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Phase II Environmental Site Assessment

Commercial Property
890 and 900 Bank Street
Ottawa, Ontario

Prepared For

Canderel Management Inc.

June 20, 2014

Report: PE3078-3

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EXECUTIVE SUMMARY

Assessment

Phase II ESAs were conducted for the property at 890 and 900 Bank Street, Ottawa, Ontario. The purpose of these Phase II ESAs was to address the areas of potential environmental concern identified during the Phase I ESA, in particular the historical use of the northern portion of the subject site (890 Bank Street) as a retail fuel outlet and commercial automobile garage. The subsurface investigation at the subject site consisted of drilling eleven (11) boreholes and installing six (6) groundwater monitoring wells.

Soil samples were obtained from the boreholes and screened using visual observations and organic vapour measurements. A total of ten (10) soil samples were submitted for laboratory analysis for a combination of PHC, BTEX and VOC parameters. Five (5) soil samples recovered from boreholes located along the northern property line exceeded the MOE Table 3 standards for PHC F1 and F2, ethylbenzene and xylenes. All other samples were in compliance with the MOE Table 3 standards.

Groundwater samples were obtained from eight (8) monitoring wells and submitted for analysis of PHCs and VOCs. All samples were in compliance with the selected MOE Table 3 standards.

Conclusion

Based on the above results, soil exists at the subject property with PHC and BTEX concentrations which exceed the MOE Table 3 standards. It is our understanding that the subject site is to be redeveloped with a multi-storey commercial building. It is our recommendation that an environmental site remediation program, involving the removal of all contaminated soil, be completed concurrently with the site redevelopment. It is also recommended that a member of this firm be present at the time of the removal of the impacted soil in order to provide direction and to obtain confirmatory soil samples upon the completion of the remediation program.

If soil which contains contaminant concentrations that meet the subject property standards but exceed MOE Table 1 (background) standards has to be removed from the site for construction purposes, it will have to be disposed of at an approved waste disposal facility at a premium.

1.0 INTRODUCTION

At the request of Canderel Management Inc., Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment of the properties addressed 890 and 900 Bank Street, in the City of Ottawa, Ontario. The purpose of this Phase II ESA was to address concerns identified in the Phase I-II ESA's prepared by Paterson, dated September 10, 2013 and October 11, 2013.

1.1 Site Description

Address:	890 and 900 Bank Street, Ottawa, Ontario.
Legal Description:	Part of Lots 6 and 7, Registered Plan 47389, and Part of Lot 24 in Block 5, Registered Plan 26085, City of Ottawa, Ontario.
Property Identification Number:	04140-0198 and 04140-0199.
Location:	The subject site consists of two (2) commercial buildings located on the west side of Bank Street, between Holmwood and Thornton Avenue. The subject site is shown on Figure 1 - Key Plan following the body of this report.
Latitude and Longitude:	45° 24' 01" N, 75° 41' 14" W.
Configuration:	Irregular (L-shaped).
Site Area:	0.32 hectares (approximate).

1.2 Property Ownership

The subject property is currently owned by 8694605 Canada Inc. Paterson was retained to complete this Phase II ESA by Mr. Ryan Blatt of Canderel Management Inc. The offices of Canderel Management Inc. are located at Suite 900, 2000 Peel Street, Montreal, Quebec. Mr. Blatt can be reached by telephone at (514) 940-1420.

1.3 Current and Proposed Future Uses

The subject site is currently occupied by two (2) commercial buildings that operate as a commercial automobile garage and The Beer Store. It is our understanding that the buildings on the subject site will be demolished and the subject site will be redeveloped with a commercial building. No further details are currently available.

1.4 Applicable Site Condition Standard

The site condition standards for the 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 the Environment (MOE), April 2011. The MOE selected Table 3 Standards are based on the following considerations:

- Coarse-grained soil conditions
- Full depth generic site conditions
- Non-potable groundwater conditions
- Commercial land use

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The subject site is located on the west side of Bank Street between Holmwood and Thornton Avenue, in the City of Ottawa, Ontario. The majority of the site not occupied by the commercial buildings consists of paved asphalt parking with a landscaped area separating both buildings. Sheet drainage to on-site catch basins and the adjacent roadways is the primary method of directing surface water away from the property. There was no sign of surficial contamination on the exterior of the property at the time of the site visit.

2.2 Past Investigations

Paterson has completed several Phase I and Phase II ESA's for the subject site, provided under separate cover. The findings of the assessments are discussed below.

According to the historical research, both lots were vacant/residential until their commercial development circa 1950. The former on-site retail fuel outlet with three (3) underground storage tanks was redeveloped into the existing automotive service garage (890 Bank Street) in the early 1980's. The past use of the site as a retail fuel outlet and automobile garage are Potentially Contaminating Activities (PCAs) representing Areas of Potential Environmental Concern (APEC). Various neighbouring properties in the Phase I study area were identified to have PCAs, however, only a former retail fuel outlet located adjacent to the south (912 Bank Street) was considered to be an APEC. Based on the information discovered during the historical research a Phase II ESA was recommended.

The results of the previous Phase II ESA's are incorporated into the body of this report.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigations were conducted in August, September and December of 2013 and consisted of drilling eleven (11) boreholes, six (6) of which were completed with groundwater monitoring wells. Boreholes were drilled to depths ranging from 4.50 to 10.67m.

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 analyzing these media is based on the Contaminants of Potential Concern identified in the Phase I ESA. Contaminants of concern for soil are Petroleum Hydrocarbons (PHCs), Volatile Organic Compounds (VOCs) and BTEX. Contaminants of concern for groundwater are VOCs and PHCs.

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

Based on information from the Geological Survey of Canada mapping and the subsurface investigations, drift thickness in the area of the subject site is in excess of 10m. Overburden soils consist of asphaltic concrete and crushed stone over loose to dense brown silty sand overlying bedrock consisting of interbedded limestone and shale from the Verulam and Billings Formation. Groundwater was encountered within the silty sand at depths ranging from 7.87 to 9.50m below existing grade.

Contaminants of Potential Concern

The following CPCs were identified with respect to the subject site:

- Volatile Organic Compounds (VOCs) – this suite of parameters includes gasoline related Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX) which are associated with de-greasing and fuel distribution operations. These parameters were selected as CPCs for the Phase I study area due to the potential use of solvents at the existing automobile garage and fuels for the former retail fuel outlet. VOCs may be present in the soil matrix as well as in the dissolved phase in the groundwater system.
- Petroleum Hydrocarbons Fractions 1 through 4 (PHCs F1-F4) – this suite of parameters encompasses gasoline (Fraction 1), diesel and fuel oil (Fraction 2), and heavy oils (Fractions 3 and 4). PHCs may be present in the soil matrix, sorbed to soil particles, as well as in free or dissolved phase in the groundwater system. PHCs are generally considered to be LNAPLs – light non-aqueous phase liquids, indicating that when present in sufficient concentrations above the solubility limit, they will partition into a separate phase above the water table, due to their lower density.

The mechanisms of contaminant transport within the site soils include physical transportation and leaching. Due to the impermeable nature of the subject site and neighbouring properties' ground cover, leaching is not considered to be a major factor on the subject site.

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, and some glacial till soils, whereas diffusion will dominate in soils with lower hydraulic conductivity, such as clays. Groundwater transport is not an issue since the groundwater is not contaminated.

Existing Buildings and Structures

The subject site is occupied by two (2) single storey commercial buildings. The commercial building addressed 900 Bank Street has a slab-on-grade construction while the commercial building addressed 890 Bank Street has a partial basement level. 900 Bank Street has a loading dock that faces Monk Street.

Water Bodies and Areas of Natural Significance

No water bodies or areas of natural significance were identified on the subject site or in the Phase I study area.

Drinking Water Wells

A search of the MOE water well database returned seventeen (17) water well records within the study area. All of these records consisted of clusters of monitoring wells associated with the redevelopment of Lansdowne Park located 45m to the southeast of the subject site. The well records delineate areas of impacted fill associated with a former landfill (Ur-27) which is outside the Phase I study area. Due to the availability of municipal water services in the area of the subject site, it is our opinion that there are no drinking water wells within the Phase I study area.

Neighbouring Land Use

Neighbouring land use in the Phase I study area is generally residential and commercial.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

The Areas of Potential Environmental Concern identified in the Phase I ESA are summarized below in Table 1. Other Potentially Contaminating Activities within the Phase I study area are not considered to pose an environmental concern to the subject site due to their separation distance and/or location down-gradient or cross-gradient of the subject site.

Table 1: Areas of Potential Environmental Concern

Source of Potentially Contaminating Activity	Location of Area of Potential Environmental Concern	Potentially Contaminating Activity	Location of PCA	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
890 Bank Street	Subject Property	Former Use as a Retail Fuel Outlet (1950's-1980's); Item 28, Table 2, O.Reg. 153/04 (Gasoline and Associated Products Storage in Fixed Tanks)	On-Site	PHCs (F1-F4) and BTEX	Soil, Groundwater
890 Bank Street	Subject Property	Existing Commercial Automobile Garage (1980's – Present); Item 28, Table 2, O.Reg. 153/04 (Garages and Maintenance and Repair)	On-Site	PHCs (F1-F4) and VOCs	Soil, Groundwater
912 Bank Street	Adjacent to the south	Former Use as a Retail Fuel Outlet (1930s-1956); Item 28, Table 2, O.Reg. 153/04 (Gasoline and Associated Products Storage in Fixed Tanks)	Off-Site	PHCs (F1-F4) and 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 to be sufficient to conclude that there are areas of potential environmental concern on the subject site and adjacent to the site which have the potential to have impacted the subject site.

The presence of potentially contaminating activities was confirmed by a variety of independent sources, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Deviations from Sampling and Analysis Plan

The Sampling and Analysis Plan for this project is included in Appendix 1 of this report. No deviations from the sampling and analysis plan were noted.

3.5 Impediments

No physical impediments or denial of access were encountered during the Phase II Environmental Site Assessment.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was conducted on August 19, 2013, September 25, 2013, and December 9, 2013. The subsurface investigation consisted of the drilling eleven (11) boreholes on the subject site, six (6) of which were completed with groundwater monitoring wells. The boreholes were placed to provide general coverage of the subject site and to address the aforementioned areas of potential environmental concern. The boreholes were drilled with a truck mounted CME 55 power auger drill rig. The truck mounted drill rig was provided by George Downing Estate Drilling of Hawkesbury, Ontario. Borehole locations are shown on Drawing PE3078-4 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

A total of one-hundred and eleven (111) soil samples were obtained from the boreholes by means of split spoon sampling. The depths at which split spoon samples were obtained from the boreholes are shown as "**SS**" on the Soil Profile and Test Data Sheets, appended to this report.

Site soils consist of asphalt or concrete underlain by native silty sand. A thin layer of granular fill was encountered at 890 Bank Street. The fill layer varied in thickness from 0.17 to 0.31m.

All of the boreholes ended within the underlying layer of silty sand at depths of 4.50 to 10.67m below ground surface.

4.3 Field Screening Measurements

All soil samples collected underwent a preliminary screening procedure, which included visual screening for colour and evidence of deleterious fill, as well as screening with a RKI Eagle gas detector (Gastech).

The soil vapours were measured by inserting the analyzer probe into the nominal headspace above the soil sample. Samples were then agitated and the peak readings recorded. The combustible vapour readings ranged from 0 to 39% LEL. The higher readings indicate the potential for contamination from volatile petroleum products. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

Soil samples were selected for analysis based on visual appearance, location, and vapour readings.

4.4 Groundwater Monitoring Well Installation

Six (6) groundwater monitoring wells were installed on the subject site during the subsurface investigations. Copies of the borehole logs for these wells are included in Appendix 1. The monitoring wells consisted of 50mm diameter Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed 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
900 Bank Street						
BH4-13	98.84	9.75	7.32-9.75	6.70-9.75	0.30-6.70	Flushmount
890 Bank Street						
BH1-13	99.48	10.67	7.62-10.67	7.18-10.67	0.30-7.18	Flushmount
BH2-13	99.59	9.75	6.70-9.75	6.23-9.75	0.30-6.23	Flushmount
BH4-13	99.48	10.67	7.61-10.67	7.18-10.67	0.30-7.18	Flushmount
BH5-13	99.44	10.06	8.52-10.06	7.92-10.06	0.30-7.92	Flushmount
BH7-13	99.51	10.67	7.62-10.67	6.83-10.67	0.30-6.83	Flushmount

4.5 Field Measurement of Water Quality Parameters

Prior to sampling, attempts were made to measure water quality parameters in the field using a multi-parameter analyzer. All wells were purged of three (3) well volumes or purged dry and allowed to stabilize prior to sampling.

4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MOE document entitled "Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario", dated May 1996. Groundwater samples were obtained from each monitoring well, using dedicated sampling equipment. Standing water was purged from each well prior to sampling. 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 Appendix 1.

4.7 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan appended to this report, the following soil and groundwater samples were submitted for analysis:

Table 3: Soil Samples Submitted

Sample ID	Sample Depth / Stratigraphic Unit	Parameters Analyzed		Rationale
		PHCs (F_1-F_4) BTEX	VOCs	
900 Bank Street				
BH1-13-SS7	5.33-5.94 m; Silty Sand	X		Assessment of potential PHC impacts (in the silty sand layer), near the centre of the property.
BH2-13-SS7	5.33-5.94 m; Silty Sand	X		Assessment of potential PHC impacts (in the silty sand layer), in the southeast corner, adjacent to the former retail fuel outlet.
BH4-13-SS11	8.38-8.99 m; Silty Sand	X		Assessment of potential PHC and BTEX impacts (in the silty sand layer), along the western property boundary.
890 Bank Street				
BH1-13-SS11	8.38-8.99 m; Silty Sand	X		Assessment of potential PHC impacts (in the silty sand layer), in the northeast corner of the property
BH2-13-SS4	3.05-3.66 m; Silty Sand	X	X	Assessment of potential PHC and VOC impacts (in the silty sand layer), along the northern property boundary
BH3-13-SS4	3.05 -3.66 m; Silty Sand	X	X	Assessment of potential PHC and VOC impacts (in the silty sand layer), along the northern property boundary
BH5-13-SS4	3.05 -3.66 m; Silty Sand	X		Assessment of potential PHC impacts (in the silty sand layer), along the northern property boundary.

BH5-13-SS10	7.62-8.23 m; Silty Sand	X		Assessment of potential PHC impacts (in the silty sand layer), contaminant delineation along the northern property boundary.
BH6-13-SS4	3.05-3.66 m; Silty Sand	X		Assessment of potential PHC impacts (in the silty sand layer), contaminant delineation along the northern property boundary.
BH7-13-SS5	3.81 -4.42 m; Silty Sand	X		Assessment of potential PHC impacts (in the silty sand layer), contaminant delineation along the northern property boundary.

Table 4: Groundwater Samples Submitted

Sample ID	Screened Interval/ Stratigraphic Unit	Parameters Analyzed		Rationale
		PHCs (F_1-F_4)	VOCs	
900 Bank Street				
BH4-13-GW1	7.32-9.75 m; Silty Sand	X	X	Assessment of potential PHC and VOC impacts in the groundwater in the western portion of the property.
BH2 (MW101)	7.02-10.20 m; Silty Sand	X	X	Assessment of potential PHC and VOC impacts in the groundwater from the former retail fuel outlet located adjacent to the south.
BH7 (MW102)	7.44-9.83 m; Silty Sand	X	X	Assessment of potential PHC and VOC impacts in the groundwater in the northeast corner of the property.
890 Bank Street				
BH1-13-GW1	7.62-10.67 m; Silty Sand	X	X	Assessment of potential PHC and VOC impacts in the groundwater in the northeast corner of the property.
BH2-13-GW1	6.70-9.75 m; Silty Sand	X	X	Assessment of potential PHC and VOC impacts in the groundwater along the northern property boundary.
BH4-13-GW1	7.61-10.67 m; Silty Sand	X	X	Assessment of potential PHC and VOC impacts in the groundwater next to the southeastern bay door.
BH5-13-GW1	8.52-10.06 m; Silty Sand	X	X	Assessment of potential PHC and VOC impacts in the groundwater along the northern property boundary.
BH7-13-GW1	7.62-10.67; Silty Sand	X	X	Assessment of potential PHC and VOC impacts in the groundwater along the northern property boundary.

Paracel Laboratories (Paracel), of Ottawa, Ontario, performed the laboratory analysis on the samples submitted for analytical testing. Paracel is a member of the Standards Council of Canada/Canadian Association for Laboratory Accreditation (SCC/CALA). Paracel is accredited and certified by SCC/CALA for specific tests registered with the association.

4.8 Residue Management

All excavated soil, purge water and fluids from equipment cleaning were retained on-site.

4.9 Elevation Surveying

An elevation survey of all borehole locations was completed by Paterson at the time of the subsurface investigation. All borehole elevations are relative to the top spindle of the fire hydrant located on the northeast corner of Bank Street and Clarey Avenue, just east of the subject site. The top of the spindle was assigned an arbitrarily elevation of 100.00 m.

4.10 Quality Assurance and Quality Control Measures

A summary of quality assurance and quality control (QA/QC) measures, including sampling containers, preservation, labelling, handling, and custody, equipment cleaning procedures, and field quality control measurements is provided in the Sampling and Analysis Plan in Appendix 1.

5.0 REVIEW AND EVALUATION

5.1 Geology

Site soils consist of thin crushed stone fill layer over silty sand. Bedrock is considered to consist of interbedded limestone and shale from the Verulam Formation and is more than 10m below ground surface. Site stratigraphy is shown on Drawing PE3078-7 – Cross-Section A-A' and Drawing PE3078-8 – Cross-Section B-B'.

Groundwater was encountered within the silty sand at depths ranging from 7.87 to 9.50m below existing grade.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling events on August 28, 2013, October 2, 2013 and December 20, 2013, using an electronic water level meter. Groundwater levels are summarized below in Table 5. All measurements are relative to the top of the fire hydrant spindle located on the northeast corner of Bank Street and Clarey Avenue, to the east of the subject site.

Table 5: Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
900 Bank Street				
BH4-13	98.84	8.71	90.13	August 28, 2013
BH2 (MW101)	98.79	8.79	90.00	August 28, 2013
BH7 (MW102)	99.39	9.01	90.38	August 28, 2013
890 Bank Street				
BH1-13	99.48	8.80	90.68	October 2, 2013
BH2-13	99.59	9.50	90.09	October 2, 2013
BH4-13	99.48	9.20	90.28	October 2, 2013
BH5 (MW101)	99.41	8.9	90.51	October 2, 2013
BH8 (MW102)	99.46	Dry	-	October 2, 2013
BH5-13	99.44	7.87	91.57	December 20, 2013
BH7-13	99.51	8.11	91.40	December 20, 2013

Based on the groundwater elevations from the October 2013 sampling event, groundwater contour mapping was completed. Groundwater contours are shown on Drawing PE3078-5 - Groundwater Contour Plan. Based on the contour mapping, groundwater flow at 890 Bank Street appears to flow in an easterly direction. A horizontal hydraulic gradient of approximately 0.03 m/m was calculated.

No free product was observed in the monitoring wells sampled at the subject site.

5.3 Fine-Coarse Soil Texture

Based on field soil observations, fine-grained soil standards are not applicable to the subject site.

5.4 Soil: Field Screening

Field screening of the soil samples collected during drilling resulted in combustible vapour readings of 0 to 39% LEL. Field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

5.5 Soil Quality

A total of ten (10) soil samples were submitted for analysis of a combination of PHCs (F1-F4), BTEX or VOCs. The results of the analytical testing are presented below in Tables 6, 7, and 8. The laboratory certificates of analysis are provided in Appendix 1.

Table 6: Analytical Test Results – Soil – BTEX and PHCs (F1-F4)

Parameter	MDL (µg/g)	Soil Samples (µg/g)					MOE Table 3 Commercial Coarse Standards (µg/g)
		August 19, 2013 900 Bank Street			September 25, 2013 890 Bank Street		
		BH1-13 SS7	BH2-13 SS7	BH4-13 SS11	BH1-13 SS11	BH2-13 SS4	
Benzene	0.02	nd	nd	nd	nd	nd	0.32
Ethylbenzene	0.05	nd	nd	nd	nd	0.08	9.5
Toluene	0.05	nd	nd	nd	nd	nd	68
Xylenes (Total)	0.05	nd	nd	nd	0.78	1.43	26
PHC F1	7	nd	nd	nd	nd	12	55
PHC F2	4	nd	nd	nd	nd	**300**	230
PHC F3	8	nd	nd	nd	nd	81	1,700
PHC F4	6	nd	nd	nd	nd	nd	3,300

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds MOE Table 3 standards

PHC fraction F2 was detected above the MOE Table 3 standard in soil Sample BH2-13-SS4. The remaining detected parameters were below the MOE Table 3 standards.

Table 7: Analytical Test Results – Soil – BTEX and PHCs (F1-F4)

Parameter	MDL (µg/g)	Soil Samples (µg/g)					MOE Table 3 Commercial Coarse Standards (µg/g)
		September 25, 2013	December 9, 2013				
		890 Bank Street					
		BH3-13 SS4	BH5-13 SS4	BH5-13 SS10	BH6-13 SS4	BH7-13 SS5	
Benzene	0.02	nd	<0.2*	nd	<0.2*	nd	0.32
Ethylbenzene	0.05	9.36	**117**	nd	**35.4**	**11.5**	9.5
Toluene	0.05	4.19	<0.5*	nd	13.2	2.76	68
Xylenes (Total)	0.05	**33.4**	**586**	0.41	**387**	22.7	26
PHC F1	7	**348**	**6960**	nd	**4,070**	**559**	55
PHC F2	4	**959**	**394**	nd	176	8	230
PHC F3	8	66	44	nd	110	nd	1,700
PHC F4	6	nd	nd	nd	nd	nd	3,300

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds MOE Table 3 standards
- *** -** Elevated detection limit due to high target analyte concentration

Several of the detected concentrations in soil sample BH3-13-SS4, BH5-13-SS4, BH6-13-SS4 and BH7-13-SS5 are in excess of the MOE Table 3 standards.

Table 8: Analytical Test Results – Soil - VOCs

Parameter	MDL (µg/g)	Soil Sample (µg/g)		MOE Table 3 Commercial Coarse Standards
		September 25, 2013		
		890 Bank Street		
		BH2-13 SS4	BH3-13 SS4	
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
m-Dichlorobenzene	0.20	nd	nd	9.6
o-Dichlorobenzene	0.05	nd	nd	6.8
p-Dichlorobenzene	0.05	nd	nd	0.2
Dichlorodifluoromethane	0.05	nd	nd	16
1,1-Dichloroethane	0.05	nd	nd	17
1,2-Dichloroethane	0.05	nd	nd	0.05
1,1-Dichlroethylene	0.05	nd	nd	0.064
c-1,2-Dichloroethylene	0.05	nd	nd	55
t-1,2-Dichloroethylene	0.05	nd	nd	1.3
1,2-Dichloropropane	0.05	nd	nd	0.16
c-1,3-Dichloropropene	0.05	nd	nd	0.18
Ethylbenzene	0.05	0.08	9.36	9.5
Hexane	0.05	0.34	28.6	46
Methyl Ethyl Ketone	0.5	nd	nd	70
Methyl Isobutyl Ketone	0.5	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
1,1,1,2-Tetrachloroethane	0.50	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	4.19	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
1,3,5-Trimethylbenzene	0.05	nd	2.59	nv
Vinyl Chloride	0.02	nd	nd	0.032
Xylenes	0.05	1.43	**33.4**	26

Notes:
- MDL – Method Detection Limit;
- nd – not detected above the MDL
- nv – No value for MOE standards
- **Bold and Underlined** – Value exceeds MOE Table 3 standards

The xylene concentration is in excess of the MOE Table 3 standards. The remaining detected parameters were in compliance with the MOE Table 3 standards.

The maximum concentrations of analyzed parameters in the soil at the site are summarized below in Table 9.

Table 9: Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Borehole	Depth Interval (m BGS)
Ethylbenzene	**117**	BH5-13	3.05 - 3.66
Toluene	13.2	BH6-13	3.05 - 3.66
Xylene	**586**	BH5-13	3.05 - 3.66
PHC F1	**6960**	BH5-13	3.05 - 3.66
PHC F2	**959**	BH3-13	3.05 - 3.66
PHC F3	110	BH6-13	3.05 - 3.66
Hexane	28.6	BH3-13	3.05 - 3.66
1,3,5-Trimethylbenzene	2.59	BH3-13	3.05 - 3.66

Notes:
- **Bold and Underlined** – Value exceeds MOE Table 3 standards

All other parameter concentrations were below laboratory detection limits.

5.6 Groundwater Quality

Groundwater samples from monitoring wells installed in BH4-13, BH2 (MW101) and BH7 (MW102) on 900 Bank Street, and BH1-13, BH2-13, BH4-13 and BH5-13 and BH7-13 on 890 Bank Street, were submitted for laboratory analysis of PHCs and VOC parameters. The groundwater samples were obtained from the screened intervals noted on Table 2. The results of the analytical testing are presented below in Tables 10, 11, 12 and 13. The laboratory certificates of analysis are provided in Appendix 1.

Table 10: Analytical Test Results – Groundwater - PHCs (F1-F4)					
Parameter	**MDL (µg/L)**	**Groundwater Samples (µg/L)**			**MOE Table 3 Commercial Coarse Standards (µg/L)**
		900 Bank Street			
		August 28, 2013			
		BH4-13 GW1	**BH2 (MW101)**	**BH7 (MW102)**	
PHC F1	25	nd	nd	nd	750
PHC F2	100	nd	nd	nd	150
PHC F3	100	nd	nd	nd	500
PHC F4	100	nd	nd	nd	500

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

Table 11: Analytical Test Results – Groundwater - PHCs (F1-F4)							
Parameter	**MDL (µg/L)**	**Groundwater Samples (µg/L)**					**MOE Table 3 Residential Coarse Standards (µg/L)**
		890 Bank Street					
		October 2, 2013			**December 20, 2013**		
		BH1-13 GW1	**BH2-13 GW1**	**BH4-13 GW1**	**BH5-13 GW1**	**BH7-13 GW1**	
PHC F1	25	nd	nd	nd	nd	nd	750
PHC F2	100	nd	nd	nd	nd	nd	150
PHC F3	100	nd	nd	nd	nd	nd	500
PHC F4	100	nd	nd	nd	nd	nd	500

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

No PHC parameters were detected above the detection limits in the eight (8) groundwater samples submitted for analysis.

Table 12: Analytical Test Results – Groundwater – VOCs					
Parameter	**MDL (µg/L)**	**Groundwater Samples (µg/L)**			**MOE Table 3 Commercial Coarse Standards (µg/L)**
		August 28, 2013			
		BH4-13 GW1	**BH2 (MW101)**	**BH7 (MW102)**	
Acetone	5.0	nd	nd	nd	130,000
Benzene	0.5	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	85,000
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
Chloroethane	1.0	nd	nd	nd	nv
Chloroform	0.5	nd	nd	nd	2.4
Chloromethane	3.0	nd	nd	nd	nv
Dibromochloromethane	0.5	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	4,400
1,2-Dibromoethane	0.2	nd	nd	nd	0.25
1,2-Dichlorobenzene	0.5	nd	nd	nd	4,600

1,3-Dichlorobenzene	0.5	nd	nd	nd	9,600
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
1,3-Dichloropropene	0.5	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	2,300
Hexane	1.0	nd	nd	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	470,000
Methyl Butyl Ketone	10.0	nd	nd	nd	nv
Methyl Isobutyl Ketone	5.0	nd	nd	nd	140,000
Methyl tert-butyl Ether	2.0	nd	nd	nd	1900
Methylene Chloride	5.0	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	3.4
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	1.6
Toluene	0.5	nd	nd	nd	18,000
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	1.0	nd	nd	nd	2,500
1,3,5-Trimethylbenzene	0.5	nd	nd	nd	nv
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	nd	4,200

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL

Table 13: Analytical Test Results – Groundwater – VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)					MOE Table 3 Commercial Coarse Standards (µg/L)
		October 2, 2013			December 20, 2013		
		BH1-13 GW1	BH2-13 GW1	BH4-13 GW1	BH5-13 GW1	BH7-13 GW1	
Acetone	5.0	nd	nd	nd	nd	nd	130,000
Benzene	0.5	nd	nd	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	nd	nd	85,000
Bromoform	0.5	nd	nd	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	nd	nd	630
Chloroethane	1.0	nd	nd	nd	nd	nd	nv
Chloroform	0.5	nd	1.8	nd	0.9	1.7	2.4
Chloromethane	3.0	nd	nd	nd	nd	nd	nv
Dibromochloromethane	0.5	nd	nd	nd	nd	nd	82,000

Dichlorodifluoromethane	1.0	nd	nd	nd	nd	nd	4,400
1,2-Dibromoethane	0.2	nd	nd	nd	nd	nd	0.25
1,2-Dichlorobenzene	0.5	nd	nd	nd	nd	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	nd	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	nd	nd	16
1,3-Dichloropropene	0.5	nd	nd	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	nd	nd	2,300
Hexane	1.0	nd	nd	nd	nd	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	nd	nd	470,000
Methyl Butyl Ketone	10.0	nd	nd	nd	nd	nd	nv
Methyl Isobutyl Ketone	5.0	nd	nd	nd	nd	nd	140,000
Methyl tert-butyl Ether	2.0	nd	nd	nd	nd	nd	1900
Methylene Chloride	5.0	nd	nd	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	nd	nd	3.4
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	0.8	nd	1.6
Toluene	0.5	nd	nd	nd	nd	nd	18,000
1,1,1-Trichloroethane	0.5	nd	nd	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	nd	nd	2,500
1,3,5-Trimethylbenzene	0.5	nd	nd	nd	nd	nd	nv
Vinyl Chloride	0.5	nd	nd	nd	nd	nd	0.5
Xylenes	0.5	nd	3.4	nd	nd	nd	4,200

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds MOE Table 3 standards

The detected VOC parameter concentrations identified in the groundwater samples analysed are in compliance with the MOE Table 3 residential and commercial standards.

The maximum final concentrations of analyzed parameters in the groundwater at the site are summarized below in Table 14.

Table 14: Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Borehole	Depth Interval (m BGS)
Chloroform	1.7	BH7-13	7.62-10.67
Tetrachloroethylene	0.8	BH5-13	8.52-10.06
Xylene	3.4	BH2-13	6.70-9.75

Notes:
- **Bold** – Value exceeds selected MOE standards

All the detected groundwater parameter concentrations were in compliance with the MOE Table 3 standards.

It is our interpretation that the analyzed parameter concentrations do not indicate the potential presence of light non-aqueous phase liquids (LNAPLs) or dense non-aqueous phase liquids (DNAPLs). No free phase hydrocarbons were noted in the wells sampled at the time of sampling.

5.7 Quality Assurance and Quality Control Results

A duplicate groundwater sample was not obtained during the 2013 sampling events. The conclusions of the report are not considered to be affected by this, as all of the analyzed groundwater parameters are in compliance with the selected MOE standards.

All samples submitted as part of the 2013 sampling event 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 analysis during the 2013 sampling event, and 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 objectives 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 Activity and Areas of Potential Environmental Concern

As indicated in the Phase I-ESA report, the existing automotive garage is the only Potentially Contaminating Activities (PCAs) currently taking place at the subject site. The historic PCAs that are considered to represent an Area of Potential Environmental Concern (APEC) on the subject site are the former use of 890 Bank Street and the adjacent property to the south (912 Bank Street) as retail fuel outlets.

PHCs, BTEX, or VOCs are identified as the Contaminants of Concern with respect to the subject site potentially resulting from the aforementioned APECs.

Contamination was identified during the subsurface investigation in the native silty sand layer. The results indicate that a silty fine sand layer in the northwest corner of 890 Bank Street contains PHC (F1-F2), ethylbenzene and xylene concentrations that exceed the MOE Table 3 standards. The other detected parameter concentrations were in compliance with the MOE Table 3 standards.

Subsurface Structures and Utilities

Underground service locates were completed prior to the subsurface investigations. A natural gas line and Bell cable run from the northwest corner of 890 Bank Street towards Thornton Avenue. A private electrical conduit connects the sign to the building.

A natural gas line runs from the northwest corner of 900 Bank Street towards Monk Street and a Bell cable runs along the southern property line. An electrical conduit connects the building to a hydro pole located along Bank Street. No private water wells or septic systems are present on the subject site.

Physical Setting

Site Stratigraphy

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is illustrated on Drawings PE3078-7 and 8 - Cross-Section A-A' and B-B'. Stratigraphy consists of:

- Fill, consisting of crushed stone varying in thickness from 0.17 to 0.31m. Groundwater was not observed in this stratigraphic unit.
- Silty sand was encountered at depths ranging from 0.20 to 10.67 m. Groundwater was encountered in this stratigraphic unit.
- The boreholes were terminated in the silty sand at depths ranging from 4.50 to 10.67m.

Hydrogeological Characteristics

Groundwater was encountered in the silty sand layer at the subject site. This unit is interpreted to function as a local aquifer at the subject site.

Water levels were measured at the subject site on August 28, 2013, October 2, 2013 and December 20, 2013. Water levels are summarized above in Section 5.2 of this report and are shown on Drawing PE3078-5.

Based on the groundwater elevations from the October 2013 monitoring event, groundwater contour mapping was completed and the horizontal hydraulic gradient for the subject site was calculated. Groundwater flow at the subject site was in an easterly direction. A hydraulic gradient of approximately 0.03 m/m was calculated.

Approximate Depth to Bedrock

Bedrock was not encountered in the boreholes advanced on the subject site. According to the geological maps consulted as part of the Phase I – ESA, bedrock depth is suspected to be approximately 10 to 15m below ground surface.

Approximate Depth to Water Table

Depth to water table at the subject site varies between approximately 7.87 to 9.50m below existing grade.

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 in that the subject site is not a Shallow Soil Property.

Fill Placement

Fill material was identified at the subject site. This fill material is suspected to be present in a relatively thin and uniform layer of approximately 0.17 to 0.31m thick in the parking areas of 890 Bank Street. The fill is suspected to have been placed on the subject site during redevelopment of the subject site. The fill material did not exhibit any visual or olfactory evidence of contamination.

Proposed Buildings and Other Structures

It is our understanding that the site is to be redeveloped with a multi-storey commercial building. No further information is available regarding the proposed redevelopment.

Existing Buildings and Structures

The subject site is currently occupied by two (2) commercial buildings. The building addressed 890 Bank Street has a partial basement while 900 Bank Street has a slab-on-grade construction. The exterior of the buildings consists of a mixture of brick, glass and metal siding and both have flat tar-and-gravel style roofs. No other buildings or structures are present on the subject site.

Water Bodies

There are no water bodies on the subject site or within the Phase I study area.

Areas of Natural Significance

No areas of natural significance are present in the area of the subject site.

Environmental Condition

Areas Where Contaminants are Present

Based on screening and analytical results, PHC (F1-F2), ethylbenzene and xylene contaminated soil is present in the northwest corner of 890 Bank Street in a specific layer of “silty fine sand” from 3.05 to 3.66m in excess of the MOE Table 3 standards. The groundwater samples obtained at the subject site were not contaminated. Sample locations are illustrated on Drawings PE3078-6.

Types of Contaminants

Based on the potentially contaminating activities identified at the subject site and the results of the Phase I-II ESAs previously conducted, the contaminants of concern (COCs) are considered to be petroleum hydrocarbons (PHCs) and volatile organic compounds (VOCs.

Contaminated Media

Based on the results Phase II – ESA’s the soil in the northwest corner of the subject site is impacted with PHCs and BTEX parameters (identified in the silty fine sand layer). Groundwater samples obtained from the subject site were in compliance with the selected MOE standards.

What Is Known About Areas Where Contaminants Are Present

The property addressed 890 Bank Street, is considered to have been utilized as a retail fuel outlet with three (3) underground storage tanks (USTs) from the 1950’s to circa 1970, after which it was redeveloped into a commercial automobile service garage. The fire insurance plans (FIPs) from 1956 show the location of the three (3) USTs as being to the north of the former building. No other potentially contaminating activities have been identified for the subject site.

Distribution and Migration of Contaminants

An area of PHC (F1 and F2), ethylbenzene and xylene contamination was found in the northwest corner of 890 Bank Street. The approximate vertical and horizontal distributions of contaminants are shown on Drawings PE3078-5, 6 and 7.

The 2014 supplemental Phase II-ESA aimed to further delineate the identified PHC impacted soil along the northern property boundary. Given the proximity of boreholes from which contaminated soil samples were obtained, it is possible that some impacted soil exists in the adjacent right-of-way.

Discharge of Contaminants

No discharge of contaminants was observed at the time of the site visit.

Climatic and Meteorological Conditions

In general, climatic and meteorological conditions have the potential to affect contaminant distribution. Two (2) ways by which climatic and meteorological conditions may affect contaminant distribution include the downward leaching of contaminants by means of the infiltration of precipitation, and the migration of contaminants via groundwater levels and/or flow, which may fluctuate seasonally. Leaching is not considered an issue since the parking areas are paved, and fluctuation of groundwater levels is not considered an issue as the groundwater is not contaminated.

Potential for Vapour Intrusion

The commercial building addressed 890 Bank Street, near which contamination was encountered, operates as a commercial automobile garage and will be demolished to facilitate redevelopment of the subject site. The building is not considered to be at risk given the contaminant concentrations in the northern corner of the property and the fact that the majority of the building is a slab-on-grade structure. The building will be vacated and demolished in the near future to accommodate site redevelopment, at which time the PHC and BTEX impacted soil will be remediated.

6.0 CONCLUSIONS

Assessment

Phase II ESAs were conducted for the property at 890 and 900 Bank Street, Ottawa, Ontario. The purpose of these Phase II ESAs was to address the areas of potential environmental concern identified during the Phase I ESA, in particular the historical use of the northern portion of the subject site (890 Bank Street) as a retail fuel outlet and commercial automobile garage. The subsurface investigation at the subject site consisted of drilling eleven (11) boreholes and installing six (6) groundwater monitoring wells.

Soil samples were obtained from the boreholes and screened using visual observations and organic vapour measurements. A total of ten (10) soil samples were submitted for laboratory analysis for a combination of PHC, BTEX and VOC parameters. Five (5) soil samples recovered from boreholes located along the northern property line exceeded the MOE Table 3 standards for PHC F1 and F2, ethylbenzene and xylenes. All other samples were in compliance with the MOE Table 3 standards.

Groundwater samples were obtained from eight (8) monitoring wells and submitted for analysis of PHCs and VOCs. All samples were in compliance with the selected MOE Table 3 standards.

Conclusion

Based on the above results, soil exists at the subject property with PHC and BTEX concentrations which exceed the MOE Table 3 standards. It is our understanding that the subject site is to be redeveloped with a multi-storey commercial building. It is our recommendation that an environmental site remediation program, involving the removal of all contaminated soil, be completed concurrently with the site redevelopment. It is also recommended that a member of this firm be present at the time of the removal of the impacted soil in order to provide direction and to obtain confirmatory soil samples upon the completion of the remediation program.

If soil which contains contaminant concentrations that meet the subject property standards but exceed MOE Table 1 (background) standards has to be removed from the site for construction purposes, it will have to be disposed of at an approved waste disposal facility at a premium.

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared in general accordance with O.Reg. 153/04 as amended by O.Reg. 269/11, and meets the requirements of CSA Z769-00. 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.

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 of the test holes themselves.

Should any conditions be encountered at the subject site and/or historical information that differ from our findings, we request that we be notified immediately in order to allow for a reassessment.

This report was prepared for the sole use of Canderel Management Inc. and notification from Canderel and Paterson will be required to release this report to any other party.

Paterson Group Inc.

Xavier Redhead, B.Eng.

Mark S. D'Arcy, P.Eng.

Report Distribution:

- Canderel Management Inc. (3 copies)
- Paterson Group (1 copy)

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE3078-4 – TEST HOLE LOCATION PLAN

DRAWING PE3078-5 - GROUNDWATER CONTOUR PLAN

DRAWING PE3078-6 – ANALYTICAL TESTING PLAN

DRAWING PE3078-7 - CROSS-SECTION A-A’

DRAWING PE3078-8 - CROSS-SECTION B-B’

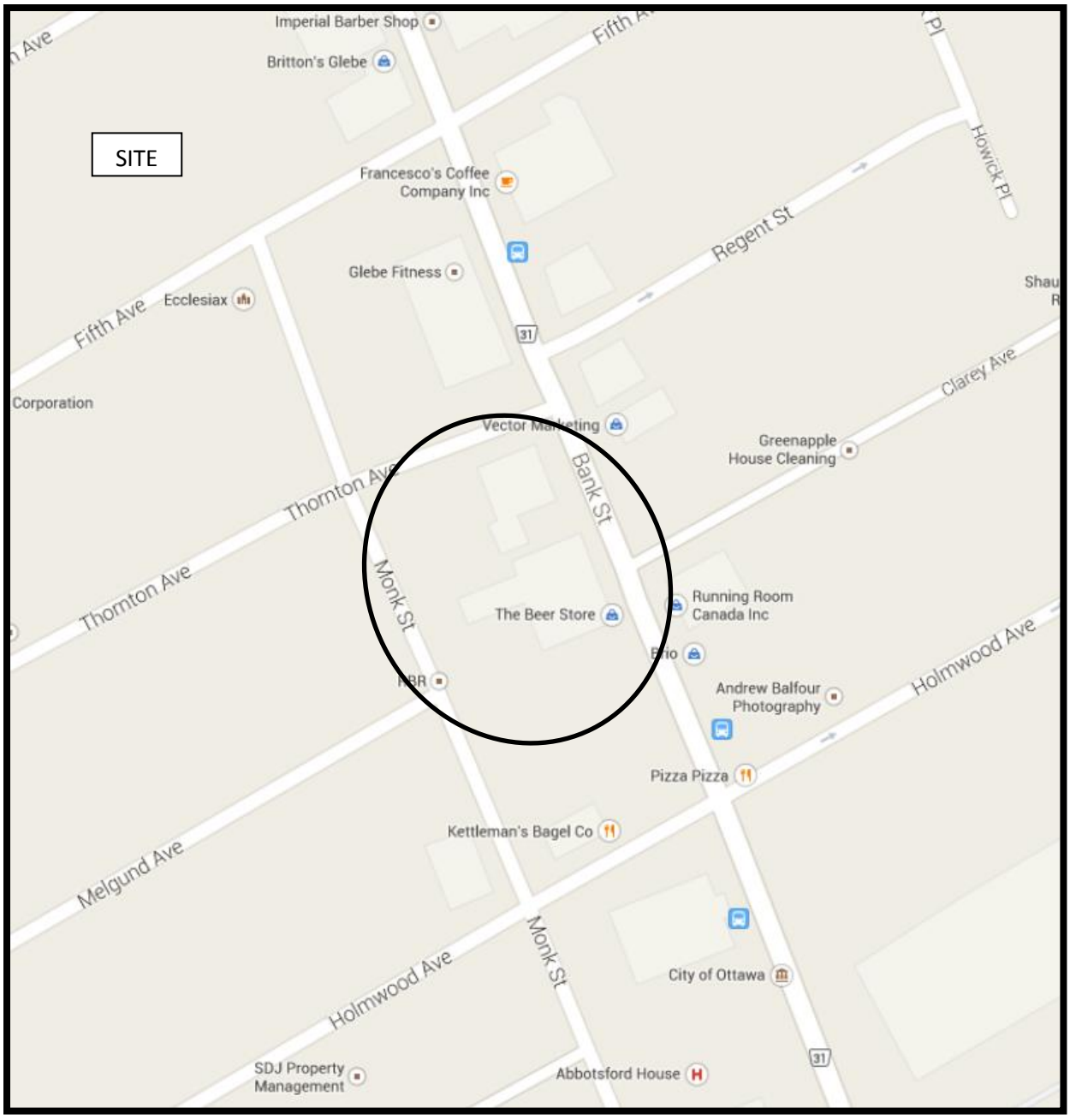

FIGURE 1

KEY PLAN

#869 BANK STREET
GLEBE MEAT MARKET

#873 BANK STREET
PINK HAIR SALON & SPA
BRIO

#885 BANK STREET
COMMERCIAL

#895 BANK STREET
MEXICALI ROSES
RESTAURANT

FH-TBM

#901 BANK STREET
RUNNING ROOM

#911 BANK STREET
PLANET BOTANIX
CIVIC SHAWARMA & PIES

#925 BANK STREET
TAJ MAHAL
INDIAN CUISINE

#929 BANK STREET
PIZZA PIZZA

REGENT STREET

CLAREY AVENUE

BANK STREET

#856 BANK STREET

#13 MONK AVENUE

THORNTON AVENUE

OLD INGROUND HOIST

MOTOR OIL TANKS

BH 1-13
99.48
(90.68)

BH 9
99.49

BH 4-13
99.48
(90.28)

BH 8
99.47

BH 7
99.39
(90.38)

GRASS

BH 11

BH 1-13
99.01

BH 2-13
98.87

BH 2-13
99.59
(90.09)

BH 5-13
99.44
(91.57)

BH 10

BH 10A

ASPHALTIC
CONCRETE
PARKING
AREA

BH 5
99.41
(90.51)

#912 BANK STREET
KETTLEMEN'S BAGEL

CB

BH 2
98.79
(90.00)

BH 8
99.46
(91.89)

BH 6-13
99.46

BH 3-13
99.67

BH 7-13
99.51
(91.40)

BH 12

#900 BANK STREET
THE BEER STORE

BH 1
98.91

BH 13

LOBBY

NATURAL GAS
CONNECTION

4-ABOVEGROUND
STORAGE TANKS

NATURAL GAS
CONNECTION

#890 BANK STREET
MISTER MUFFLER

WASTE STORAGE
LOCATION

ASPHALTIC CONCRETE
PARKING AREA

WASTE STORAGE
LOCATION

BH 3
98.88

RESIDENTIAL

GRASS

LOADING RAMP

GRASS

CB

CB

BH 4-13
98.84
(90.13)

BH 4
98.72

BH 3-13
98.89

#35 MONK AVENUE
RESIDENTIAL

#151 HOLMWOOD AVE.
RESIDENTIAL APARTMENT
BUILDING

MONK AVENUE

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE3113, 2013
- BOREHOLE LOCATION, PATERSON GROUP REPORT PE3113, 2013
- BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE2654, 2012
- BOREHOLE LOCATION, PATERSON GROUP REPORT PE2654, 2012
- 99.48 GROUND SURFACE ELEVATION (m)
- (90.00) GROUNDWATER SURFACE ELEVATION (m), AUGUST / OCTOBER / DECEMBER 2013

FH - TBM - TOP SPINDLE OF FIRE HYDRANT, ASSUMED ELEVATION = 100.00m

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consulting engineers

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Ottawa, Ontario, K2E 7J5
Tel: (613)226-7381 Fax: (613) 226-6344

REVISIONS	DATE	INITIAL

CANDEREL MANAGEMENT INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
890 AND 900 BANK STREET

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Drawn by:	Checked by:	Date:
MPG	MSD	06/2014
Scale: 1:400		Drawing No.: PE3078-4
Report No.: PE3078-3		

11x17

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REGENT STREET

#869 BANK STREET
GLEBE MEAT MARKET

#873 BANK STREET
PINK HAIR SALON & SPA
BRIO

#885 BANK STREET
COMMERCIAL

#895 BANK STREET
MEXICALI ROSES
RESTAURANT

FH-TBM

CLAREY AVENUE

#901 BANK STREET
RUNNING ROOM

#911 BANK STREET
PLANET BOTANIX
CIVIC SHAWARMA & PIES

#925 BANK STREET
TAJ MAHAL
INDIAN CUISINE

#929 BANK STREET
PIZZA PIZZA

B A N K S T R E E T

#856 BANK STREET

THORNTON AVENUE

OLD INGROUND HOIST

MOTOR OIL TANKS

BH 1-13
99.48
(90.88)

BH 9
99.49

BH 4-13
99.48
(90.28)

BH 5-13
99.44

BH 10

BH 6
99.47

90.3

(0.03 mm/mm)

BH 2-13
99.59

BH 10A

BH 5
99.41
(90.51)

90.4

ASPHALTIC CONCRETE PARKING AREA

BH 6-13
99.48

BH 8
99.48

90.6

BH 3-13
99.87

90.5

BH 7-13
99.51

BH 12

BH 13

LOBBY

4-ABOVEGROUND STORAGE TANKS

NATURAL GAS CONNECTION

#890 BANK STREET
MISTER MUFFLER

WASTE STORAGE LOCATION

RESIDENTIAL

BH 7
99.39

GRASS

BH 11

#900 BANK STREET
THE BEER STORE

NATURAL GAS CONNECTION

WASTE STORAGE LOCATION

GRASS

LOADING RAMP

GRASS

BH 1-13
99.01

BH 2-13
98.87

BH 1
98.91

CB

BH 2
98.79

#912 BANK STREET
KETTLEMEN'S BAGEL

ASPHALTIC CONCRETE PARKING AREA

BH 3
98.88

CB

CB

BH 4-13
98.84

BH 4
98.72

BH 3-13
98.89

#35 MONK AVENUE
RESIDENTIAL

#151 HOLMWOOD AVE.
RESIDENTIAL APARTMENT
BUILDING

M O N K A V E N U E

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE3113, 2013
- BOREHOLE LOCATION, PATERSON GROUP REPORT PE3113, 2013
- BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE2654, 2012
- BOREHOLE LOCATION, PATERSON GROUP REPORT PE2654, 2012

99.48 GROUND SURFACE ELEVATION (m)

(90.00) GROUNDWATER SURFACE ELEVATION, OCTOBER 2013

90.5 GROUNDWATER CONTOUR

0.03 mm/mm APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

paterson group
consulting engineers

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Ottawa, Ontario, K2E 7J5
Tel: (613)226-7381 Fax: (613) 226-6344

REVISIONS	DATE	INITIAL

CANDEREL MANAGEMENT INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
890 AND 900 BANK STREET

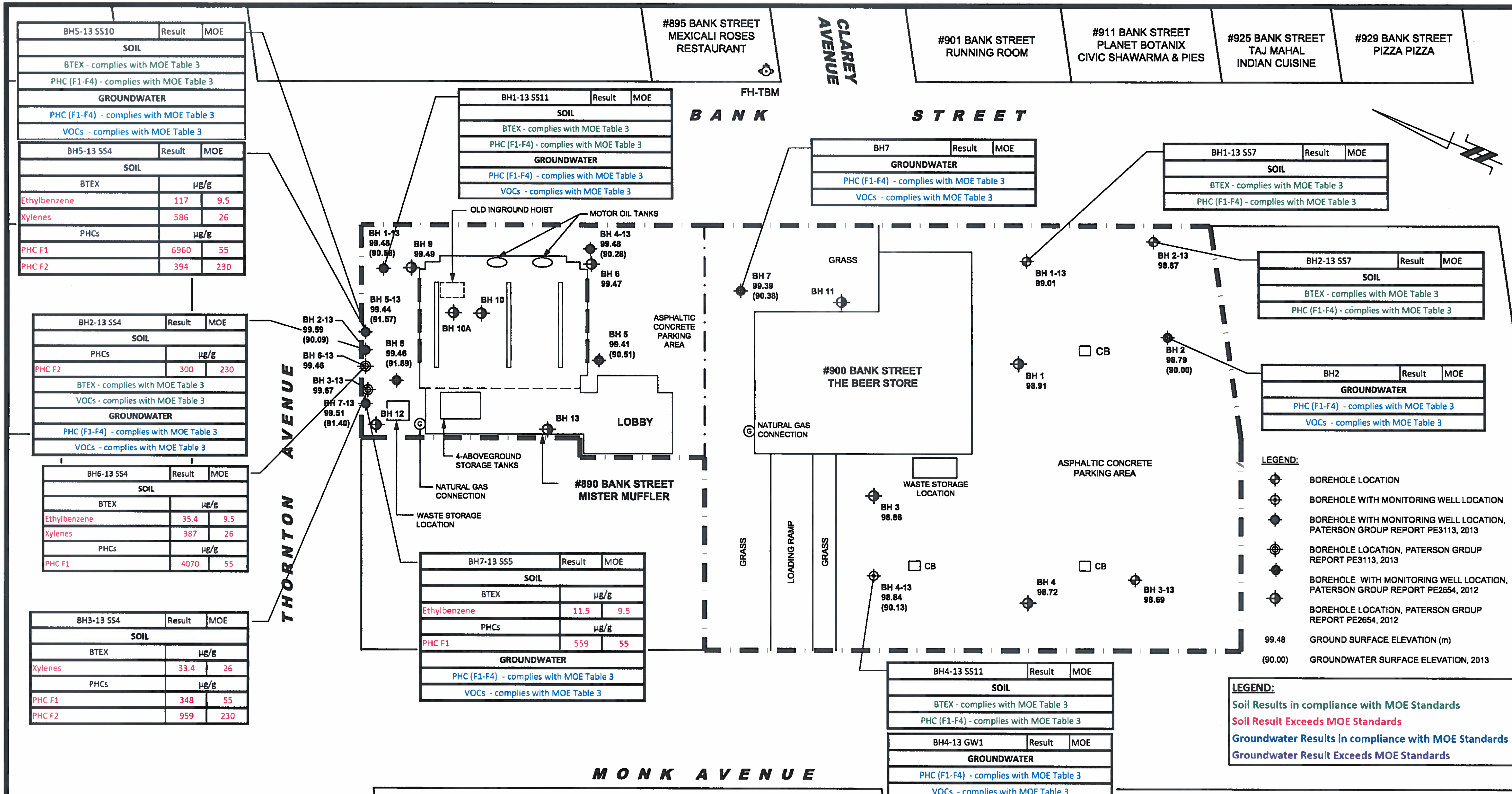
OTTAWA, ONTARIO

Title:

GROUNDWATER CONTOUR PLAN

Drawn by:	Checked by:	Date:
MPG	MSD	06/2014
Scale: 1:400		Drawing No.: PE3078-5
Report No.: PE3078-3		

11x17



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NO.	REVISIONS	DATE	INITIAL

CANDEREL MANAGEMENT INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
890 AND 900 BANK STREET

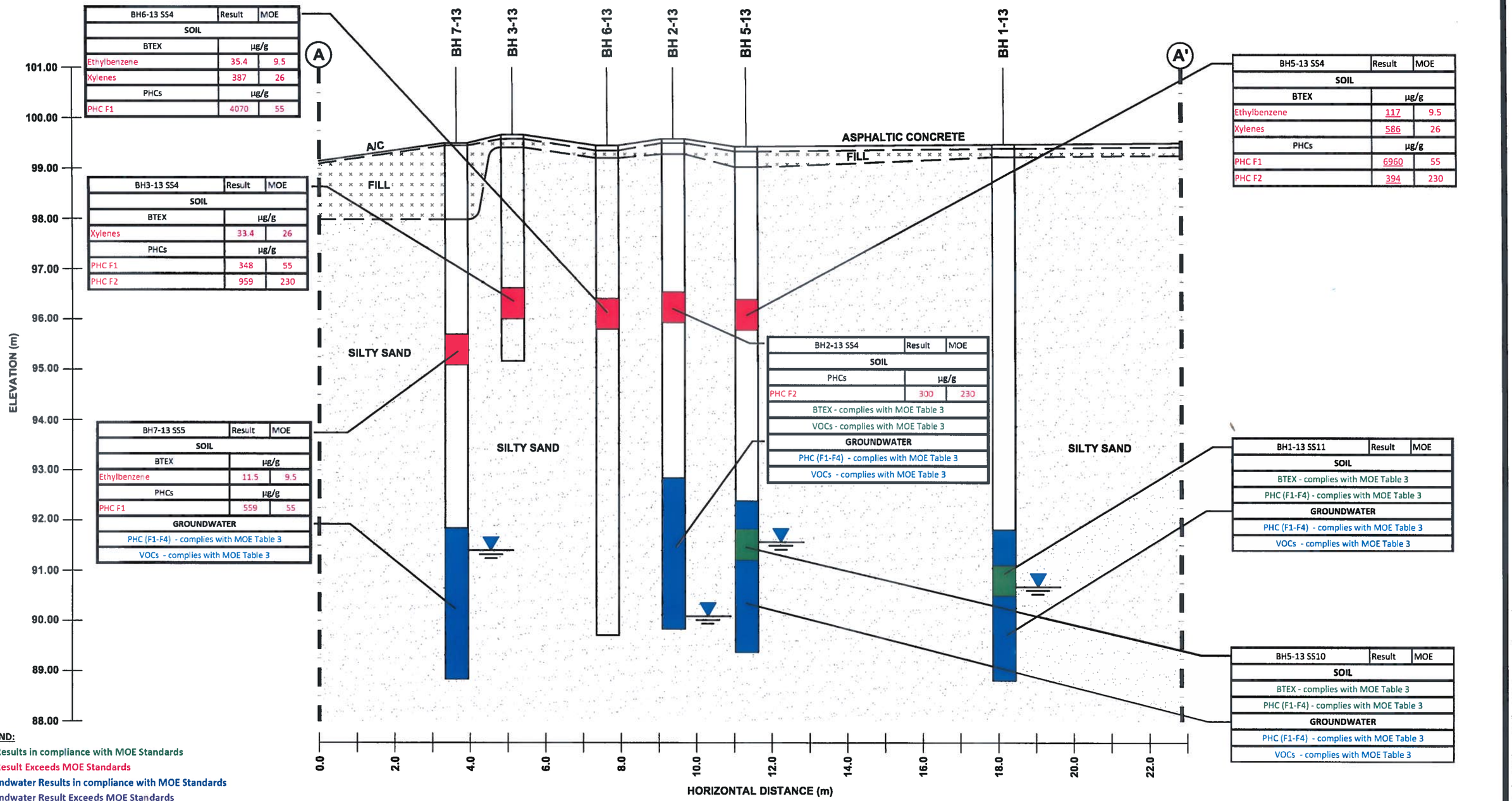
OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN

Drawn by:	Checked by:	Date:
MPG	MSD	06/2014
Scale: 1:400		Drawing No.: PE3078-6
Report No.: PE3078-3		

11x17



LEGEND:

Soil Results in compliance with MOE Standards

Soil Result Exceeds MOE Standards

Groundwater Results in compliance with MOE Standards

Groundwater Result Exceeds MOE Standards

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NO.	REVISIONS	DATE	INITIAL

CANDEREL MANAGEMENT IN.C

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
890 AND 900 BANK STREET

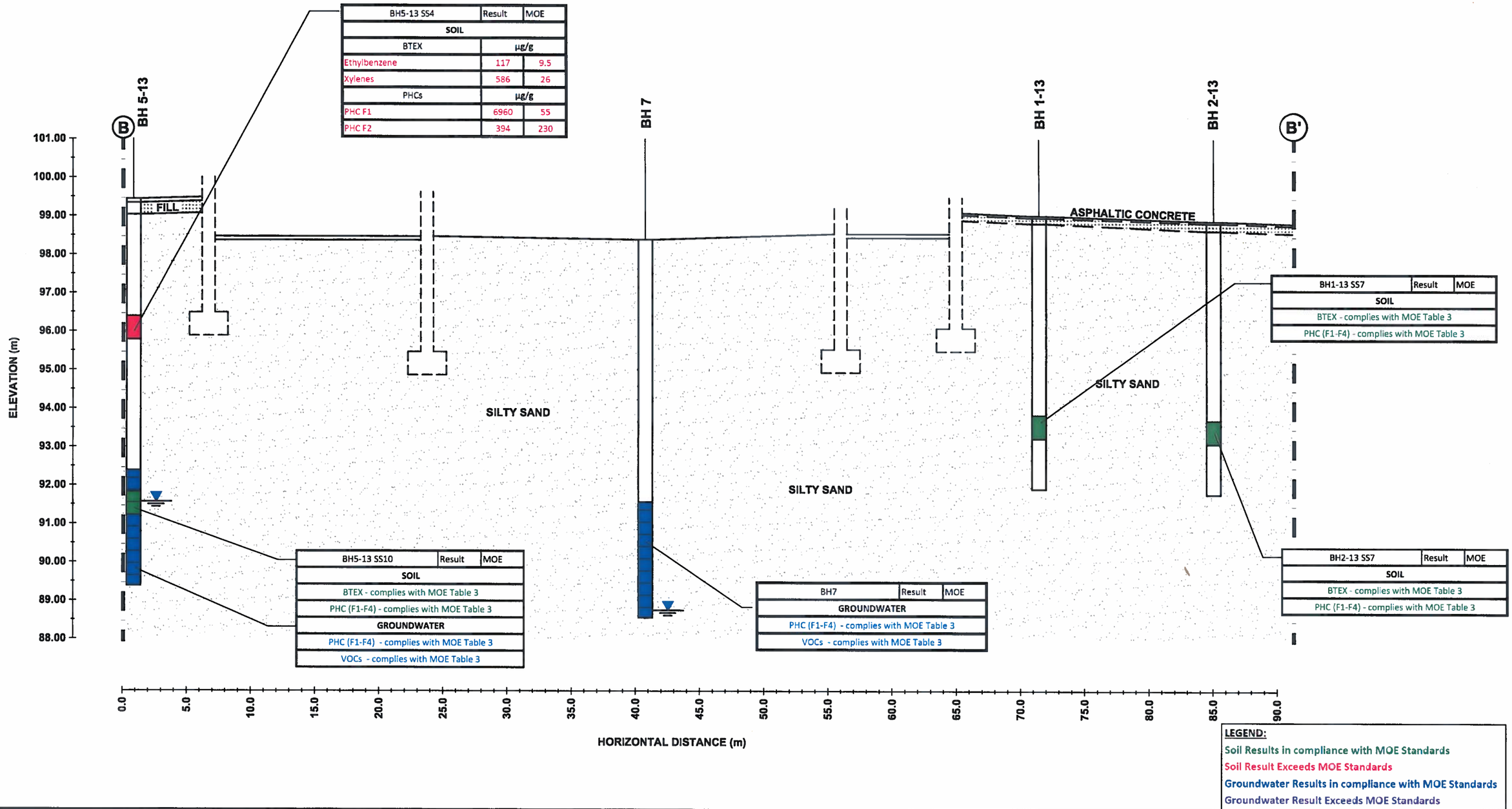
OTTAWA, ONTARIO

Title:

CROSS-SECTION A-A'

Drawn by:	Checked by:	Date:
MPG	MSD	06/2014
Scale: AS SHOWN		Drawing No.: PE3078-7
Report No.: PE3078-3		

p:\autocad drawings\environmental\pe3078x\pe3078\may 2014\pe3078-7 crosssection a-a.dwg



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NO.	REVISIONS	DATE	INITIAL

CANDEREL MANAGEMENT INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
890 AND 900 BANK STREET

OTTAWA, ONTARIO

Title:

CROSS-SECTION B-B'

Drawn by:	Checked by:	Date:
MPG	MSD	06/2014

Scale: AS SHOWN

Drawing No.: PE3078-8

Report No.: PE3078-3

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

Paterson Group Inc.

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Sampling & Analysis Plan

Phase II-Environmental Site Assessment
Existing Commercial Property
890 and 900 Bank Street
Ottawa

Prepared For

Canderel Management Inc.

June 20, 2014

Report: PE3078-SAP

Table of Contents

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Canderel Management Inc. to conduct a Phase II-Environmental Site Assessment (ESA) for the property located at 890 and 900 Bank Street, in the City of Ottawa. Based on a Phase I-ESA completed by Paterson for the subject property, the following subsurface investigation program, consisting of borehole drilling, was developed:

Borehole	Location & Rationale	Proposed Depth & Rationale
900 Bank Street		
BH1-13	Located adjacent to the subject building to address potential soil or groundwater impacts.	Drilled to intercept water table.
BH2-13	Located in the southeast corner of the property to address potential soil or groundwater impacts from the former retail fuel outlet.	Drilled to intercept water table.
BH3-13	Located in the southwest corner of the property to address potential soil and groundwater impacts.	Drilled to intercept water table within the native soil.
BH4-13	Located in the western portion of the property to address potential soil or groundwater impacts.	Drilled to intercept water table for the installation of a monitoring well.
890 Bank Street		
BH1-13	Located in the northeast corner of the property to address potential soil and groundwater impacts.	Drilled to intercept water table for the installation of a monitoring well.
BH2-13 BH5-13 BH7-13	Located along the northern property boundary to address potential soil and groundwater impacts from the former retail fuel outlet and existing automobile garage.	Drilled to intercept water table for the installation of a monitoring well
BH3-13 BH6-13	Located along the northern property boundary to address potential soil and groundwater impacts from the former retail fuel outlet and existing automobile garage.	Drilled to intercept water table within the native soil.
BH4-13	Located adjacent to the southeast corner of the building at 890 Bank Street to address potential soil or groundwater impacts.	Drilled to intercept water table for the installation of a monitoring well

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

At each borehole, split-spoon samples of overburden soils will be obtained at 0.76 m intervals until at least 1.5 m below the groundwater table. All soil samples will be retained, and samples will be selected for submission following a preliminary screening analysis.

Following borehole drilling, monitoring wells will be installed in the boreholes (as above) 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 boreholes where there is visual or olfactory evidence of contamination, or where organic vapour meter or photoionization detector readings indicate the presence of contamination, the 'worst-case' sample from each borehole should be submitted for comparison with MOE site condition standards.
- In boreholes with evidence of contamination as described above, at least one sample should be submitted to delineate the horizontal extent of contamination across the site and at least one sample from each stratigraphic unit should be submitted to delineate the vertical extent of contamination at the site.
- Parameters analyzed should be consistent with the Contaminants of Potential Concern identified in the Phase I-ESA.

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

- Groundwater monitoring wells should be installed in all boreholes with visual or olfactory evidence of soil contamination, in stratigraphic units where soil contamination was encountered, where those stratigraphic units are at or below the water table (i.e. a water sample can be obtained).
- Groundwater monitoring well screens should straddle the water table at sites where the contaminants of concern are suspected to be LNAPLs.
- If contamination is encountered or suspected, at least one groundwater monitoring well should be installed in a stratigraphic unit below the suspected contamination, where said stratigraphic unit is water-bearing.
- Parameters analyzed should be consistent with the Contaminants of Concern identified in the Phase I-ESA and with the contaminants identified in the soil samples.

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

The purpose of environmental boreholes is to identify and/or delineate contamination within the soil and/or to install groundwater monitoring wells in order to identify contamination within the groundwater.

Equipment

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

- Glass soil sample jars
- 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 combustible vapour meter or MiniRae photoionization detector (depending on contamination suspected)

Determining Borehole Locations

If conditions on site are not as expected and planned borehole locations cannot be drilled, **call the office to discuss**. Alternative borehole locations will be determined in conversation with the field technician and supervising engineer (QP).

After drilling is completed, a plan with the borehole locations must be provided. Distances and orientations of boreholes 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 0.6m) or semi-continuous (every 0.76 m) are required.
- 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.
- 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, 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.

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.

3.2 Monitoring Well Installation Procedure

Equipment

- 1.52m x 0.05m threaded sections of Schedule 40 PVC slotted well screen (1.52m x 0.03m if installing in cored hole in bedrock)
- 1.52m x 0.05m threaded sections of Schedule 40 PVC riser pipe (1.52m x 0.05m 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
- pH/Temperature/Conductivity combo pen
- 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.

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The QA/QC program for this Phase II-ESA is as follows:

- All non-dedicated sampling equipment (split spoons) will be decontaminated according to the SOPs listed above.
- All groundwater sampling equipment is dedicated (polyethylene and flexible peristaltic tubing is replaced for each well).
- Where groundwater samples are to be analyzed for VOCs, one laboratory-provided trip blank will be submitted for analysis.
- Approximately one (1) field duplicate will be submitted for every ten (10) samples submitted for laboratory analysis. A minimum of one (1) field duplicate per project will be submitted. Field duplicates will be submitted for soil and/or groundwater samples
- Where combo pens are used to measure field chemistry, they will be calibrated on an approximately monthly basis, according to frequency of use.

5.0 DATA QUALITY OBJECTIVES

The purpose of setting data quality objectives (DQOs) is to ensure that the level of uncertainty in data collected during the Phase II-ESA is low enough that decision-making is not affected, and that the overall objectives of the investigation are met.

The quality of data is assessed by comparing field duplicates with original samples. If the relative percent difference (RPD) between the duplicate and the sample is within 20%, the data are considered to be of sufficient quality so as not to affect decision-making. The RPD is calculated as follows:

$$RPD = \left| \frac{x_1 - x_2}{(x_1 + x_2)/2} \right| \times 100\%$$

Where x_1 is the concentration of a given parameter in an original sample and x_2 is the concentration of that same parameter in the field duplicate sample.

For the purpose of calculating the RPD, it is desirable to select field duplicates from samples for which parameters are present in concentrations above laboratory detection limits, i.e. samples which are expected to be contaminated. If parameters are below laboratory detection limits for selected samples or duplicates, the RPD may be calculated using a concentration equal to one half (0.5) multiplied by the laboratory detection limit.

It is also important to consider data quality in the overall context of the project. For example, if the DQOs are not met for a given sample, yet the concentrations of contaminants in both the sample and the duplicate exceed the MOE site remediation standards by a large margin, the decision-making usefulness of the sample may not be considered to be impaired. The proximity of other samples which meet the DQOs must also be considered in developing the Phase II Conceptual Site Model; often there are enough data available to produce a reliable Phase II Conceptual Site Model even if DQOs are not met for certain individual samples.

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS TO SAMPLING & ANALYSIS PLAN

Physical impediments to the Sampling and Analysis plan may include:

- The location of underground utilities
- Poor recovery of split-spoon soil samples
- Insufficient groundwater volume for groundwater samples
- 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
- Drill rig breakdowns
- Winter conditions
- Other site-specific impediments

Site-specific impediments to the Sampling and Analysis plan are discussed in the body of the Phase II-ESA report.

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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
900 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located at the corner of Bank Street and Clarey Avenue. Assumed elevation = 100.00m.

FILE NO. **PE3078**

REMARKS

HOLE NO. **BH 1-13**

BORINGS BY CME 55 Power Auger **DATE** August 19, 2013

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	99.01
50mm Asphaltic concrete over crushed stone 0.20							
		SS	1	58	3	1	98.01
		SS	2	42	8	2	97.01
		SS	3	50	13		
Very loose to compact, brown **SILTY SAND**		SS	4	58	16	3	96.01
		SS	5	50	19	4	95.01
		SS	6	50	26	5	94.01
		SS	7	58	21		
6.10						6	93.01
End of Borehole							
Sample SS7 analyzed for BTEX and PHC							

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 I - II Environmental Site Assessment
900 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located at the corner of Bank Street and Clarey Avenue. Assumed elevation = 100.00m.

FILE NO. PE3078

REMARKS

HOLE NO. BH 2-13

BORINGS BY CME 55 Power Auger **DATE** August 19, 2013

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	98.87
50mm Asphaltic concrete over crushed stone 0.25							
		SS	1	50	5	1	97.87
		SS	2	33	8	2	96.87
		SS	3	58	10		
Loose to compact, brown **SILTY SAND**		SS	4	58	9	3	95.87
		SS	5	50	19	4	94.87
		SS	6	58	21	5	93.87
		SS	7		23		
6.10						6	92.87
End of Borehole							
Sample SS7 analyzed for BTEX and PHC							

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 I - II Environmental Site Assessment
900 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located at the corner of Bank Street and Clarey Avenue. Assumed elevation = 100.00m.

FILE NO. **PE3078**

REMARKS

HOLE NO. **BH 3-13**

BORINGS BY CME 55 Power Auger **DATE** August 19, 2013

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	98.69
50mm Asphaltic concrete over crushed stone 0.20							
		SS	1	50	11	1	97.69
		SS	2	58	5	2	96.69
		SS	3	67	15		
Loose to compact, brown **SILTY SAND**		SS	4	50	7	3	95.69
		SS	5	42	6	4	94.69
		SS	6	58	23	5	93.69
		SS	7	50	25		
6.10						6	92.69
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 I - II Environmental Site Assessment
900 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located at the corner of Bank Street and Clarey Avenue. Assumed elevation = 100.00m.

FILE NO. PE3078

REMARKS

HOLE NO. BH 4-13

BORINGS BY CME 55 Power Auger **DATE** August 19, 2013

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	98.84
50mm Asphaltic concrete over crushed stone 0.30							
		SS	1	42	15	1	97.84
		SS	2	50	21	2	96.84
		SS	3	50	22	3	95.84
		SS	4	42	22	4	94.84
		SS	5	58	19		
Compact, brown **SILTY SAND**		SS	6	50	21	5	93.84
		SS	7	58	23	6	92.84
		SS	8	67	25		
		SS	9	50	23	7	91.84
		SS	10	92	33	8	90.84
		SS	11	50	21	9	89.84
		SS	12	50	23		
9.75 End of Borehole							

(GWL @ 8.71m-Aug. 28, 2013)

Sample SS11 analyzed for BTEX and PHC

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

Supplemental Phase II - Enviro. Site Assessment
890 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on northeast corner of Bank Street and Clarey Ave. Assumed elevation = 100.00m.

FILE NO. PE3113

REMARKS

HOLE NO. BH 1-13

BORINGS BY CME 55 Power Auger **DATE** September 25, 2013

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	99.48
Asphaltic concrete 0.08							
FILL: Crushed stone 0.25							
		SS	1	8	6	1	98.48
		SS	2	58	13	2	97.48
		SS	3	67	33		
		SS	4	67	28	3	96.48
Compact to very dense, brown **SILTY SAND**		SS	5	75	26	4	95.48
		SS	6	67	26	5	94.48
		SS	7	50	26		
		SS	8	67	36	6	93.48
		SS	9	58	30	7	92.48
- grey with trace gravel by 7.6m depth		SS	10	50	56	8	91.48
		SS	11	58	56	9	90.48
		SS	12	50	40		
		SS	13	58		10	89.48
10.67							
End of Borehole							
(GWL @ 8.80m-Oct. 2, 2013)							

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

Supplemental Phase II - Enviro. Site Assessment
890 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on northeast corner of Bank Street and Clarey Ave. Assumed elevation = 100.00m.

FILE NO. PE3113

REMARKS

HOLE NO. BH 2-13

BORINGS BY CME 55 Power Auger **DATE** September 25, 2013

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.08						0	99.59
FILL: Crushed stone 0.30							
		SS	1	50	13	1	98.59
		SS	2	42	16	2	97.59
		SS	3	58	17		
		SS	4	67	16	3	96.59
Compact to dense, brown **SILTY SAND**		SS	5	50	19	4	95.59
		SS	6	50	21	5	94.59
		SS	7	50	20		
		SS	8	67	30	6	93.59
- grey and with gravel by 6.7m depth		SS	9	75	33	7	92.59
		SS	10	67	26	8	91.59
		SS	11	71	50+		
		SS	12		26	9	90.59
9.75 End of Borehole							
(GWL @ 9.50m-Oct. 2, 2013)							

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.

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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Phase II - Enviro. Site Assessment
890 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on northeast corner of Bank Street and Clarey Ave. Assumed elevation = 100.00m.

FILE NO. PE3113

REMARKS

HOLE NO. BH 3-13

BORINGS BY CME 55 Power Auger **DATE** September 25, 2013

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	99.67
Asphaltic concrete 0.08							
FILL: Crushed stone 0.25		SS	1	33	6	1	98.67
		SS	2	42	9		
Loose to compact, brown **SILTY SAND**		SS	3	50	20	2	97.67
- black from 3.2 to 3.7m depth		SS	4	50		3	96.67
4.50		SS	5	58	26	4	95.67
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

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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Phase II - Enviro. Site Assessment
890 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on northeast corner of Bank Street and Clarey Ave. Assumed elevation = 100.00m.

FILE NO. PE3113

REMARKS

HOLE NO. BH 4-13

BORINGS BY CME 55 Power Auger **DATE** September 25, 2013

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	99.48
Asphaltic concrete 0.10							
FILL: Crushed stone 0.36		SS	1	50	13	1	98.48
		SS	2	42	16	2	97.48
		SS	3	58	22		
		SS	4	58	27	3	96.48
		SS	5	67	40	4	95.48
		SS	6	67	32	5	94.48
Compact to dense, brown **SILTY SAND**		SS	7	75	31	6	93.48
		SS	8	83	29		
		SS	9	100	39	7	92.48
		SS	10	75		8	91.48
		SS	11	100	50+		
		SS	12	67	28	9	90.48
		SS	13			10	89.48
10.67							
End of Borehole							
(GWL @ 9.20m-Oct. 2, 2013)							

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

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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Phase II - Enviro. Site Assessment
890 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on northeast corner of Bank Street and Clarey Ave. Assumed elevation = 100.00m.

FILE NO. PE3113

REMARKS

HOLE NO. BH 5-13

BORINGS BY CME 55 Power Auger **DATE** December 9, 2013

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	99.44
Asphaltic concrete 0.10							
FILL: Crushed stone 0.41							
		SS	1	42	21	1	98.44
Compact, brown **SILTY SAND**		SS	2	50	29	2	97.44
		SS	3	67	30		
3.00						3	96.44
Compact, brown **SILTY FINE SAND**		SS	4	83	18		
3.70						4	95.44
		SS	5	83	25		
		SS	6	58	22	5	94.44
		SS	7	83	21		
Compact to dense, brown **SILTY SAND**		SS	8	83	25	6	93.44
		SS	9	58	26	7	92.44
		SS	10	75	18	8	91.44
- trace gravel by 8.2m depth		SS	11	83	46		
						9	90.44
10.06						10	89.44
End of Borehole							
(GWL @ 7.87m-Dec. 20, 2013)							

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.

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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Phase II - Enviro. Site Assessment
890 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on northeast corner of Bank Street and Clarey Ave. Assumed elevation = 100.00m.

FILE NO. PE3113

REMARKS

HOLE NO. BH 6-13

BORINGS BY CME 55 Power Auger **DATE** December 9, 2013

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.10							
FILL: Crushed stone 0.25							
		SS	1	42	21	1	98.46
Compact, brown **SILTY SAND**		SS	2	58	26	2	97.46
		SS	3	75	25		
3.00						3	96.46
Compact, brown **SILTY FINE SAND**		SS	4	58	20		
3.70						4	95.46
		SS	5	67	24		
		SS	6	75	21	5	94.46
Compact to dense, brown **SILTY SAND**		SS	7	58	20		
		SS	8	83	21	6	93.46
- tracve gravel by 6.7m depth		SS	9	67	65	7	92.46
		SS	10	100	50+		
		SS	11	50	50	8	91.46
		SS	12	50	34	9	90.46
9.75							
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

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Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Phase II - Enviro. Site Assessment
890 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on northeast corner of Bank Street and Clarey Ave. Assumed elevation = 100.00m.

FILE NO. PE3113

REMARKS

HOLE NO. BH 7-13

BORINGS BY CME 55 Power Auger **DATE** December 9, 2013

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	99.51
Asphaltic concrete 0.05							
FILL: Brown silty sand, trace gravel		SS	1	42	6	1	98.51
1.52							
		SS	2	42	5	2	97.51
Loose to compact, brown **SILTY SAND**		SS	3	58	14		
3.00						3	96.51
Compact, brown **SILTY FINE SAND**		SS	4	67	15		
3.70						4	95.51
		SS	5	58	23		
		SS	6	58	22	5	94.51
Compact to dense, brown **SILTY SAND**		SS	7	75	23		
		SS	8	83	25	6	93.51
- trace gravel by 6.7m depth		SS	9	75	31	7	92.51
		SS	10	75	35	8	91.51
		SS	11	58	51		
		SS	12	75	40	9	90.51
						10	89.51
10.67							
End of Borehole							
(GWL @ 8.11m-Dec. 20, 2013)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

640

Monitoring Well Construction

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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

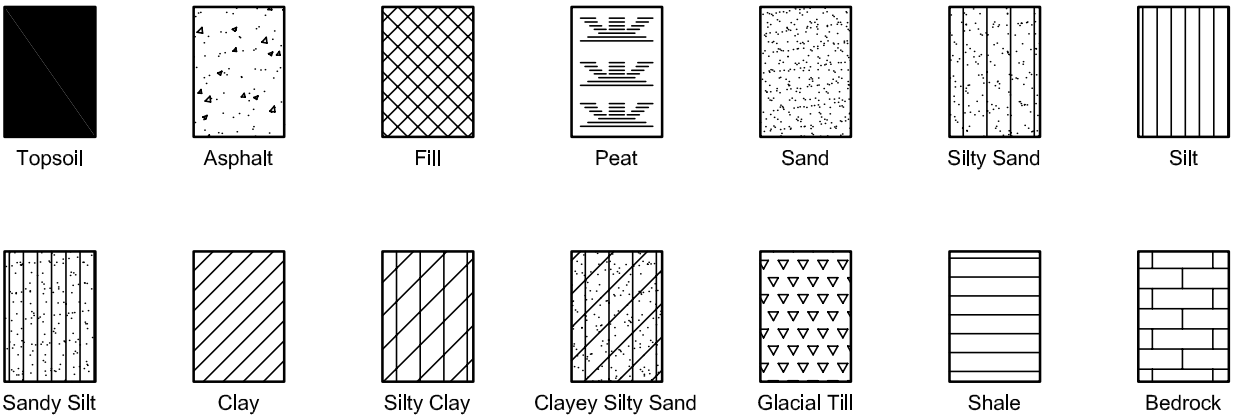
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void 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.

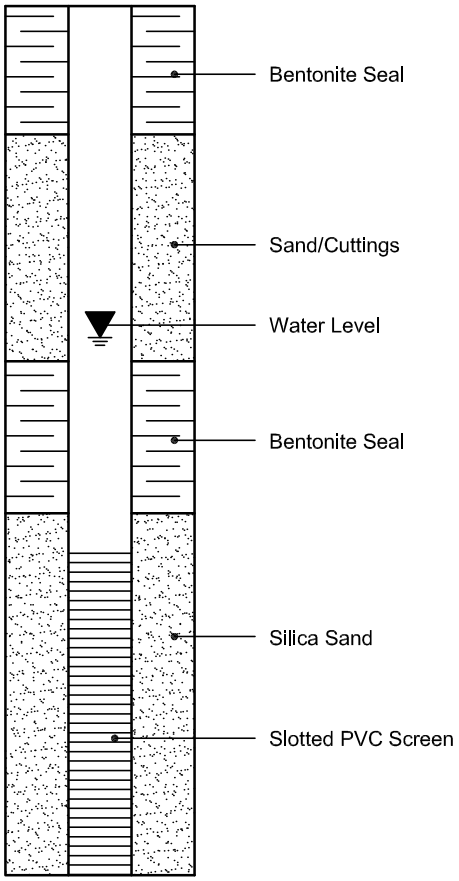
SYMBOLS AND TERMS (continued)

STRATA PLOT

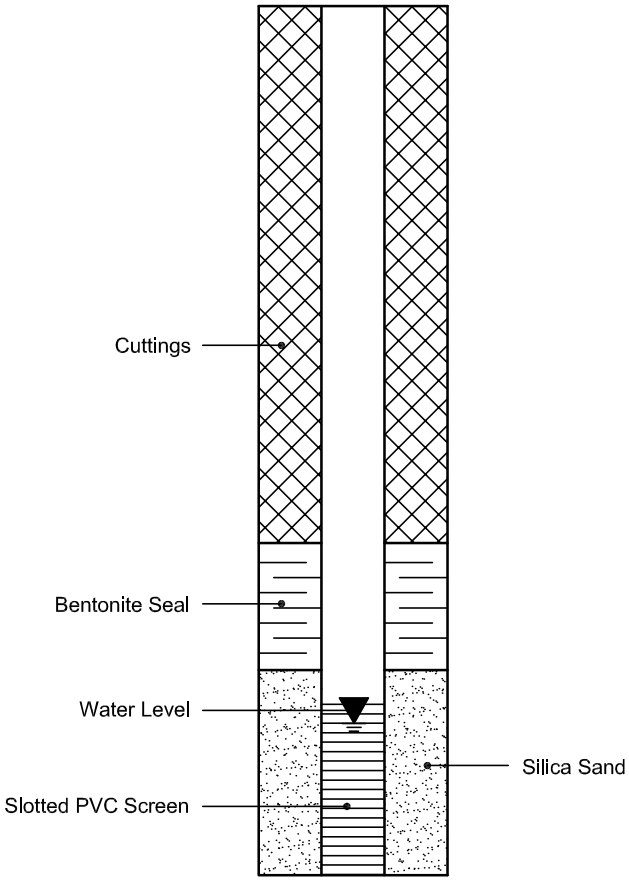


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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www.paracellabs.com

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Eric Leveque

Phone: (613) 226-7381
Fax: (613) 226-6344

Client PO: 15014
Project: PE3078
Custody: 98022

Report Date: 26-Aug-2013
Order Date: 20-Aug-2013
Order #: 1334112

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

Paracel ID	Client ID
1334112-01	BH1-13 SS7
1334112-02	BH2-13 SS7
1334112-03	BH4-13 SS11

Approved By: Mark Foto

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

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

Certificate of Analysis

Report Date: 26-Aug-2013
Order Date:20-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15014 Project Description: PE3078

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	21-Aug-13	24-Aug-13
PHC F1	CWS Tier 1 - P&T GC-FID	21-Aug-13	24-Aug-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	23-Aug-13	23-Aug-13
Solids, %	Gravimetric, calculation	22-Aug-13	22-Aug-13

Certificate of Analysis

Report Date: 26-Aug-2013
Order Date:20-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15014

Project Description: PE3078

	Client ID:	BH1-13 SS7	BH2-13 SS7	BH4-13 SS11	-
	Sample Date:	19-Aug-13	19-Aug-13	19-Aug-13	-
	Sample ID:	1334112-01	1334112-02	1334112-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	96.1	97.7	84.1	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene-d8	Surrogate	82.5%	83.2%	82.7%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	-

Certificate of Analysis

Report Date: 26-Aug-2013
Order Date:20-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15014 Project Description: PE3078

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*2.85*		*ug/g*		*89.1*	*50-140*			

Certificate of Analysis

Report Date: 26-Aug-2013
Order Date:20-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15014 Project Description: PE3078

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	77.3	0.1	% by Wt.	77.5			0.3	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	*2.28*		*ug/g dry*	*ND*	*83.2*	*50-140*			

Certificate of Analysis

Report Date: 26-Aug-2013
Order Date:20-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15014 Project Description: PE3078

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	202	7	ug/g	ND	101	80-120			
F2 PHCs (C10-C16)	89	4	ug/g	ND	77.8	60-140			
F3 PHCs (C16-C34)	221	8	ug/g	ND	93.0	60-140			
F4 PHCs (C34-C50)	118	6	ug/g	ND	74.7	60-140			
Volatiles									
Benzene	4.02	0.02	ug/g	ND	101	60-130			
Ethylbenzene	3.41	0.05	ug/g	ND	85.3	60-130			
Toluene	3.91	0.05	ug/g	ND	97.7	60-130			
m,p-Xylenes	7.65	0.05	ug/g	ND	95.7	60-130			
o-Xylene	3.77	0.05	ug/g	ND	94.3	60-130			
Surrogate: Toluene-d8	*2.76*		*ug/g*		*86.1*	*50-140*			

Certificate of Analysis

Report Date: 26-Aug-2013
Order Date:20-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15014 Project Description: PE3078

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

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Page ___ of ___

Client Name: Paterson Group	Project Reference: PE 3078	TAT: [X] Regular [ ] 3 Day
Contact Name: Eric Leveque	Quote #	[ ] 2 Day [ ] 1 Day
Address: 154 Colonnade	PO # 15014	Date Required:
Telephone: 613-226-7381	Email Address: eleveque@patersongroup.ca	

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

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

Required Analyses

Paracel Order Number: 1334112

	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	BH1-13 SS7	S		2	Aug 19/13	9 Am	X											~120 m2 + 1 Vial		
2	BH2-13 SS7	S		2		10 Am	X													
3	BH4-13 SS11	S		2		11 Am	X													
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: Pick up

Relinquished By (Sign):	Received by Driver/Depot: T. Scouse	Received at Lab: SUNEEP BORN	Verified By: MJC
Relinquished By (Print):	Date/Time: 20/08/13 3:35PM	Date/Time: AUG 20 2013 04:30	Date/Time: Aug 20/13 4:48
Date/Time:	Temperature: ___ °C	Temperature: 33.5 °C	pH Verified [ ] By: N/A

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
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Attn: Eric Leveque

Phone: (613) 226-7381
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Client PO: 15050
Project: PE3113
Custody:

Report Date: 2-Oct-2013
Order Date: 26-Sep-2013
Order #: 1339210

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

Paracel ID	Client ID
1339210-01	BH1-13 SS11
1339210-02	BH2-13 SS4
1339210-03	BH3-13 SS4

Approved By:

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

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Certificate of Analysis

Report Date: 02-Oct-2013
Order Date:26-Sep-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15050 Project Description: PE3113

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	26-Sep-13	29-Sep-13
PHC F1	CWS Tier 1 - P&T GC-FID	26-Sep-13	29-Sep-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	30-Sep-13	27-Sep-13
Solids, %	Gravimetric, calculation	27-Sep-13	27-Sep-13
VOCs by P&T GC-MS	EPA 8260 - P&T GC-MS	26-Sep-13	29-Sep-13

Certificate of Analysis

Report Date: 02-Oct-2013
Order Date:26-Sep-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15050

Project Description: PE3113

	Client ID:	BH1-13 SS11	BH2-13 SS4	BH3-13 SS4	-
	Sample Date:	25-Sep-13	25-Sep-13	25-Sep-13	-
	Sample ID:	1339210-01	1339210-02	1339210-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	92.4	86.0	81.8	-
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	-
Chloroethane	0.05 ug/g dry	-	<0.05	<0.05	-
Chloroform	0.05 ug/g dry	-	<0.05	<0.05	-
Chloromethane	0.20 ug/g dry	-	<0.20	<0.20	-
Dibromochloromethane	0.05 ug/g dry	-	<0.05	<0.05	-
Dichlorodifluoromethane	0.05 ug/g dry	-	<0.05	<0.05	-
1,2-Dibromoethane	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-Dichloroethylene, total	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	-	0.08	9.36	-
Hexane	0.05 ug/g dry	-	0.34	28.6	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	<0.50	<0.50	-
Methyl Butyl Ketone (2-Hexanone)	2.00 ug/g dry	-	<2.00	<2.00	-
Methyl Isobutyl Ketone	0.50 ug/g dry	-	<0.50	<0.50	-

Certificate of Analysis

Report Date: 02-Oct-2013
Order Date:26-Sep-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15050

Project Description: PE3113

	Client ID:	BH1-13 SS11	BH2-13 SS4	BH3-13 SS4	-
	Sample Date:	25-Sep-13	25-Sep-13	25-Sep-13	-
	Sample ID:	1339210-01	1339210-02	1339210-03	-
	MDL/Units	Soil	Soil	Soil	-
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	-
Toluene	0.05 ug/g dry	-	<0.05	4.19	-
1,2,4-Trichlorobenzene	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	-
1,3,5-Trimethylbenzene	0.05 ug/g dry	-	<0.05	2.59	-
Vinyl chloride	0.02 ug/g dry	-	<0.02	<0.02	-
m,p-Xylenes	0.05 ug/g dry	-	0.74	25.0	-
o-Xylene	0.05 ug/g dry	-	0.69	8.48	-
Xylenes, total	0.05 ug/g dry	-	1.43	33.4	-
4-Bromofluorobenzene	Surrogate	-	94.2%	96.3%	-
Dibromofluoromethane	Surrogate	-	92.4%	93.5%	-
Toluene-d8	Surrogate	-	106%	108%	-
Benzene	0.02 ug/g dry	<0.02	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
m,p-Xylenes	0.05 ug/g dry	0.49	-	-	-
o-Xylene	0.05 ug/g dry	0.30	-	-	-
Xylenes, total	0.05 ug/g dry	0.78	-	-	-
Toluene-d8	Surrogate	104%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	12	348	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	300	959	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	81	66	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	-

Certificate of Analysis

Report Date: 02-Oct-2013
Order Date:26-Sep-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15050 Project Description: PE3113

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						
Chloroethane	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Chloromethane	ND	0.20	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dibromoethane	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-Dichloroethylene, total	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						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Butyl Ketone (2-Hexanone)	ND	2.00	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						
1,2,4-Trichlorobenzene	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						
1,3,5-Trimethylbenzene	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	*7.74*		*ug/g*		*96.7*	*50-140*			
Surrogate: Dibromofluoromethane	*8.34*		*ug/g*		*104*	*50-140*			
Surrogate: Toluene-d8	*8.39*		*ug/g*		*105*	*50-140*			

Certificate of Analysis

Report Date: 02-Oct-2013
Order Date:26-Sep-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15050 Project Description: PE3113

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*8.39*		*ug/g*		*105*	*50-140*			

Certificate of Analysis

Report Date: 02-Oct-2013
Order Date:26-Sep-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15050 Project Description: PE3113

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	86.1	0.1	% by Wt.	86.0			0.1	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	
Chloroethane	ND	0.05	ug/g dry	ND				50	
Chloroform	ND	0.05	ug/g dry	ND				50	
Chloromethane	ND	0.20	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-Dibromoethane	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	
Hexane	ND	0.05	ug/g dry	ND				50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND				50	
Methyl Butyl Ketone (2-Hexanone)	ND	2.00	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	
1,2,4-Trichlorobenzene	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	
1,3,5-Trimethylbenzene	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	*8.52*		*ug/g dry*	*ND*	*95.0*	*50-140*			
Surrogate: Dibromofluoromethane	*8.93*		*ug/g dry*	*ND*	*99.6*	*50-140*			

Certificate of Analysis

Report Date: 02-Oct-2013
Order Date:26-Sep-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15050 Project Description: PE3113

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: Toluene-d8	*9.50*		*ug/g dry*	*ND*	*106*	*50-140*			
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	*9.50*		*ug/g dry*	*ND*	*106*	*50-140*			

Certificate of Analysis

Report Date: 02-Oct-2013
Order Date:26-Sep-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15050 Project Description: PE3113

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	199	7	ug/g	ND	99.3	80-120			
F2 PHCs (C10-C16)	71	4	ug/g	ND	78.4	60-140			
F3 PHCs (C16-C34)	148	8	ug/g	ND	79.6	60-140			
F4 PHCs (C34-C50)	90	6	ug/g	ND	72.6	60-140			
Volatiles									
Acetone	10.9	0.50	ug/g	ND	109	50-140			
Benzene	4.37	0.02	ug/g	ND	109	60-130			
Bromodichloromethane	4.10	0.05	ug/g	ND	103	60-130			
Bromoform	5.01	0.05	ug/g	ND	125	60-130			
Bromomethane	4.10	0.05	ug/g	ND	102	50-140			
Carbon Tetrachloride	4.44	0.05	ug/g	ND	111	60-130			
Chlorobenzene	4.94	0.05	ug/g	ND	124	60-130			
Chloroethane	5.15	0.05	ug/g	ND	129	50-140			
Chloroform	4.23	0.05	ug/g	ND	106	60-130			
Chloromethane	4.84	0.20	ug/g	ND	121	50-140			
Dibromochloromethane	4.98	0.05	ug/g	ND	124	60-130			
Dichlorodifluoromethane	4.40	0.05	ug/g	ND	110	50-140			
1,2-Dibromoethane	4.95	0.05	ug/g	ND	124	60-130			
1,2-Dichlorobenzene	4.53	0.05	ug/g	ND	113	60-130			
1,3-Dichlorobenzene	4.66	0.05	ug/g	ND	116	60-130			
1,4-Dichlorobenzene	4.70	0.05	ug/g	ND	118	60-130			
1,1-Dichloroethane	5.07	0.05	ug/g	ND	127	60-130			
1,2-Dichloroethane	4.27	0.05	ug/g	ND	107	60-130			
1,1-Dichloroethylene	4.87	0.05	ug/g	ND	122	60-130			
cis-1,2-Dichloroethylene	4.57	0.05	ug/g	ND	114	60-130			
trans-1,2-Dichloroethylene	4.85	0.05	ug/g	ND	121	60-130			
1,2-Dichloropropane	4.57	0.05	ug/g	ND	114	60-130			
cis-1,3-Dichloropropylene	3.97	0.05	ug/g	ND	99.2	60-130			
trans-1,3-Dichloropropylene	4.10	0.05	ug/g	ND	102	60-130			
Ethylbenzene	4.91	0.05	ug/g	ND	123	60-130			
Hexane	4.92	0.05	ug/g	ND	123	60-130			
Methyl Ethyl Ketone (2-Butanone)	10.8	0.50	ug/g	ND	108	50-140			
Methyl Butyl Ketone (2-Hexanone)	13.3	2.00	ug/g	ND	133	50-140			
Methyl Isobutyl Ketone	11.0	0.50	ug/g	ND	110	50-140			
Methyl tert-butyl ether	10.0	0.05	ug/g	ND	100	50-140			
Methylene Chloride	4.07	0.05	ug/g	ND	102	60-130			
Styrene	5.02	0.05	ug/g	ND	126	60-130			
1,1,1,2-Tetrachloroethane	4.82	0.05	ug/g	ND	120	60-130			
1,1,2,2-Tetrachloroethane	4.84	0.05	ug/g	ND	121	60-130			
Tetrachloroethylene	5.11	0.05	ug/g	ND	128	60-130			
Toluene	4.68	0.05	ug/g	ND	117	60-130			
1,2,4-Trichlorobenzene	5.09	0.05	ug/g	ND	127	60-130			
1,1,1-Trichloroethane	4.45	0.05	ug/g	ND	111	60-130			
1,1,2-Trichloroethane	3.86	0.05	ug/g	ND	96.4	60-130			
Trichloroethylene	4.06	0.05	ug/g	ND	102	60-130			
Trichlorofluoromethane	3.81	0.05	ug/g	ND	95.3	50-140			
1,3,5-Trimethylbenzene	4.46	0.05	ug/g	ND	112	60-130			
Vinyl chloride	4.69	0.02	ug/g	ND	117	50-140			
m,p-Xylenes	9.63	0.05	ug/g	ND	120	60-130			

Certificate of Analysis

Report Date: 02-Oct-2013
Order Date:26-Sep-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15050 Project Description: PE3113

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	4.45	0.05	ug/g	ND	111	60-130			
Surrogate: 4-Bromofluorobenzene	*7.69*		*ug/g*		*96.1*	*50-140*			
Benzene	4.37	0.02	ug/g	ND	109	60-130			
Ethylbenzene	4.91	0.05	ug/g	ND	123	60-130			
Toluene	4.68	0.05	ug/g	ND	117	60-130			
m,p-Xylenes	9.63	0.05	ug/g	ND	120	60-130			
o-Xylene	4.45	0.05	ug/g	ND	111	60-130			

Certificate of Analysis

Report Date: 02-Oct-2013
Order Date:26-Sep-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15050 Project Description: PE3113

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)
Nº 13334

Page __ of __

Client Name: Paterson Group	Project Reference: PE3113	TAT: X Regular [ ] 3 Day [ ] 2 Day [ ] 1 Day
Contact Name: ERIC LEVEQUE	Quote #	
Address: 154 Colonnade	PO # 15050	Date Required:
Telephone: 613-226-7381	Email Address: elevegue@patersongroup.ca	

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

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

Paracel Order Number: 1339210

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	VOC	PHC (F1-F4)	BTEX								
1	BH1-13 SS11	S		2	Sept 25/13	NOON	X	X	X								
2	BH2-13 SS4	S		2	↓	↓	X	X									
3	BH3-13 SS4	S		2	↓	↓	X	X									
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign): MIKE B.	Received by Driver/Depot: T. LOUSE	Received at Lab: BRAM	Verified By:
Relinquished By (Print):	Date/Time: 26/09/13 11:51AM	Date/Time: Sept 25/13 12:35	Date/Time:
Date/Time:	Temperature: ____ °C	Temperature: 5.4 °C	pH Verified [ ] By:

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Certificate of Analysis

Paterson Group Consulting Engineers
154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Eric Leveque

Phone: (613) 226-7381
Fax: (613) 226-6344

Client PO: 15201
Project: PE3113
Custody: 99055

Report Date: 16-Dec-2013
Order Date: 10-Dec-2013
Order #: 1350146

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

Paracel ID	Client ID
1350146-01	BH5-13 SS4
1350146-02	BH5-13 SS10
1350146-03	BH6-13 SS4
1350146-04	BH7-13 SS5

Approved By: Mark Foto

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

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

Certificate of Analysis

Report Date: 16-Dec-2013
Order Date:10-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15201 Project Description: PE3113

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	13-Dec-13	16-Dec-13
PHC F1	CWS Tier 1 - P&T GC-FID	13-Dec-13	16-Dec-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	12-Dec-13	12-Dec-13
Solids, %	Gravimetric, calculation	12-Dec-13	12-Dec-13

Certificate of Analysis

Report Date: 16-Dec-2013
Order Date:10-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15201

Project Description: PE3113

	Client ID:	BH5-13 SS4	BH5-13 SS10	BH6-13 SS4	BH7-13 SS5
	Sample Date:	09-Dec-13	09-Dec-13	09-Dec-13	09-Dec-13
	Sample ID:	1350146-01	1350146-02	1350146-03	1350146-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	87.3	85.1	89.6	87.1
Volatiles					
Benzene	0.02 ug/g dry	<0.20 [1]	<0.02	<0.20 [1]	<0.02
Ethylbenzene	0.05 ug/g dry	117	<0.05	35.4	11.5
Toluene	0.05 ug/g dry	<0.50 [1]	<0.05	13.2	2.76
m,p-Xylenes	0.05 ug/g dry	416	0.32	276	18.8
o-Xylene	0.05 ug/g dry	170	0.10	111	3.95
Xylenes, total	0.05 ug/g dry	586	0.41	387	22.7
Toluene-d8	Surrogate	104%	102%	103%	92.4%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	6960	<7	4070	559
F2 PHCs (C10-C16)	4 ug/g dry	394	<4	176	8
F3 PHCs (C16-C34)	8 ug/g dry	44	<8	110	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	<6

Certificate of Analysis

Report Date: 16-Dec-2013
Order Date:10-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15201 Project Description: PE3113

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*3.28*		*ug/g*		*102*	*50-140*			

Certificate of Analysis

Report Date: 16-Dec-2013
Order Date:10-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15201 Project Description: PE3113

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Physical Characteristics									
% Solids	82.9	0.1	% by Wt.	85.5			3.0	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	*3.60*		*ug/g dry*	*ND*	*102*	*50-140*			

Certificate of Analysis

Report Date: 16-Dec-2013
Order Date:10-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15201 Project Description: PE3113

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	219	7	ug/g	ND	109	80-120			
F2 PHCs (C10-C16)	174	4	ug/g	ND	74.7	60-140			
F3 PHCs (C16-C34)	431	8	ug/g	ND	89.4	60-140			
F4 PHCs (C34-C50)	279	6	ug/g	ND	86.7	60-140			
Volatiles									
Benzene	3.03	0.02	ug/g	ND	75.8	60-130			
Ethylbenzene	4.06	0.05	ug/g	ND	101	60-130			
Toluene	3.59	0.05	ug/g	ND	89.7	60-130			
m,p-Xylenes	8.05	0.05	ug/g	ND	101	60-130			
o-Xylene	4.63	0.05	ug/g	ND	116	60-130			
Surrogate: Toluene-d8	*2.73*		*ug/g*		*85.3*	*50-140*			

Certificate of Analysis

Report Date: 16-Dec-2013
Order Date:10-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15201 Project Description: PE3113

Qualifier Notes:

Sample Qualifiers :

1 : Elevated detection limit due to dilution required because of high target analyte concentration.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

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Page ___ of ___

Client Name: Paterson Group	Project Reference: PE3113	TAT: [X] Regular [ ] 3 Day
Contact Name: ERIC LEVEQUE	Quote #	[ ] 2 Day [ ] 1 Day
Address: 154 Colonnade Rd	PO # 15201	Date Required:
Telephone: 613-226-7381	Email Address: elevegue@patersongroup.ca	

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

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

Required Analyses

Paracel Order Number: 1350146

	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	BH5-13 SS4	S		2	Dec 9/13	AM	X											120mL + 3vial		
2	BH5-13 SS10	S		2		AM	X											↓		
3	BH6-13 SS4	S		2		AM	X													
4	BH7-13 SS5	S		2	↓	PM	X											✓		
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign): MIKE B	Received by Driver/Depot: T. LOUSE	Received at Lab: SUKEEPORN
Relinquished By (Print):	Date/Time: 10/12/13 3:42 PM	Date/Time: DEC 11, 2013 09:55
Date/Time:	Temperature: ___ °C	Temperature: 7.8 °C

Verified By: M

Date/Time: Dec 11/13 11:01

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: Eric Leveque

Phone: (613) 226-7381
Fax: (613) 226-6344

Client PO: 15020
Project: PE3078
Custody: 96274

Report Date: 4-Sep-2013
Order Date: 28-Aug-2013
Order #: 1335171

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

Paracel ID	Client ID
1335171-01	MW101-GW1
1335171-02	MW102-GW1
1335171-03	BH4-13 GW1

Approved By:

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

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

Certificate of Analysis

Report Date: 04-Sep-2013
Order Date:28-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15020 Project Description: PE3078

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	30-Aug-13	2-Sep-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	30-Aug-13	4-Sep-13
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	30-Aug-13	2-Sep-13

Certificate of Analysis

Report Date: 04-Sep-2013
Order Date:28-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15020

Project Description: PE3078

	Client ID:	MW101-GW1	MW102-GW1	BH4-13 GW1	-
	Sample Date:	28-Aug-13	28-Aug-13	28-Aug-13	-
	Sample ID:	1335171-01	1335171-02	1335171-03	-
	MDL/Units	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	-
Chloroethane	1.0 ug/L	<1.0	<1.0	<1.0	-
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	-
Chloromethane	3.0 ug/L	<3.0	<3.0	<3.0	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	<0.2	-
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-Dichloroethylene, total	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	-
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 Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	<10.0	-
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	-

Certificate of Analysis

Report Date: 04-Sep-2013
Order Date:28-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15020

Project Description: PE3078

	Client ID:	MW101-GW1	MW102-GW1	BH4-13 GW1	-
	Sample Date:	28-Aug-13	28-Aug-13	28-Aug-13	-
	Sample ID:	1335171-01	1335171-02	1335171-03	-
	MDL/Units	Water	Water	Water	-
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	<0.5	<0.5	<0.5	-
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
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	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	-
4-Bromofluorobenzene	Surrogate	105%	105%	106%	-
Dibromofluoromethane	Surrogate	97.6%	95.2%	97.2%	-
Toluene-d8	Surrogate	111%	112%	110%	-
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	-

Certificate of Analysis

Report Date: 04-Sep-2013
Order Date:28-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15020 Project Description: PE3078

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dibromoethane	ND	0.2	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloroethylene, total	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,2,4-Trichlorobenzene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*34.1*		*ug/L*		*107*	*50-140*			
Surrogate: Dibromofluoromethane	*28.4*		*ug/L*		*88.8*	*50-140*			
Surrogate: Toluene-d8	*38.7*		*ug/L*		*121*	*50-140*			

Certificate of Analysis

Report Date: 04-Sep-2013
Order Date:28-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15020 Project Description: PE3078

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Volatiles									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroethane	ND	1.0	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dibromoethane	ND	0.2	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,2,4-Trichlorobenzene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	*34.2*		*ug/L*	*ND*	*107*	*50-140*			
Surrogate: Dibromofluoromethane	*26.0*		*ug/L*	*ND*	*81.3*	*50-140*			
Surrogate: Toluene-d8	*38.2*		*ug/L*	*ND*	*119*	*50-140*			

Certificate of Analysis

Report Date: 04-Sep-2013
Order Date:28-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15020 Project Description: PE3078

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1870	25	ug/L	ND	93.7	68-117			
F2 PHCs (C10-C16)	1850	100	ug/L	ND	103	60-140			
F3 PHCs (C16-C34)	3660	100	ug/L	ND	98.5	60-140			
F4 PHCs (C34-C50)	2150	100	ug/L	ND	86.7	60-140			
Volatiles									
Acetone	60.6	5.0	ug/L	ND	60.6	50-140			
Benzene	38.5	0.5	ug/L	ND	96.2	50-140			
Bromodichloromethane	31.2	0.5	ug/L	ND	78.1	50-140			
Bromoform	34.2	0.5	ug/L	ND	85.6	50-140			
Bromomethane	44.2	0.5	ug/L	ND	110	50-140			
Carbon Tetrachloride	33.1	0.2	ug/L	ND	82.7	50-140			
Chlorobenzene	44.0	0.5	ug/L	ND	110	50-140			
Chloroethane	41.6	1.0	ug/L	ND	104	50-140			
Chloroform	36.7	0.5	ug/L	ND	91.8	50-140			
Chloromethane	49.4	3.0	ug/L	ND	124	50-140			
Dibromochloromethane	34.6	0.5	ug/L	ND	86.6	50-140			
Dichlorodifluoromethane	32.4	1.0	ug/L	ND	80.9	50-140			
1,2-Dibromoethane	40.4	0.2	ug/L	ND	101	50-140			
1,2-Dichlorobenzene	41.1	0.5	ug/L	ND	103	50-140			
1,3-Dichlorobenzene	40.9	0.5	ug/L	ND	102	50-140			
1,4-Dichlorobenzene	51.1	0.5	ug/L	ND	128	50-140			
1,1-Dichloroethane	32.9	0.5	ug/L	ND	82.4	50-140			
1,2-Dichloroethane	37.0	0.5	ug/L	ND	92.4	50-140			
1,1-Dichloroethylene	39.5	0.5	ug/L	ND	98.7	50-140			
cis-1,2-Dichloroethylene	42.1	0.5	ug/L	ND	105	50-140			
trans-1,2-Dichloroethylene	35.6	0.5	ug/L	ND	88.9	50-140			
1,2-Dichloropropane	35.3	0.5	ug/L	ND	88.2	50-140			
cis-1,3-Dichloropropylene	29.9	0.5	ug/L	ND	74.6	50-140			
trans-1,3-Dichloropropylene	30.8	0.5	ug/L	ND	77.0	50-140			
Ethylbenzene	43.5	0.5	ug/L	ND	109	50-140			
Hexane	18.8	1.0	ug/L	ND	47.1	50-140			
Methyl Ethyl Ketone (2-Butanone)	75.2	5.0	ug/L	ND	75.2	50-140			
Methyl Butyl Ketone (2-Hexanone)	93.6	10.0	ug/L	ND	93.6	50-140			
Methyl Isobutyl Ketone	90.7	5.0	ug/L	ND	90.7	50-140			
Methyl tert-butyl ether	75.4	2.0	ug/L	ND	75.4	50-140			
Methylene Chloride	41.7	5.0	ug/L	ND	104	50-140			
Styrene	45.0	0.5	ug/L	ND	113	50-140			
1,1,1,2-Tetrachloroethane	37.8	0.5	ug/L	ND	94.5	50-140			
1,1,2,2-Tetrachloroethane	45.6	0.5	ug/L	ND	114	50-140			
Tetrachloroethylene	40.1	0.5	ug/L	ND	100	50-140			
Toluene	47.4	0.5	ug/L	ND	119	50-140			
1,2,4-Trichlorobenzene	46.6	0.5	ug/L	ND	116	50-140			
1,1,1-Trichloroethane	32.2	0.5	ug/L	ND	80.4	50-140			
1,1,2-Trichloroethane	34.8	0.5	ug/L	ND	87.1	50-140			
Trichloroethylene	35.5	0.5	ug/L	ND	88.6	50-140			
Trichlorofluoromethane	41.2	1.0	ug/L	ND	103	50-140			
1,3,5-Trimethylbenzene	41.8	0.5	ug/L	ND	105	50-140			
Vinyl chloride	45.5	0.5	ug/L	ND	114	50-140			
m,p-Xylenes	91.8	0.5	ug/L	ND	115	50-140			

Certificate of Analysis

Report Date: 04-Sep-2013
Order Date:28-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15020 Project Description: PE3078

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	43.8	0.5	ug/L	ND	110	50-140			
Surrogate: 4-Bromofluorobenzene	*29.5*		*ug/L*		*92.2*	*50-140*			

Certificate of Analysis

Report Date: 04-Sep-2013
Order Date:28-Aug-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15020 Project Description: PE3078

Qualifier Notes:

Login Qualifiers :

Sample - Received with >5% sediment, instructed to decant and analyze without sediment
Applies to samples: MW101-GW1

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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Page ___ of ___

Client Name: Paterson Group	Project Reference: PE3078	TAT: [X] Regular [ ] 3 Day
Contact Name: ERIC LEVEQUE	Quote #	[ ] 2 Day [ ] 1 Day
Address: 154 Colonnade Rd S.	PO # 15020	Date Required:
Telephone: 613-226-7381	Email Address: elevesque@patersongroup.ca	

Criteria: [ ] O. Reg. 153/04 Table __ [X] O. Reg. 153/11 (Current) Table 3 [ ] RSC Filing [ ] O. Reg. 558/00 [ ] PWQO [ ] CCME [ ] SUB (Storm) [ ] SUB (Sanitary) Municipality:_____ [ ] Other:_____

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

Required Analyses

Paracel Order Number: 1335171

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP/MS	Hg	CrVI	B (HWS)						
1	MW101-GW1	GW		3	Aug 26/13	10	X	X						→	↑ 5% sediment				
2	MW102-GW1	GW		3	↓	1030	X	X											
3	BH4-13 GW1	GW		3	↓	11	X	X											
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Print & Sign):	Received by Driver/Depot: M. Scouse	Received at Lab: SUNEEPORN	Verified By: MC
	Date/Time: 28/08/13 2:17pm	Date/Time: Aug 28, 2013 04:05	Date/Time: Aug 28/13 6:33
Date/Time:	Temperature: ____ °C	Temperature: 20.2 °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: Eric Leveque

Phone: (613) 226-7381
Fax: (613) 226-6344

Client PO: 14950
Project: PE3113
Custody: 8206

Report Date: 7-Oct-2013
Order Date: 2-Oct-2013
Order #: 1340180

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

Paracel ID	Client ID
1340180-01	BH1-13-GW1
1340180-02	BH2-13-GW1
1340180-03	BH4-13-GW1

Approved By:

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

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

Certificate of Analysis

Report Date: 07-Oct-2013
Order Date:2-Oct-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 14950 Project Description: PE3113

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	4-Oct-13	4-Oct-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	3-Oct-13	3-Oct-13
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	4-Oct-13	4-Oct-13

Certificate of Analysis

Report Date: 07-Oct-2013
Order Date:2-Oct-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 14950

Project Description: PE3113

	Client ID:	BH1-13-GW1	BH2-13-GW1	BH4-13-GW1	-
	Sample Date:	02-Oct-13	02-Oct-13	02-Oct-13	-
	Sample ID:	1340180-01	1340180-02	1340180-03	-
	MDL/Units	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	-
Chloroethane	1.0 ug/L	<1.0	<1.0	<1.0	-
Chloroform	0.5 ug/L	<0.5	1.8	<0.5	-
Chloromethane	3.0 ug/L	<3.0	<3.0	<3.0	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	<0.2	-
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-Dichloroethylene, total	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	-
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 Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	<10.0	-
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	-

Certificate of Analysis

Report Date: 07-Oct-2013
Order Date:2-Oct-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 14950

Project Description: PE3113

	Client ID:	BH1-13-GW1	BH2-13-GW1	BH4-13-GW1	-
	Sample Date:	02-Oct-13	02-Oct-13	02-Oct-13	-
	Sample ID:	1340180-01	1340180-02	1340180-03	-
	MDL/Units	Water	Water	Water	-
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	<0.5	<0.5	<0.5	-
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
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	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	<0.5	1.7	<0.5	-
o-Xylene	0.5 ug/L	<0.5	1.7	<0.5	-
Xylenes, total	0.5 ug/L	<0.5	3.4	<0.5	-
4-Bromofluorobenzene	Surrogate	118%	118%	118%	-
Dibromofluoromethane	Surrogate	98.7%	99.0%	98.9%	-
Toluene-d8	Surrogate	109%	110%	110%	-
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	-

Certificate of Analysis

Report Date: 07-Oct-2013
Order Date:2-Oct-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 14950 Project Description: PE3113

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dibromoethane	ND	0.2	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloroethylene, total	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,2,4-Trichlorobenzene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*29.5*		*ug/L*		*92.3*	*50-140*			
Surrogate: Dibromofluoromethane	*28.1*		*ug/L*		*87.8*	*50-140*			
Surrogate: Toluene-d8	*28.4*		*ug/L*		*88.8*	*50-140*			

Certificate of Analysis

Report Date: 07-Oct-2013
Order Date:2-Oct-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 14950 Project Description: PE3113

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	5.00	0.5	ug/L	3.71			29.6	30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroethane	ND	1.0	ug/L	ND				30	
Chloroform	13.5	0.5	ug/L	9.50			34.8	30	QR-05
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	3.33	0.5	ug/L	2.09			45.8	30	QR-05
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dibromoethane	ND	0.2	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,2,4-Trichlorobenzene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	*38.0*		*ug/L*	*ND*	*119*	*50-140*			
Surrogate: Dibromofluoromethane	*31.2*		*ug/L*	*ND*	*97.5*	*50-140*			
Surrogate: Toluene-d8	*35.8*		*ug/L*	*ND*	*112*	*50-140*			

Certificate of Analysis

Report Date: 07-Oct-2013
Order Date:2-Oct-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 14950 Project Description: PE3113

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1760	25	ug/L	ND	88.0	68-117			
F2 PHCs (C10-C16)	1780	100	ug/L	ND	98.9	60-140			
F3 PHCs (C16-C34)	3130	100	ug/L	ND	84.3	60-140			
F4 PHCs (C34-C50)	2030	100	ug/L	ND	81.9	60-140			
Volatiles									
Acetone	81.4	5.0	ug/L	ND	81.4	50-140			
Benzene	36.0	0.5	ug/L	ND	90.0	50-140			
Bromodichloromethane	42.2	0.5	ug/L	3.71	96.1	50-140			
Bromoform	41.3	0.5	ug/L	ND	103	50-140			
Bromomethane	27.3	0.5	ug/L	ND	68.2	50-140			
Carbon Tetrachloride	36.1	0.2	ug/L	ND	90.3	50-140			
Chlorobenzene	35.7	0.5	ug/L	ND	89.3	50-140			
Chloroethane	38.9	1.0	ug/L	ND	97.2	50-140			
Chloroform	47.8	0.5	ug/L	9.50	95.8	50-140			
Chloromethane	35.0	3.0	ug/L	ND	87.5	50-140			
Dibromochloromethane	41.5	0.5	ug/L	2.09	98.4	50-140			
Dichlorodifluoromethane	32.6	1.0	ug/L	ND	81.6	50-140			
1,2-Dibromoethane	32.3	0.2	ug/L	ND	80.6	50-140			
1,2-Dichlorobenzene	38.6	0.5	ug/L	ND	96.6	50-140			
1,3-Dichlorobenzene	36.5	0.5	ug/L	ND	91.2	50-140			
1,4-Dichlorobenzene	38.4	0.5	ug/L	ND	95.9	50-140			
1,1-Dichloroethane	34.0	0.5	ug/L	ND	84.9	50-140			
1,2-Dichloroethane	34.2	0.5	ug/L	ND	85.6	50-140			
1,1-Dichloroethylene	38.7	0.5	ug/L	ND	96.6	50-140			
cis-1,2-Dichloroethylene	32.5	0.5	ug/L	ND	81.3	50-140			
trans-1,2-Dichloroethylene	31.7	0.5	ug/L	ND	79.2	50-140			
1,2-Dichloropropane	34.6	0.5	ug/L	ND	86.4	50-140			
cis-1,3-Dichloropropylene	40.4	0.5	ug/L	ND	101	50-140			
trans-1,3-Dichloropropylene	44.2	0.5	ug/L	ND	110	50-140			
Ethylbenzene	36.1	0.5	ug/L	ND	90.2	50-140			
Hexane	30.0	1.0	ug/L	ND	75.0	50-140			
Methyl Ethyl Ketone (2-Butanone)	68.3	5.0	ug/L	ND	68.3	50-140			
Methyl Butyl Ketone (2-Hexanone)	89.1	10.0	ug/L	ND	89.1	50-140			
Methyl Isobutyl Ketone	94.3	5.0	ug/L	ND	94.3	50-140			
Methyl tert-butyl ether	132	2.0	ug/L	ND	132	50-140			
Methylene Chloride	32.3	5.0	ug/L	ND	80.8	50-140			
Styrene	38.7	0.5	ug/L	ND	96.7	50-140			
1,1,1,2-Tetrachloroethane	34.2	0.5	ug/L	ND	85.4	50-140			
1,1,2,2-Tetrachloroethane	44.1	0.5	ug/L	ND	110	50-140			
Tetrachloroethylene	31.2	0.5	ug/L	ND	77.9	50-140			
Toluene	35.7	0.5	ug/L	ND	89.4	50-140			
1,2,4-Trichlorobenzene	29.9	0.5	ug/L	ND	74.7	50-140			
1,1,1-Trichloroethane	41.3	0.5	ug/L	ND	103	50-140			
1,1,2-Trichloroethane	34.2	0.5	ug/L	ND	85.4	50-140			
Trichloroethylene	32.1	0.5	ug/L	ND	80.4	50-140			
Trichlorofluoromethane	39.8	1.0	ug/L	ND	99.4	50-140			
1,3,5-Trimethylbenzene	33.8	0.5	ug/L	ND	84.6	50-140			
Vinyl chloride	35.6	0.5	ug/L	ND	89.1	50-140			
m,p-Xylenes	77.5	0.5	ug/L	ND	96.9	50-140			

Certificate of Analysis

Report Date: 07-Oct-2013
Order Date:2-Oct-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 14950 Project Description: PE3113

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	37.3	0.5	ug/L	ND	93.4	50-140			
Surrogate: 4-Bromofluorobenzene	*30.2*		*ug/L*		*94.3*	*50-140*			

Certificate of Analysis

Report Date: 07-Oct-2013
Order Date:2-Oct-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 14950 Project Description: PE3113

Qualifier Notes:

QC Qualifiers :

QR-05 : Duplicate RPDs higher than normally accepted. Remaing batch QA\QC was acceptable. May be sample effect.

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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№ 8206

Page 1 of 1

Client Name: PATERSON GROUP INC.	Project Reference: PE3113
Contact Name: ERIC LEVEQUE	Quote #
Address: 154 COLONNADE ROAD SOUTH	PO # 14950
Telephone: (613) 226-7381	Email Address: ELEVEQUE@PATERSONGROUP.CA

TAT: [X] Regular [ ] 3 Day [ ] 2 Day [ ] 1 Day
Date Required: _____

Criteria: [X] O. Reg. 153/04 Table 2 [X] O. Reg. 153/11 (Current) Table 3 [ ] RSC Filing [ ] O. Reg. 558/00 [ ] PWQO [ ] CCME [ ] SUB (Storm) [ ] SUB (Sanitary) Municipality: _____ [ ] Other: _____

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

Paracel Order Number: 1340180

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs (F1-F4) BTEX	VOCs
1	BH1-13-GW1	GW		3	Oct 2, 2013	~	X	X
2	BH2-13-GW1	"		3	"	~	X	X
3	BH4-13-GW1	"		3	"	~	X	X
4								
5								
6								
7								
8								
9								
10								

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Print & Sign): SEAN MCGRIDGE	Received by Driver/Depot: T. LOUSE	Received at Lab: SUNDEEPORN
Date/Time: October 2, 2013 ~1pm	Date/Time: 02/10/13 3:33PM	Date/Time: OCT 09, 2013 05:30
	Temperature: ___ °C	Temperature: 18.5 °C

Verified By: M/C
Date/Time: Oct 2/13 6:39
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: Eric Leveque

Phone: (613) 226-7381
Fax: (613) 226-6344

Client PO: 15205
Project: PE3113
Custody: 99029

Report Date: 27-Dec-2013
Order Date: 20-Dec-2013
Order #: 1351265

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

Paracel ID	Client ID
1351265-01	BH5-13 GW1
1351265-02	BH7-13 GW1

Approved By: Mark Foto

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

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

Certificate of Analysis

Report Date: 27-Dec-2013
Order Date:20-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15205 Project Description: PE3113

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	24-Dec-13	24-Dec-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	20-Dec-13	23-Dec-13
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	24-Dec-13	24-Dec-13

Certificate of Analysis

Report Date: 27-Dec-2013
Order Date:20-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15205

Project Description: PE3113

	Client ID:	BH5-13 GW1	BH7-13 GW1	-	-
	Sample Date:	20-Dec-13	20-Dec-13	-	-
	Sample ID:	1351265-01	1351265-02	-	-
	MDL/Units	Water	Water	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	-	-
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
Chloroethane	1.0 ug/L	<1.0	<1.0	-	-
Chloroform	0.5 ug/L	0.9	1.7	-	-
Chloromethane	3.0 ug/L	<3.0	<3.0	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	<0.2	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Hexane	1.0 ug/L	<1.0	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	<10.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	-

Certificate of Analysis

Report Date: 27-Dec-2013
Order Date:20-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15205

Project Description: PE3113

	Client ID:	BH5-13 GW1	BH7-13 GW1	-	-
	Sample Date:	20-Dec-13	20-Dec-13	-	-
	Sample ID:	1351265-01	1351265-02	-	-
	MDL/Units	Water	Water	-	-
Styrene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	0.8	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	-	-
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	-	-
4-Bromofluorobenzene	Surrogate	114%	115%	-	-
Dibromofluoromethane	Surrogate	99.0%	99.5%	-	-
Toluene-d8	Surrogate	104%	108%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-
F1 + F2 PHCs	125 ug/L	<125	<125	-	-
F3 + F4 PHCs	200 ug/L	<200	<200	-	-

Certificate of Analysis

Report Date: 27-Dec-2013
Order Date:20-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15205 Project Description: PE3113

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dibromoethane	ND	0.2	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloroethylene, total	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,2,4-Trichlorobenzene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*92.8*		*ug/L*		*116*	*50-140*			
Surrogate: Dibromofluoromethane	*80.9*		*ug/L*		*101*	*50-140*			
Surrogate: Toluene-d8	*85.2*		*ug/L*		*107*	*50-140*			

Certificate of Analysis

Report Date: 27-Dec-2013
Order Date:20-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15205 Project Description: PE3113

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Volatiles									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroethane	ND	1.0	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Chloromethane	ND	3.0	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dibromoethane	ND	0.2	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			0.0	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Butyl Ketone (2-Hexanone)	ND	10.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			0.0	30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,2,4-Trichlorobenzene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND			0.0	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	*90.7*		*ug/L*	*ND*	*113*	*50-140*			
Surrogate: Dibromofluoromethane	*74.4*		*ug/L*	*ND*	*93.0*	*50-140*			
Surrogate: Toluene-d8	*83.8*		*ug/L*	*ND*	*105*	*50-140*			

Certificate of Analysis

Report Date: 27-Dec-2013
Order Date:20-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15205 Project Description: PE3113

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1740	25	ug/L	ND	87.2	68-117			
F2 PHCs (C10-C16)	1950	100	ug/L	ND	108	60-140			
F3 PHCs (C16-C34)	3910	100	ug/L	ND	105	60-140			
F4 PHCs (C34-C50)	2680	100	ug/L	ND	108	60-140			
Volatiles									
Acetone	95.7	5.0	ug/L	ND	95.7	50-140			
Benzene	39.8	0.5	ug/L	ND	99.6	60-130			
Bromodichloromethane	40.3	0.5	ug/L	ND	101	60-130			
Bromoform	37.1	0.5	ug/L	ND	92.6	60-130			
Bromomethane	36.8	0.5	ug/L	ND	92.0	50-140			
Carbon Tetrachloride	43.0	0.2	ug/L	ND	108	60-130			
Chlorobenzene	36.2	0.5	ug/L	ND	90.6	60-130			
Chloroethane	42.0	1.0	ug/L	ND	105	50-140			
Chloroform	38.0	0.5	ug/L	ND	95.1	60-130			
Chloromethane	32.6	3.0	ug/L	ND	81.6	50-140			
Dibromochloromethane	38.7	0.5	ug/L	ND	96.7	60-130			
Dichlorodifluoromethane	32.5	1.0	ug/L	ND	81.2	50-140			
1,2-Dibromoethane	37.6	0.2	ug/L	ND	94.1	60-130			
1,2-Dichlorobenzene	38.1	0.5	ug/L	ND	95.3	60-130			
1,3-Dichlorobenzene	37.5	0.5	ug/L	ND	93.8	60-130			
1,4-Dichlorobenzene	38.1	0.5	ug/L	ND	95.2	60-130			
1,1-Dichloroethane	43.5	0.5	ug/L	ND	109	60-130			
1,2-Dichloroethane	39.4	0.5	ug/L	ND	98.4	60-130			
1,1-Dichloroethylene	38.8	0.5	ug/L	ND	97.0	60-130			
cis-1,2-Dichloroethylene	40.3	0.5	ug/L	ND	101	60-130			
trans-1,2-Dichloroethylene	39.3	0.5	ug/L	ND	98.3	60-130			
1,2-Dichloropropane	40.2	0.5	ug/L	ND	100	60-130			
cis-1,3-Dichloropropylene	39.0	0.5	ug/L	ND	97.4	60-130			
trans-1,3-Dichloropropylene	44.1	0.5	ug/L	ND	110	60-130			
Ethylbenzene	41.7	0.5	ug/L	ND	104	60-130			
Hexane	26.8	1.0	ug/L	ND	67.0	60-130			
Methyl Ethyl Ketone (2-Butanone)	76.9	5.0	ug/L	ND	76.9	50-140			
Methyl Butyl Ketone (2-Hexanone)	79.1	10.0	ug/L	ND	79.1	50-140			
Methyl Isobutyl Ketone	98.3	5.0	ug/L	ND	98.3	50-140			
Methyl tert-butyl ether	122	2.0	ug/L	ND	122	50-140			
Methylene Chloride	39.8	5.0	ug/L	ND	99.5	60-130			
Styrene	41.8	0.5	ug/L	ND	105	60-130			
1,1,1,2-Tetrachloroethane	39.0	0.5	ug/L	ND	97.4	60-130			
1,1,2,2-Tetrachloroethane	38.0	0.5	ug/L	ND	95.0	60-130			
Tetrachloroethylene	37.5	0.5	ug/L	ND	93.8	60-130			
Toluene	38.2	0.5	ug/L	ND	95.6	60-130			
1,2,4-Trichlorobenzene	43.0	0.5	ug/L	ND	107	60-130			
1,1,1-Trichloroethane	38.7	0.5	ug/L	ND	96.7	60-130			
1,1,2-Trichloroethane	37.9	0.5	ug/L	ND	94.7	60-130			
Trichloroethylene	38.4	0.5	ug/L	ND	95.9	60-130			
Trichlorofluoromethane	42.0	1.0	ug/L	ND	105	60-130			
1,3,5-Trimethylbenzene	37.2	0.5	ug/L	ND	92.9	60-130			
Vinyl chloride	24.3	0.5	ug/L	ND	60.8	50-140			
m,p-Xylenes	79.0	0.5	ug/L	ND	98.7	60-130			

Certificate of Analysis

Report Date: 27-Dec-2013
Order Date:20-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15205 Project Description: PE3113

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	39.4	0.5	ug/L	ND	98.5	60-130			
Surrogate: 4-Bromofluorobenzene	*76.4*		*ug/L*		*95.4*	*50-140*			

Certificate of Analysis

Report Date: 27-Dec-2013
Order Date:20-Dec-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 15205 Project Description: PE3113

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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Page 1 of 1

Client Name: Paterson Group	Project Reference: PE 3113	TAT: [X] Regular	[ ] 3 Day
Contact Name: Eric Levesque	Quote #	[ ] 2 Day	[ ] 1 Day
Address: 154 Colonnade	PO # 15205	Date Required:	
Telephone: 613-226-7381	Email Address: elevesque@patersongroup.ca		

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

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

Required Analyses

Paracel Order Number: 1351265

	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	BH5-13 GW1	GW		3	Dec 20/13	AM	X	X					
2	BH7-13 GW1	GW		3	↓	↓	X	X					
3													
4													
5													
6													
7													
8													
9													
10													

Comments:

Method of Delivery: Swift

Relinquished By (Sign): Mike B	Received by Driver/Depot:	Received at Lab: SUNEZPORN	Verified By: MC
Relinquished By (Print):	Date/Time:	Date/Time: Dec 20 2013 18:30	Date/Time: Dec 20/13 3:15
Date/Time:	Temperature: ____ °C	Temperature: 12.5 °C	pH Verified [ ] By: N/A