthalene	0.02 ug/g dry	1.82	0.02	<0.02	-
2-Methylnaphthalene	0.02 ug/g dry	2.50	0.03	0.05	-
Methylnaphthalene (1&2)	0.04 ug/g dry	4.32	0.05	0.05	-
Naphthalene	0.01 ug/g dry	4.88	0.02	0.04	-
Phenanthrene	0.02 ug/g dry	65.2	0.28	0.42	-
Pyrene	0.02 ug/g dry	68.9	0.47	1.74	-
2-Fluorobiphenyl	Surrogate	71.2%	69.1%	70.3%	-
Terphenyl-d14	Surrogate	121%	86.3%	76.3%	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 21505

Report Date: 13-Dec-2016
Order Date: 7-Dec-2016
Project Description: PE3908

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, available	ND	0.5	ug/g						
Boron	ND	1.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	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						
Mercury	ND	0.1	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						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	*1.00*		*ug/g*		*75.1*	*50-140*			
Surrogate: Terphenyl-d14	*0.998*		*ug/g*		*74.9*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1.0	ug/g dry	ND			0.0	30	
Arsenic	ND	1.0	ug/g dry	ND				30	
Barium	92.6	1.0	ug/g dry	81.5			12.8	30	
Beryllium	ND	1.0	ug/g dry	ND			0.0	30	
Boron, available	ND	0.5	ug/g dry	ND			0.0	35	
Boron	4.99	1.0	ug/g dry	4.62			7.6	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium (VI)	ND	0.2	ug/g dry	ND				35	
Chromium	25.9	1.0	ug/g dry	23.3			10.4	30	
Cobalt	6.55	1.0	ug/g dry	5.68			14.2	30	
Copper	13.0	1.0	ug/g dry	11.4			13.2	30	
Lead	9.68	1.0	ug/g dry	8.36			14.6	30	
Mercury	ND	0.1	ug/g dry	ND			0.0	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	11.7	1.0	ug/g dry	10.3			12.9	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	ND	1.0	ug/g dry	ND			0.0	30	
Vanadium	33.1	1.0	ug/g dry	28.8			14.0	30	
Zinc	45.4	1.0	ug/g dry	39.6			13.6	30	
Physical Characteristics									
% Solids	79.1	0.1	% by Wt.	77.5			2.0	25	
Semi-Volatiles									
Acenaphthene	0.033	0.02	ug/g dry	0.051			43.5	40	QR-01
Acenaphthylene	0.262	0.02	ug/g dry	0.343			26.6	40	
Anthracene	0.267	0.02	ug/g dry	0.324			19.5	40	
Benzo [a] anthracene	0.674	0.02	ug/g dry	0.857			23.9	40	
Benzo [a] pyrene	0.762	0.02	ug/g dry	0.920			18.8	40	
Benzo [b] fluoranthene	0.984	0.02	ug/g dry	1.07			8.8	40	
Benzo [g,h,i] perylene	0.454	0.02	ug/g dry	0.575			23.5	40	
Benzo [k] fluoranthene	0.577	0.02	ug/g dry	0.617			6.7	40	
Chrysene	0.832	0.02	ug/g dry	0.903			8.2	40	
Dibenzo [a,h] anthracene	0.143	0.02	ug/g dry	0.191			28.9	40	
Fluoranthene	1.74	0.02	ug/g dry	2.04			15.4	40	
Fluorene	0.075	0.02	ug/g dry	0.092			20.5	40	
Indeno [1,2,3-cd] pyrene	0.452	0.02	ug/g dry	0.605			29.0	40	
1-Methylnaphthalene	ND	0.02	ug/g dry	ND				40	
2-Methylnaphthalene	0.043	0.02	ug/g dry	0.051			17.5	40	
Naphthalene	0.032	0.01	ug/g dry	0.042			27.0	40	
Phenanthrene	0.434	0.02	ug/g dry	0.420			3.2	40	
Pyrene	1.53	0.02	ug/g dry	1.74			12.6	40	
Surrogate: 2-Fluorobiphenyl	*1.17*		*ug/g dry*		*71.7*	*50-140*			
Surrogate: Terphenyl-d14	*1.23*		*ug/g dry*		*75.0*	*50-140*			

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 21505

Report Date: 13-Dec-2016
Order Date: 7-Dec-2016
Project Description: PE3908

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	286		ug/L	4.49	112	70-130			
Arsenic	277		ug/L		111	70-130			
Barium	245		ug/L		97.8	70-130			
Beryllium	270		ug/L	ND	108	70-130			
Boron, available	5.00	0.5	ug/g	ND	100	70-122			
Boron	380		ug/L	92.5	115	70-130			
Cadmium	272		ug/L	3.09	107	70-130			
Chromium (VI)	4.7	0.2	ug/g		94.0	70-130			
Chromium	782		ug/L	466	126	70-130			
Cobalt	390		ug/L	114	110	70-130			
Copper	512		ug/L	228	114	70-130			
Lead	407		ug/L	167	95.9	70-130			
Mercury	1.47	0.1	ug/g	ND	97.8	70-130			
Molybdenum	256		ug/L	2.62	101	70-130			
Nickel	460		ug/L	205	102	70-130			
Selenium	269		ug/L	ND	108	70-130			
Silver	232		ug/L	ND	92.8	70-130			
Thallium	241		ug/L	4.15	94.9	70-130			
Uranium	290		ug/L	ND	116	70-130			
Vanadium	246		ug/L		98.6	70-130			
Zinc	1100		ug/L	792	124	70-130			
Semi-Volatiles									
Acenaphthene	0.253	0.02	ug/g	0.051	98.8	50-140			
Acenaphthylene	0.436	0.02	ug/g	0.343	45.5	50-140			QM-06
Anthracene	0.430	0.02	ug/g	0.324	51.5	50-140			
Benzo [a] anthracene	0.755	0.02	ug/g	0.857	-49.7	50-140			QM-06
Benzo [a] pyrene	0.796	0.02	ug/g	0.920	-60.2	50-140			QM-06
Benzo [b] fluoranthene	1.02	0.02	ug/g	1.07	-24.6	50-140			QM-06
Benzo [g,h,i] perylene	0.595	0.02	ug/g	0.575	10.0	50-140			QM-06
Benzo [k] fluoranthene	0.723	0.02	ug/g	0.617	51.9	50-140			
Chrysene	0.761	0.02	ug/g	0.903	-69.4	50-140			QM-06
Dibenzo [a,h] anthracene	0.355	0.02	ug/g	0.191	80.2	50-140			
Fluoranthene	1.66	0.02	ug/g	2.04	-183	50-140			QM-06
Fluorene	0.267	0.02	ug/g	0.092	85.7	50-140			
Indeno [1,2,3-cd] pyrene	0.651	0.02	ug/g	0.605	22.6	50-140			QM-06
1-Methylnaphthalene	0.207	0.02	ug/g	ND	101	50-140			
2-Methylnaphthalene	0.225	0.02	ug/g	0.051	85.1	50-140			
Naphthalene	0.190	0.01	ug/g	0.042	72.5	50-140			
Phenanthrene	0.558	0.02	ug/g	0.420	67.4	50-140			
Pyrene	1.36	0.02	ug/g	1.74	-183	50-140			QM-06
Surrogate: 2-Fluorobiphenyl	*1.18*		*ug/g*		*72.0*	*50-140*			

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-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.

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.

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Chain of Custody
(Lab Use Only)
№ 110941

Page __ of __

Client Name: PATERSON GROUP	Project Reference: PE3908	**Turnaround Time:**
Contact Name: MARK D'ARCY	Quote #	☐ 1 Day ☐ 3 Day
Address: 154 COLONNADE RD S OTTAWA, ON	PO # 21505	☐ 2 Day ☑ Regular
Telephone: 613-226-7381	Email Address: mdarcy@patersongroup.ca	Date Required:

Criteria: ☑ O. Reg. 153/04 (As Amended) Table __ ☐ 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: 165042

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)							
1	BH2 - SS2	S		1	06/12/16				✓	✓	✓	✓	✓				- 250mL -			
2	BH3 - SS2	S		1					✓	✓	✓	✓	✓				- 125mL -			
3	BH4 - SS2	S		1					✓	✓	✓	✓	✓	- HOLD			- 250mL -			
4	BH5 - SS2	S		1	↓				✓	✓	✓	✓	✓				- 250mL -			
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: Paracel

Relinquished By (Sign):	Received by Driver/Depot: T. Louise	Received at Lab: SUNEEPORN DONMAI	Verified By:
Relinquished By (Print):	Date/Time: 07/12/16 4:00PM	Date/Time: DEC 07, 2016 05:06	Date/Time: Dec 8/16 7:57a
Date/Time:	Temperature: ___ °C	Temperature: 17.2 °C	pH Verified [ ] By: N/A

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mark D'Arcy

Client PO: 20941
Project: PE3908
Custody: 110955

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

Order #: 1651490

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

Paracel ID	Client ID
1651490-01	BH6-SS7
1651490-02	BH7-SS6

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	19-Dec-16	21-Dec-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	17-Dec-16	19-Dec-16
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	19-Dec-16	21-Dec-16
Solids, %	Gravimetric, calculation	17-Dec-16	17-Dec-16

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 20941

Report Date: 22-Dec-2016

Order Date: 16-Dec-2016

Project Description: PE3908

	Client ID:	BH6-SS7	BH7-SS6	-	-
	Sample Date:	15-Dec-16	15-Dec-16	-	-
	Sample ID:	1651490-01	1651490-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	88.2	92.2	-	-
Volatiles					
Acetone	0.50 ug/g dry	<0.50	<0.50	-	-
Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Bromodichloromethane	0.05 ug/g dry	<0.05	<0.05	-	-
Bromoform	0.05 ug/g dry	<0.05	<0.05	-	-
Bromomethane	0.05 ug/g dry	<0.05	<0.05	-	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	<0.05	-	-
Chlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Chloroform	0.05 ug/g dry	<0.05	<0.05	-	-
Dibromochloromethane	0.05 ug/g dry	<0.05	<0.05	-	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	<0.05	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	<0.05	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Ethylene dibromide (dibromoethan	0.05 ug/g dry	<0.05	<0.05	-	-
Hexane	0.05 ug/g dry	<0.05	<0.05	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	<0.50	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	<0.50	-	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	<0.05	-	-
Methylene Chloride	0.05 ug/g dry	<0.05	<0.05	-	-
Styrene	0.05 ug/g dry	<0.05	<0.05	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 20941

Report Date: 22-Dec-2016
Order Date: 16-Dec-2016
Project Description: PE3908

	Client ID:	BH6-SS7	BH7-SS6	-	-
	Sample Date:	15-Dec-16	15-Dec-16	-	-
	Sample ID:	1651490-01	1651490-02	-	-
	MDL/Units	Soil	Soil	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	-	-
Trichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	<0.05	-	-
Vinyl chloride	0.02 ug/g dry	<0.02	<0.02	-	-
m,p-Xylenes	0.05 ug/g dry	0.30	<0.05	-	-
o-Xylene	0.05 ug/g dry	0.09	<0.05	-	-
Xylenes, total	0.05 ug/g dry	0.39	<0.05	-	-
4-Bromofluorobenzene	Surrogate	100%	100%	-	-
Dibromofluoromethane	Surrogate	107%	94.9%	-	-
Toluene-d8	Surrogate	105%	105%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	15	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	9	15	-	-
F3 PHCs (C16-C34)	8 ug/g dry	13	14	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	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: 4-Bromofluorobenzene	*7.95*		*ug/g*		*99.4*	*50-140*			
Surrogate: Dibromofluoromethane	*7.42*		*ug/g*		*92.7*	*50-140*			
Surrogate: Toluene-d8	*8.58*		*ug/g*		*107*	*50-140*			

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 20941

Report Date: 22-Dec-2016
Order Date: 16-Dec-2016
Project Description: PE3908

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	65	8	ug/g dry	49			28.2	30	
F4 PHCs (C34-C50)	58	6	ug/g dry	47			19.9	30	
Physical Characteristics									
% Solids	88.3	0.1	% by Wt.	88.1			0.3	25	
Volatiles									
Acetone	ND	0.50	ug/g dry	ND				50	
Benzene	ND	0.02	ug/g dry	ND				50	
Bromodichloromethane	ND	0.05	ug/g dry	ND				50	
Bromoform	ND	0.05	ug/g dry	ND				50	
Bromomethane	ND	0.05	ug/g dry	ND				50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND				50	
Chlorobenzene	ND	0.05	ug/g dry	ND				50	
Chloroform	ND	0.05	ug/g dry	ND				50	
Dibromochloromethane	ND	0.05	ug/g dry	ND				50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND				50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND				50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND				50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND				50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND				50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Ethylene dibromide (dibromoethane	ND	0.05	ug/g dry	ND				50	
Hexane	ND	0.05	ug/g dry	ND				50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND				50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND				50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND				50	
Methylene Chloride	ND	0.05	ug/g dry	ND				50	
Styrene	ND	0.05	ug/g dry	ND				50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND				50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND				50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND				50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND				50	
Trichloroethylene	ND	0.05	ug/g dry	ND				50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND				50	
Vinyl chloride	ND	0.02	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: 4-Bromofluorobenzene	*9.11*		*ug/g dry*		*100*	*50-140*			
Surrogate: Dibromofluoromethane	*8.71*		*ug/g dry*		*95.9*	*50-140*			
Surrogate: Toluene-d8	*9.52*		*ug/g dry*		*105*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	197	7	ug/g		98.5	80-120			
F2 PHCs (C10-C16)	110	4	ug/g	ND	92.9	60-140			
F3 PHCs (C16-C34)	282	8	ug/g	49	95.3	60-140			
F4 PHCs (C34-C50)	204	6	ug/g	47	96.3	60-140			
Volatiles									
Acetone	6.29	0.50	ug/g		62.9	50-140			
Benzene	3.14	0.02	ug/g		78.4	60-130			
Bromodichloromethane	3.47	0.05	ug/g		86.6	60-130			
Bromoform	4.11	0.05	ug/g		103	60-130			
Bromomethane	3.10	0.05	ug/g		77.5	50-140			
Carbon Tetrachloride	3.50	0.05	ug/g		87.5	60-130			
Chlorobenzene	3.40	0.05	ug/g		85.0	60-130			
Chloroform	3.50	0.05	ug/g		87.4	60-130			
Dibromochloromethane	3.83	0.05	ug/g		95.8	60-130			
Dichlorodifluoromethane	2.69	0.05	ug/g		67.3	50-140			
1,2-Dichlorobenzene	3.91	0.05	ug/g		97.7	60-130			
1,3-Dichlorobenzene	4.22	0.05	ug/g		105	60-130			
1,4-Dichlorobenzene	3.84	0.05	ug/g		96.0	60-130			
1,1-Dichloroethane	3.13	0.05	ug/g		78.3	60-130			
1,2-Dichloroethane	3.70	0.05	ug/g		92.5	60-130			
1,1-Dichloroethylene	2.81	0.05	ug/g		70.2	60-130			
cis-1,2-Dichloroethylene	2.88	0.05	ug/g		72.1	60-130			
trans-1,2-Dichloroethylene	2.76	0.05	ug/g		69.1	60-130			
1,2-Dichloropropane	2.88	0.05	ug/g		72.0	60-130			
cis-1,3-Dichloropropylene	2.42	0.05	ug/g		60.6	60-130			
trans-1,3-Dichloropropylene	2.49	0.05	ug/g		62.3	60-130			
Ethylbenzene	3.27	0.05	ug/g		81.7	60-130			
Ethylene dibromide (dibromoethane	3.48	0.05	ug/g		87.1	60-130			
Hexane	2.75	0.05	ug/g		68.8	60-130			
Methyl Ethyl Ketone (2-Butanone)	6.04	0.50	ug/g		60.4	50-140			
Methyl Isobutyl Ketone	6.02	0.50	ug/g		60.2	50-140			
Methyl tert-butyl ether	9.00	0.05	ug/g		90.0	50-140			
Methylene Chloride	2.73	0.05	ug/g		68.3	60-130			
Styrene	3.33	0.05	ug/g		83.2	60-130			
1,1,1,2-Tetrachloroethane	4.06	0.05	ug/g		101	60-130			
1,1,2,2-Tetrachloroethane	2.98	0.05	ug/g		74.5	60-130			
Tetrachloroethylene	3.81	0.05	ug/g		95.3	60-130			
Toluene	3.22	0.05	ug/g		80.5	60-130			
1,1,1-Trichloroethane	3.52	0.05	ug/g		88.0	60-130			
1,1,2-Trichloroethane	2.65	0.05	ug/g		66.3	60-130			
Trichloroethylene	2.79	0.05	ug/g		69.8	60-130			
Trichlorofluoromethane	3.86	0.05	ug/g		96.6	50-140			
Vinyl chloride	3.81	0.02	ug/g		95.2	50-140			
m,p-Xylenes	6.86	0.05	ug/g		85.7	60-130			
o-Xylene	3.26	0.05	ug/g		81.4	60-130			
Surrogate: 4-Bromofluorobenzene	*8.08*		*ug/g*		*101*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

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Chain of Custody
(Lab Use Only)
№ 110955

Page 1 of 1

Client Name: Paterson Group	Project Reference: PE3908	**Turnaround Time:**
Contact Name: Mark D'Arcy	Quote #	☐ 1 Day ☐ 3 Day
Address:	PO # 20941	☐ 2 Day ☑ Regular
Telephone: 226-7381	Email Address:	Date Required:

Criteria: ☑ O. Reg. 153/04 (As Amended) Table _ ☐ 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: 165490 / Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)							
1	BH6-SS7	S	-	2	Dec 15/16	9am	✓	✓									- 72hr tat			
2	BH7-SS6	S	-	2	" "	11am	✓	✓										✓		
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: Paracel

Relinquished By (Sign):	Received by Driver/Depot: T Jousf	Received at Lab: SUNEEPORN BOX MM	Verified By:
Relinquished By (Print):	Date/Time: 16/12/16 1:50 PM	Date/Time: DEC 16, 2016 04:47	Date/Time: 16/12/16 1722
Date/Time:	Temperature: ____ °C	Temperature: 20.1 °C	pH Verified [ ] By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mark D'Arcy

Client PO: 21312
Project: PE3908
Custody: 110230

Report Date: 23-Dec-2016
Order Date: 20-Dec-2016

Order #: 1652139

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

Paracel ID	Client ID
1652139-01	BH5-GW1
1652139-02	BH7-GW1
1652139-03	BH97-5-GW1
1652139-04	BHMW3-2012-GW1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 21312

Report Date: 23-Dec-2016
Order Date: 20-Dec-2016
Project Description: PE3908

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	21-Dec-16	21-Dec-16
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	21-Dec-16	21-Dec-16
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	21-Dec-16	21-Dec-16
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	21-Dec-16	21-Dec-16

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 21312

Report Date: 23-Dec-2016

Order Date: 20-Dec-2016

Project Description: PE3908

	Client ID:	BH5-GW1	BH7-GW1	BH97-5-GW1	BHMW3-2012-GW1
	Sample Date:	20-Dec-16	20-Dec-16	20-Dec-16	20-Dec-16
	Sample ID:	1652139-01	1652139-02	1652139-03	1652139-04
	MDL/Units	Water	Water	Water	Water
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	-
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Chloroform	0.5 ug/L	<0.5	1.4	<0.5	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylene dibromide (dibromoethan	0.2 ug/L	<0.2	<0.2	<0.2	-
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L	0.7	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 21312

Report Date: 23-Dec-2016
Order Date: 20-Dec-2016
Project Description: PE3908

	Client ID:	BH5-GW1	BH7-GW1	BH97-5-GW1	BHMW3-2012-GW1
	Sample Date:	20-Dec-16	20-Dec-16	20-Dec-16	20-Dec-16
	Sample ID:	1652139-01	1652139-02	1652139-03	1652139-04
	MDL/Units	Water	Water	Water	Water
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	1.1	<0.5	<0.5	-
o-Xylene	0.5 ug/L	0.5	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	1.6	<0.5	<0.5	-
4-Bromofluorobenzene	Surrogate	93.9%	91.0%	92.6%	-
Dibromofluoromethane	Surrogate	105%	108%	110%	-
Toluene-d8	Surrogate	99.3%	99.5%	99.8%	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	-
F1 + F2 PHCs	125 ug/L	<125	<125	<125	-
F3 + F4 PHCs	200 ug/L	<200	<200	<200	-
Semi-Volatiles					
Acenaphthene	0.05 ug/L	-	-	-	<0.05
Acenaphthylene	0.05 ug/L	-	-	-	<0.05
Anthracene	0.01 ug/L	-	-	-	0.04
Benzo [a] anthracene	0.01 ug/L	-	-	-	0.12
Benzo [a] pyrene	0.01 ug/L	-	-	-	0.12
Benzo [b] fluoranthene	0.05 ug/L	-	-	-	0.15
Benzo [g,h,i] perylene	0.05 ug/L	-	-	-	0.10
Benzo [k] fluoranthene	0.05 ug/L	-	-	-	0.09
Chrysene	0.05 ug/L	-	-	-	0.13
Dibenzo [a,h] anthracene	0.05 ug/L	-	-	-	<0.05
Fluoranthene	0.01 ug/L	-	-	-	0.25
Fluorene	0.05 ug/L	-	-	-	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	-	-	-	0.09
1-Methylnaphthalene	0.05 ug/L	-	-	-	<0.05
2-Methylnaphthalene	0.05 ug/L	-	-	-	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	-	-	-	<0.10
Naphthalene	0.05 ug/L	-	-	-	<0.05
Phenanthrene	0.05 ug/L	-	-	-	0.15
Pyrene	0.01 ug/L	-	-	-	0.23

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 21312

Report Date: 23-Dec-2016
Order Date: 20-Dec-2016
Project Description: PE3908

	Client ID:	BH5-GW1	BH7-GW1	BH97-5-GW1	BHMW3-2012-GW1
	Sample Date:	20-Dec-16	20-Dec-16	20-Dec-16	20-Dec-16
	Sample ID:	1652139-01	1652139-02	1652139-03	1652139-04
	MDL/Units	Water	Water	Water	Water
2-Fluorobiphenyl	Surrogate	-	-	-	98.6%
Terphenyl-d14	Surrogate	-	-	-	115%

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						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	*14.7*		*ug/L*		*73.5*	*50-140*			
Surrogate: Terphenyl-d14	*20.8*		*ug/L*		*104*	*50-140*			
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						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	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-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						
Ethylene dibromide (dibromoethane	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	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						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	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						
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	*77.7*		*ug/L*		*97.1*	*50-140*			
Surrogate: Dibromofluoromethane	*84.2*		*ug/L*		*105*	*50-140*			
Surrogate: Toluene-d8	*85.6*		*ug/L*		*107*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	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	
Chloroform	ND	0.5	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	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	
Ethylene dibromide (dibromoethane	ND	0.2	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 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	
1,1,1-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	
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	*75.6*		*ug/L*		*94.5*	*50-140*			
Surrogate: Dibromofluoromethane	*81.7*		*ug/L*		*102*	*50-140*			
Surrogate: Toluene-d8	*79.3*		*ug/L*		*99.2*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1990	25	ug/L		99.5	68-117			
F2 PHCs (C10-C16)	1940	100	ug/L		108	60-140			
F3 PHCs (C16-C34)	4540	100	ug/L		122	60-140			
F4 PHCs (C34-C50)	2620	100	ug/L		106	60-140			
Semi-Volatiles									
Acenaphthene	5.16	0.05	ug/L		103	50-140			
Acenaphthylene	4.62	0.05	ug/L		92.5	50-140			
Anthracene	4.59	0.01	ug/L		91.8	50-140			
Benzo [a] anthracene	4.41	0.01	ug/L		88.2	50-140			
Benzo [a] pyrene	4.78	0.01	ug/L		95.6	50-140			
Benzo [b] fluoranthene	5.69	0.05	ug/L		114	50-140			
Benzo [g,h,i] perylene	5.32	0.05	ug/L		106	50-140			
Benzo [k] fluoranthene	5.90	0.05	ug/L		118	50-140			
Chrysene	4.92	0.05	ug/L		98.4	50-140			
Dibenzo [a,h] anthracene	5.80	0.05	ug/L		116	50-140			
Fluoranthene	4.77	0.01	ug/L		95.4	50-140			
Fluorene	4.52	0.05	ug/L		90.5	50-140			
Indeno [1,2,3-cd] pyrene	5.89	0.05	ug/L		118	50-140			
1-Methylnaphthalene	4.73	0.05	ug/L		94.5	50-140			
2-Methylnaphthalene	5.00	0.05	ug/L		99.9	50-140			
Naphthalene	4.42	0.05	ug/L		88.4	50-140			
Phenanthrene	4.13	0.05	ug/L		82.7	50-140			
Pyrene	4.81	0.01	ug/L		96.3	50-140			
Surrogate: 2-Fluorobiphenyl	*17.4*		*ug/L*		*87.0*	*50-140*			
Volatiles									
Acetone	74.8	5.0	ug/L		74.8	50-140			
Benzene	36.4	0.5	ug/L		90.9	60-130			
Bromodichloromethane	38.9	0.5	ug/L		97.2	60-130			
Bromoform	42.2	0.5	ug/L		105	60-130			
Bromomethane	46.9	0.5	ug/L		117	50-140			
Carbon Tetrachloride	38.4	0.2	ug/L		96.1	60-130			
Chlorobenzene	39.8	0.5	ug/L		99.4	60-130			
Chloroform	36.1	0.5	ug/L		90.3	60-130			
Dibromochloromethane	41.8	0.5	ug/L		105	60-130			
Dichlorodifluoromethane	37.1	1.0	ug/L		92.6	50-140			
1,2-Dichlorobenzene	38.3	0.5	ug/L		95.7	60-130			
1,3-Dichlorobenzene	38.9	0.5	ug/L		97.2	60-130			
1,4-Dichlorobenzene	38.5	0.5	ug/L		96.2	60-130			
1,1-Dichloroethane	34.8	0.5	ug/L		86.9	60-130			
1,2-Dichloroethane	35.4	0.5	ug/L		88.4	60-130			
1,1-Dichloroethylene	34.8	0.5	ug/L		86.9	60-130			
cis-1,2-Dichloroethylene	36.0	0.5	ug/L		90.0	60-130			
trans-1,2-Dichloroethylene	36.0	0.5	ug/L		89.9	60-130			
1,2-Dichloropropane	35.4	0.5	ug/L		88.6	60-130			
cis-1,3-Dichloropropylene	40.1	0.5	ug/L		100	60-130			
trans-1,3-Dichloropropylene	41.5	0.5	ug/L		104	60-130			
Ethylbenzene	42.2	0.5	ug/L		105	60-130			
Ethylene dibromide (dibromoethane	39.5	0.2	ug/L		98.8	60-130			
Hexane	31.4	1.0	ug/L		78.4	60-130			
Methyl Ethyl Ketone (2-Butanone)	86.8	5.0	ug/L		86.8	50-140			
Methyl Isobutyl Ketone	105	5.0	ug/L		105	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl tert-butyl ether	88.6	2.0	ug/L		88.6	50-140			
Methylene Chloride	35.9	5.0	ug/L		89.8	60-130			
Styrene	40.1	0.5	ug/L		100	60-130			
1,1,1,2-Tetrachloroethane	41.8	0.5	ug/L		104	60-130			
1,1,2,2-Tetrachloroethane	36.8	0.5	ug/L		92.0	60-130			
Tetrachloroethylene	38.9	0.5	ug/L		97.3	60-130			
Toluene	39.2	0.5	ug/L		98.0	60-130			
1,1,1-Trichloroethane	37.5	0.5	ug/L		93.8	60-130			
1,1,2-Trichloroethane	38.2	0.5	ug/L		95.6	60-130			
Trichloroethylene	36.5	0.5	ug/L		91.2	60-130			
Trichlorofluoromethane	45.0	1.0	ug/L		112	60-130			
Vinyl chloride	35.6	0.5	ug/L		89.0	50-140			
m,p-Xylenes	82.4	0.5	ug/L		103	60-130			
o-Xylene	41.5	0.5	ug/L		104	60-130			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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

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Chain of Custody
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№ 110230

Page 1 of 1

Client Name:	Paterson Group.	Project Reference:	PE3908
Contact Name:	Mark D'Arcy	Quote #	
Address:	154 Colonade Rd. S.	PO #	21312
		Email Address:	MDarcy@PatersonGroup.ca. Amery Hart@PatersonGroup.ca.
Telephone:	613-226-7381		

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

Criteria: ☒ O. Reg. 153/04 (As Amended) Table _ ☐ 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: 1652439

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX (Voet)	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
1	BH5-GW1	GW		4	Dec. 20. 16		X		X				
2	BH7-GW1	GW		3	↓		X						
3	BH97-5-GW1	GW		3			X						
4	BHMW3-2010-GW1	GW		1	▽				X				
5													
6													
7													
8													
9													
10													

Comments: Hold PAH Sample From BH5-GW1 & ALL PHC = NON PRESERVE.

Method of Delivery: Paracel

Relinquished By (Sign): Ryan Mathe	Received by Driver/Depot: A. Stouse	Received at Lab: SUNEETPORN DEKMATI	Verified By:
Relinquished By (Print): Ryan Matheson	Date/Time: 20/12/16 4:05	Date/Time: DEC 20, 2016 05.00	Date/Time: 20/12/16 17:17
Date/Time: Dec. 20. 16 / 2:57 pm.	Temperature: ____ °C	Temperature: 13.4 °C	pH Verified ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mark D'Arcy

Client PO: 21312
Project: PE3908
Custody: 110230

Report Date: 10-Jan-2017
Order Date: 9-Jan-2017

Order #: 1702031

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

Paracel ID	Client ID
1702031-01	BH5-GW1

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 21312

Report Date: 10-Jan-2017
Order Date: 9-Jan-2017
Project Description: PE3908

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	9-Jan-17	10-Jan-17

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 21312

Report Date: 10-Jan-2017

Order Date: 9-Jan-2017

Project Description: PE3908

	Client ID:	BH5-GW1	-	-	-
	Sample Date:	20-Dec-16	-	-	-
	Sample ID:	1702031-01	-	-	-
	MDL/Units	Water	-	-	-
Semi-Volatiles					
Acenaphthene	0.05 ug/L	<0.05 [1]	-	-	-
Acenaphthylene	0.05 ug/L	<0.05 [1]	-	-	-
Anthracene	0.01 ug/L	<0.01 [1]	-	-	-
Benzo [a] anthracene	0.01 ug/L	<0.01 [1]	-	-	-
Benzo [a] pyrene	0.01 ug/L	<0.01 [1]	-	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05 [1]	-	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05 [1]	-	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05 [1]	-	-	-
Chrysene	0.05 ug/L	<0.05 [1]	-	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05 [1]	-	-	-
Fluoranthene	0.01 ug/L	<0.01 [1]	-	-	-
Fluorene	0.05 ug/L	<0.05 [1]	-	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05 [1]	-	-	-
1-Methylnaphthalene	0.05 ug/L	<0.05 [1]	-	-	-
2-Methylnaphthalene	0.05 ug/L	<0.05 [1]	-	-	-
Methylnaphthalene (1&2)	0.10 ug/L	<0.10 [1]	-	-	-
Naphthalene	0.05 ug/L	<0.05 [1]	-	-	-
Phenanthrene	0.05 ug/L	<0.05 [1]	-	-	-
Pyrene	0.01 ug/L	<0.01 [1]	-	-	-
2-Fluorobiphenyl	Surrogate	113% [1]	-	-	-
Terphenyl-d14	Surrogate	112% [1]	-	-	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 21312

Report Date: 10-Jan-2017
Order Date: 9-Jan-2017
Project Description: PE3908

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	*22.2*		*ug/L*		*111*	*50-140*			
Surrogate: Terphenyl-d14	*22.7*		*ug/L*		*114*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Semi-Volatiles									
Acenaphthene	5.34	0.05	ug/L		107	50-140			
Acenaphthylene	4.61	0.05	ug/L		92.2	50-140			
Anthracene	4.57	0.01	ug/L		91.4	50-140			
Benzo [a] anthracene	4.28	0.01	ug/L		85.5	50-140			
Benzo [a] pyrene	4.95	0.01	ug/L		98.9	50-140			
Benzo [b] fluoranthene	5.99	0.05	ug/L		120	50-140			
Benzo [g,h,i] perylene	5.36	0.05	ug/L		107	50-140			
Benzo [k] fluoranthene	6.02	0.05	ug/L		120	50-140			
Chrysene	4.77	0.05	ug/L		95.3	50-140			
Dibenzo [a,h] anthracene	5.79	0.05	ug/L		116	50-140			
Fluoranthene	5.14	0.01	ug/L		103	50-140			
Fluorene	4.53	0.05	ug/L		90.7	50-140			
Indeno [1,2,3-cd] pyrene	5.76	0.05	ug/L		115	50-140			
1-Methylnaphthalene	5.08	0.05	ug/L		102	50-140			
2-Methylnaphthalene	4.98	0.05	ug/L		99.6	50-140			
Naphthalene	4.06	0.05	ug/L		81.2	50-140			
Phenanthrene	4.17	0.05	ug/L		83.5	50-140			
Pyrene	5.07	0.01	ug/L		101	50-140			
Surrogate: 2-Fluorobiphenyl	*19.7*		*ug/L*		*98.6*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Sample - One or more parameter received past hold time - PAHs
Applies to samples: BH5-GW1

Sample Qualifiers :

1 : Holding time had been exceeded upon receipt of the sample at the laboratory.

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.

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№ 110230

Page 1 of 1

Client Name: Paterson Group.	Project Reference: PE3908	**Turnaround Time:**	
Contact Name: Mark D'Arcy	Quote #	☐ 1 Day	☐ 3 Day
Address: 154 Colonade Rd. S.	PO # 21512	☐ 2 Day	☒ Regular
Telephone: 613-226-7381	Email Address: MDarcy@PatersonGroup.ca. AMarykutz@PatersonGroup.ca.	Date Required:	

Criteria: ☑ O. Reg. 153/04 (As Amended) Table 1 ☐ 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: 1702031 ~~1652134~~

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4 + BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)							
1	BH5-GW1	GW		4	Dec 20.16		X		X											
2	BH7-GW1	GW		3	↓		X													
3	BH97-5-GW1	GW		3			X													
4	BHMW3-2010-GW1	GW		1	▽				X											
5																				
6					Revised															
7					9/1/17	SR.														
8																				
9																				
10																				

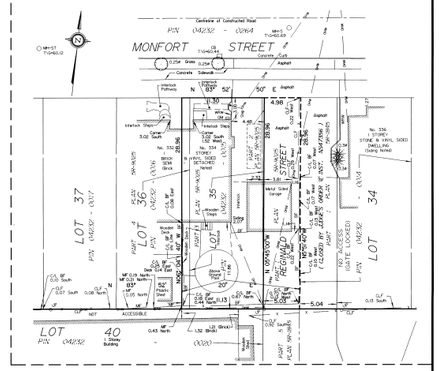
Comments: Hold PAH Sample From BH5-GW1 & ALL PHC = NON PRESERVE.
Past Hold Time. Proceed as per Hailey. SR.

Method of Delivery: Parcel

Relinquished By (Sign): Ryan Mattesson	Received by Driver/Depot:	Received at Lab: SUMETPOKH DOLMATI	Verified By:
Relinquished By (Print): Ryan Mattesson	Date/Time: 20/12/16 4:05	Date/Time: Dec 20, 2016 05:00	Date/Time: 20/12/16 17:17
Date/Time: Dec 20 16 / 2:57 pm	Temperature: °C	Temperature: 13.4 °C	pH Verified ☐ By:

09/1/17 13:35

DETAIL SCALE 1:250



TOPOGRAPHICAL PLAN OF

LOTS 25 to 31 (both inclusive)
LOT 35,
40 to 46 (both inclusive)
PART OF 36
PART OF 47 and 48
PART OF REGINALD STREET
(Closed by Judge's Order Inst. NS47356)
REGISTERED PLAN 246
CITY OF OTTAWA

Prepared by Annis, O'Sullivan, Vollebekk Ltd.

Scale 1 : 250

10 7.5 5.0 2.5 0 5 10 Metres

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

Nov 30 2016
Date

E.H. Herweyer O.L.S.

Notes & Legend

	Denotes	
○ FH	•	Fire Hydrant
⊠ WV	•	Water Valve
⊠ VC	•	Valve Chamber (Watermain)
○ MH-ST	•	Maintenance Hole (Storm Sewer)
○ MH-S	•	Maintenance Hole (Sanitary)
○ MH-H	•	Maintenance Hole (Hydro)
⊠ GV	•	Gas Valve
ST	•	Underground Storm Sewer
S	•	Underground Sanitary Sewer
W	•	Underground Water
P	•	Underground Power
G	•	Underground Gas
B	•	Underground Bell
☐ CB	•	Catch Basin
CLF	•	Chain Link Fence
BF	•	Board Fence
MF	•	Metal Fence
⊙ TSP	•	Traffic Signal Post
⊙ MW	•	Monitoring Well
○ UP	•	Utility Pole
○ PO–W	•	Wood Pole
T/G	•	Top of Grate
Inv.	•	Invert
CRW	•	Concrete Retaining Wall
CBRW	•	Concrete Block Retaining Wall
Ø	•	Diameter
+ 68.00	•	Location of Elevations
+ 68.00T	•	Top of Wall / Concrete Curb Elevation
C/L	•	Centreline
	•	Property Line
	•	Deciduous Tree
○ LS	•	Light Standard
WRW	•	Wooden Retaining Wall
⊠ GM	•	Gas Meter
	•	Coniferous Tree

Bearings are grid and are referred to the Central Meridian of MTM Zone 9 (76°30' West Longitude) NAD-83 (original).

LOTS 25 to 31 (both inclusive),40 to 46 (both inclusive)
PART OF LOTS 47 and 48, PART OF REGINALD STREET
SITE AREA=6378 m²

LOT 35, PART OF LOT 36 AND PART OF REGINALD STREET BEING PARTS 2 AND 3 PLAN 5R-9025
SITE AREA=324.7 m²

PART OF REGINALD STREET
BEING PART 1 PLAN 5R-9025
SITE AREA=144.5 m²

ELEVATION NOTES

1. Elevations shown are geodetic and are referred to the CGVD28 geodetic datum.
2. It is the responsibility of the user of this information to verify that the job benchmark has not been altered or disturbed and that it's relative elevation and description agrees with the information shown on this drawing.

UTILITY NOTES

1. This drawing cannot be accepted as acknowledging all of the utilities and it will be the responsibility of the user to contact the respective utility authorities for confirmation.
2. Only visible surface utilities were located.
3. A field location of underground plant by the pertinent utility authority is mandatory before any work involving breaking ground, probing, excavating etc.
4. Maintenance holes marked by T. Underground services and Inverts are taken from City of Ottawa Engineering Drawings D-17-06 and S-546.

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Ontario Land Surveyors

Job No. 15041-R Ch. 25 Tp. 5 Pl. 246 T. 50

1g