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Phase II – Environmental Site Assessment

36 & 40 Jamie Avenue
Ottawa, Ontario

Prepared For

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the properties addressed 36 & 40 Jamie Avenue, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the potentially contaminating activities (PCAs) that were identified during the January 2021 Phase I ESA and were considered to result in areas of potential environmental concern (APECs) on the subject site.

The subsurface investigation was conducted on January 22, 2021 and consisted of drilling three (3) boreholes (BH1-21 – BH3-21) throughout the subject site, all of which were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 7.62 m to 8.23 m below the existing grade and terminated within a layer of silty sand.

Two (2) soil samples were submitted for laboratory analysis of PHC (F₁-F₄) and VOC parameters. According to the analytical test results, all parameter concentrations in the soil samples analyzed comply with the selected MECP Table 3 commercial standards.

Three (3) groundwater samples were recovered and submitted for laboratory analysis of PHC (F₁-F₄) and VOC parameters. According to the analytical test results, all parameter concentrations in the groundwater samples analyzed comply with the selected MECP Table 3 commercial standards.

Recommendations

Monitoring Wells

If the groundwater monitoring wells installed on-site are not going to be used in the future, or will be destroyed during future construction activities, then they must be decommissioned according to Ontario Regulation 903 (Ontario Water Resources Act). The monitoring wells will be registered with the MECP under this regulation. Further information can be provided upon request in this regard.

1.0 INTRODUCTION

At the request of Mr. Brian Clark of Brian K. Clark Architect, acting on behalf of Star Motors of Ottawa, Paterson Group (Paterson) conducted a Phase II – Environmental Site Assessment (Phase II ESA) for the properties addressed 36 & 40 Jamie Avenue, in the City of Ottawa, Ontario. The purpose of this Phase II ESA has been to address the areas of potential environmental concern (APECs) identified on the subject site as a result of the findings of the Phase I ESA, completed by Paterson in January 2021.

1.1 Site Description

Address:	36 & 40 Jamie Avenue, Ottawa, Ontario.
Legal Description:	Part of Lot 28, Concession A (Rideau Front), Formerly the Township of Nepean, in the City of Ottawa.
Location:	The subject site is located on the south side of Jamie Avenue, approximately 100 m west of Sunderland Street, in the City of Ottawa, Ontario. Refer to Figure 1 – Key Plan for the site location.
Latitude and Longitude:	45° 20' 04" N, 75° 43' 10" W.

Site Description:

Configuration:	Rectangular
Site Area:	3,810 m ² (approximate)
Zoning:	IH1 – Heavy Industrial Zone
Current Uses:	The subject site is currently occupied with two (2) autobody repair shops.
Services:	The subject site is located within a municipally serviced area.

1.2 Property Ownership

The subject property is currently owned by Star Motors of Ottawa. Paterson was retained to complete this Phase II ESA by Star Motors of Ottawa, whose offices are located at 400 West Hunt Club Road, Ottawa, Ontario. Star Motors of Ottawa can be contacted via telephone at 613-737-7827.

1.3 Current and Proposed Future Uses

The subject site is currently occupied with two (2) autobody repair shops, surrounded by asphaltic concrete parking lots and laneways. It is our understanding that an infill addition is to be constructed in the space between the two (2) body shop buildings.

1.4 Applicable Site Condition Standard

The site condition standards for the subject property were obtained from Table 3 of the document entitled, *“Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”*, prepared by the Ministry of the Environment, Conservation and Parks (MECP), and dated April 15, 2011. The selected MECP standards are based on the following considerations:

- Coarse-grained soil conditions;
- Non-potable groundwater conditions;
- Commercial/industrial land use.

The commercial standards were selected based on the current and future land use of the subject site.

Grain size analysis was not conducted as part of this assessment, however, the coarse-grained soil standards were selected as a conservative approach.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The subject site is currently occupied with two (2) autobody repair shops, surrounded entirely by asphaltic concrete parking areas and laneways. The site topography slopes very gently down to the north and east, whereas the regional topography is relatively flat. The subject site sits slightly above the grade of Jamie Avenue, yet is considered to be at grade with respect to the neighbouring properties. Water drainage on the subject site occurs primarily via sheet flow towards catch basins located within the western portion of the subject site or along Jamie Avenue.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted on January 22, 2021 and consisted of drilling three (3) boreholes (BH1-21 – BH3-21) throughout the subject site, all of which were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 7.62 m to 8.23 m below the existing grade and terminated within a layer of silty sand.

3.2 Media Investigated

During the subsurface investigation, soil 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.

The contaminants of potential concern for the soil and groundwater on the subject site include the following:

- Volatile Organic Compounds (VOCs);
- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F₁-F₄).

3.3 Phase I ESA Conceptual Site Model

Existing Buildings and Structures

The subject site is currently occupied with two (2) auto body repair shops, surrounded entirely by asphaltic concrete parking lots and laneways.

Geological and Hydrogeological Setting

Based on the available information, the bedrock in the area of the subject site consists of interbedded sandstone and dolomite of the March Formation, whereas the surficial geology consists of deltaic and estuarine deposits (nearshore marine deposits), with an overburden thickness ranging from approximately 15 m to 25 m.

Groundwater is anticipated to be encountered within the overburden and flow in a northerly direction

Water Bodies and Areas of Natural and Scientific Interest

No water bodies or areas of natural and scientific interest are known to exist within the Phase I study area. The nearest named water body with respect to the subject site is the Rideau River, located approximately 1.53 km to the southeast.

Drinking Water Wells

Based on the availability of municipal services, no drinking water wells are expected to be present within the Phase I study area.

Neighbouring Land Use

Neighbouring land use within the Phase I study area consists mainly of commercial and industrial properties.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.1 of the Phase I ESA report, five (5) potentially contaminating activities (PCAs), resulting in areas of potential environmental concern (APECs), were identified as pertaining to the subject site. These APECs include:

- The current use of the subject site as an autobody repair shop (36 Jamie Avenue);
- The current use of the subject site as an autobody repair shop (40 Jamie Avenue);
- A former auto service garage; located immediately to the south (37 Bentley Avenue);
- An existing auto dealership and service center; located 20 m to the north (400 West Hunt Club Road);
- An existing autobody repair shop, located 35 m to the east (50 Jamie Avenue);

Numerous off-site PCAs were identified within the Phase I study area but were deemed not to be of any environmental concern to the subject site based on their separation distances as well as their down-gradient or cross-gradient orientation.

Contaminants of Potential Concern

The contaminants of potential concern (CPCs) associated with the aforementioned APECs are considered to be:

- Volatile Organic Compounds (VOCs);
- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F₁-F₄).

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the subject site.

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 PCAs and APECs associated with the subject site. The presence of these PCAs were 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.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

A subsurface investigation was previously conducted for 36 Jamie Avenue in April 2013 and consisted of drilling two (2) interior boreholes (BH2-13 and BH3-13) and two (2) exterior boreholes (BH1-13 and BH4-13) on the subject site. Upon completion, two (2) of the boreholes were instrumented with groundwater monitoring wells (BH3-13 and BH4-13). The boreholes were advanced to depths ranging from approximately 5.49 m to 7.62 m below the existing ground surface and terminated within a layer of brown silty sand.

One (1) soil sample, recovered from an interior BH2-13 was submitted for laboratory analysis of metal parameters. Based on the analytical test results, all detected parameter concentrations were in compliance with the selected MECP Table 3 commercial standards. Two (2) groundwater samples, recovered from the monitoring wells installed in boreholes BH3-13 and BH4-13, were submitted for laboratory analysis of PHC, metal, and VOC parameters. Based on the analytical test results, all detected parameter concentrations were in compliance with the selected MECP Table 3 commercial standards. Based on the findings of the Phase II ESA, no further investigation was recommended.

The subsurface investigation for this assessment was conducted on January 22, 2021 and consisted of drilling three (3) boreholes (BH1-21 – BH3-21) throughout the subject site, all of which were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 7.62 m to 8.23 m below the existing grade and terminated within a layer of brown silty sand.

Under the full-time supervision of Paterson personnel, the boreholes were drilled using a low-clearance drill rig provided by George Downing Estate Drilling of Hawkesbury, Ontario.

The locations of the boreholes are illustrated on Drawing PE5124-3 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

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

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

Thirty (30) soil samples were obtained from the boreholes by means of auger and split spoon sampling. The depths at which auger and split spoon samples were obtained from the boreholes are shown as “**AU**” and “**SS**”, respectively, on the Soil Profile and Test Data Sheets, appended to this report.

Site soils generally consist of asphaltic concrete over top of engineered fill (brown silty sand with crushed stone), underlain by medium-fine brown silty sand. Bedrock was not encountered in any of the boreholes at the time of the field program.

4.3 Field Screening Measurements

All soil samples collected were subjected to a preliminary screening procedure, which included visual screening for colour and evidence of metals, as well as soil vapour screening with a Photo Ionization Detector.

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

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

4.4 Groundwater Monitoring Well Installation

Three (3) groundwater monitoring wells were installed on the subject site as part of this Phase II ESA investigation. These monitoring wells were constructed using 50 mm diameter Schedule 40 threaded PVC risers and screens. A sand pack consisting of silica sand was placed around the screen and a bentonite seal was placed above the screen to minimize cross-contamination. A summary of the monitoring well construction details are listed below in Table 1 as well as on the Soil Profile and Test Data Sheets provided in Appendix 1.

Upon completion, the groundwater monitoring wells were developed using a dedicated inertial lift pump, with a minimum of three (3) well volumes being removed from the wells at the time of installation. The wells were developed until the appearance of the water was noted to be stabilized. In addition, the ground surface elevations of each borehole were subsequently surveyed with respect to a known geodetic elevation.

Table 1 Monitoring Well Construction Details						
Well ID	Ground Surface Elevation (m ASL)	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1-21	88.93	7.32	5.82-7.32	5.49-7.32	0.25-5.49	Flushmount
BH2-21	88.99	7.47	5.97-7.47	5.49-7.47	0.33-5.49	Flushmount
BH3-21	88.56	7.50	6.00-7.50	5.51-7.50	0.20-5.51	Flushmount

4.5 Field Measurement of Water Quality Parameters

Groundwater sampling was conducted at boreholes BH1-21 – BH3-21 on January 27, 2021. No water quality parameters were measured in the field at that time. Other/previous wells could not be located at the time of the sampling event.

4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MECP document entitled, “*Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario*”, dated May 1996.

Standing water was purged from each monitoring well prior to the recovery of the groundwater samples using dedicated sampling equipment. The samples were then stored in coolers to reduce possible analyte volatilization during their transportation. Further details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan, appended to this report.

4.7 Analytical Testing

The following soil and groundwater samples were submitted for laboratory analysis:

Table 2 Testing Parameters for Submitted Soil Samples				
Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed		Rationale
		VOCs	PHCs F ₁ -F ₄	
BH1-21-SS10	6.86-7.47 m Silty Sand	X	X	To assess for potential impacts resulting from the presence of two (2) on-site auto body repair shops.
BH2-21-SS7	6.10-6.71 m Silty Sand	X	X	
DUP1 ¹	6.86-7.47 m Silty Sand	X		For laboratory QA/QC purposes.

1 – Duplicate sample of BH1-21-SS10

Table 3 Testing Parameters for Submitted Groundwater Samples				
Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed		Rationale
		VOCs	PHCs F ₁ -F ₄	
BH1-21-GW1	5.82-7.32 m Silty Sand	X	X	To assess for potential impacts resulting from the presence of two (2) existing on-site auto body repair shops and one (1) existing off-site autobody repair shop.
BH2-21-GW1	5.97-7.47 m Silty Sand	X	X	To assess for potential impacts resulting from the presence of two (2) existing on-site auto body repair shops and one (1) former off-site auto service garage.
BH3-21-GW1	6.00-7.50 m Silty Sand	X	X	To assess for potential impacts resulting from the presence of two (2) existing on-site auto body repair shops, one existing off-site auto body repair shop, and one (1) existing off-site auto dealership and service garage.
DUP1 ¹	5.82-7.32 m Silty Sand	X		For laboratory QA/QC purposes.

1 – Duplicate sample of BH1-21-GW1

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) and is accredited and certified by the SCC/CALA for specific tests registered with the association.

4.8 Residue Management

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

4.9 Elevation Surveying

The ground surface elevations at each borehole location were surveyed using a GPS device by Paterson personnel and referenced to a geodetic datum.

4.10 Quality Assurance and Quality Control Measures

A summary of the quality assurance and quality control (QA/QC) measures, undertaken as part of this assessment, is provided in the Sampling and Analysis Plan in Appendix 1.

5.0 REVIEW AND EVALUATION

5.1 Geology

In general, the subsurface profile encountered at the borehole locations consists of a 0.07 m thick layer of asphaltic concrete, underlain by approximately 0.65 m of engineered fill material (brown silty sand with crushed stone), over top of native silty sand with trace silt seams.

Bedrock was not encountered in any of the borehole locations at the time of the field drilling program.

Site geology details are provided in the Soil Profile and Test Data Sheets in Appendix 1.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured using an electronic water level meter at boreholes BH1-21 – BH3-21 on January 27, 2021. The groundwater levels are summarized below in Table 4.

Table 4 Groundwater Level Measurements				
Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1-21	88.93	6.38	82.55	January 27, 2021
BH2-21	88.99	6.43	82.58	
BH3-21	88.56	6.10	82.46	

The groundwater at the subject site was generally encountered within the silty sand overburden unit at depths ranging from approximately 6.10 m to 6.43 m below the existing ground surface. No unusual visual or olfactory observations were noted with respect to the recovered groundwater samples at the time of the sampling event.

Using the groundwater elevations recorded during the sampling event, groundwater contour mapping was completed as part of this assessment. According to the mapped contour data, illustrated on Drawing PE5124-3 – Test Hole Location Plan in the appendix, the groundwater flow on the subject site is interpreted to be in an easterly direction. A horizontal hydraulic gradient of approximately 0.001 m/m was also calculated as part of this assessment.

It should be noted that groundwater levels are expected to fluctuate throughout the year with seasonal variations.

5.3 Fine/Coarse Soil Texture

Grain size analysis was not completed as part of this investigation. As a result, the coarse-grained soil standards were chosen as a conservative approach.

5.4 Field Screening

Field screening of the soil samples collected during the drilling program resulted in organic vapour readings ranging from 0.4 ppm to 11.9 ppm. The organic vapour readings obtained from the field screening indicate that there is a negligible potential for the presence of volatile substances. Heavier substances, such as heavy oil, may not be detected by the above field screening method. 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

Two (2) soil samples were submitted for laboratory analysis of PHC (F₁-F₄) and VOC parameters. The results of the analytical testing are presented below in Tables 5 and 6, as well as on the laboratory certificates of analysis included in Appendix 1.

Table 5 Analytical Test Results – Soil PHCs (F₁-F₄)					
Parameter	MDL (µg/g)	Soil Samples (µg/g)		MECP Table 1 Background Soil Standards (µg/g)	MECP Table 3 Commercial Soil Standards (µg/g)
		January 22, 2021			
		BH1-21-SS10	BH2-21-SS7		
PHCs F ₁	7	nd	nd	25	55
PHCs F ₂	4	nd	nd	10	230
PHCs F ₃	8	nd	12	240	1,700
PHCs F ₄	6	nd	19	120	3,300
Notes: <input type="checkbox"/> MDL – Method Detection Limit <input type="checkbox"/> nt – not tested for this parameter <input type="checkbox"/> nd – not detected above the MDL <input type="checkbox"/> <u> </u> – Value exceeds MECP Table 1 standards <input type="checkbox"/> <u> </u> – value exceeds selected MECP standards					

All detected PHC concentrations in the soil samples analysed are in compliance with the selected MECP Table 3 commercial standards. The results also comply with the MECP Table 1 standards.

Table 6					
Analytical Test Results – Soil					
VOCs					
Parameter	MDL (µg/g)	Soil Samples (ug/g)		MECP Table 1 Background Soil Standards (µg/g)	MECP Table 3 Commercial Soil Standards (µg/g)
		January 21, 2021			
		BH1-21-SS10	BH2-21-SS7		
Acetone	0.50	nd	nd	0.5	16
Benzene	0.02	nd	nd	0.02	0.32
Bromodichloromethane	0.05	nd	nd	0.05	18
Bromoform	0.05	nd	nd	0.05	0.61
Bromomethane	0.05	nd	nd	0.05	0.05
Carbon Tetrachloride	0.05	nd	nd	0.05	0.21
Chlorobenzene	0.05	nd	nd	0.05	2.4
Chloroform	0.05	nd	nd	0.05	0.47
Dibromochloromethane	0.05	nd	nd	0.05	13
Dichlorodifluoromethane	0.05	nd	nd	0.05	16
1,2-Dichlorobenzene	0.05	nd	nd	0.05	6.8
1,3-Dichlorobenzene	0.05	nd	nd	0.05	9.6
1,4-Dichlorobenzene	0.05	nd	nd	0.05	0.2
1,1-Dichloroethane	0.05	nd	nd	0.05	17
1,2-Dichloroethane	0.05	nd	nd	0.05	0.05
1,1-Dichloroethylene	0.05	nd	nd	0.05	0.064
cis-1,2-Dichloroethylene	0.05	nd	nd	0.05	55
trans-1,2-Dichloroethylene	0.05	nd	nd	0.05	1.3
1,2-Dichloropropane	0.05	nd	nd	0.05	0.16
1,3-Dichloropropene	0.05	nd	nd	0.05	0.18
Ethylbenzene	0.05	nd	nd	0.05	9.5
Ethylene Dibromide	0.05	nd	nd	0.05	0.05
Hexane	0.05	nd	nd	0.05	46
Methyl Ethyl Ketone	0.50	nd	nd	0.5	70
Methyl Isobutyl Ketone	0.50	nd	nd	0.5	31
Methyl tert-butyl ether	0.05	nd	nd	0.05	11
Methylene Chloride	0.05	nd	nd	0.05	1.6
Styrene	0.05	nd	nd	0.05	34
1,1,1,2-Tetrachloroethane	0.05	nd	nd	0.05	0.087
1,1,2,2-Tetrachloroethane	0.05	nd	nd	0.05	0.05
Tetrachloroethylene	0.05	nd	nd	0.05	4.5
Toluene	0.05	nd	nd	0.2	68
1,1,1-Trichloroethane	0.05	nd	nd	0.05	6.1
1,1,2-Trichloroethane	0.05	nd	nd	0.05	0.05
Trichloroethylene	0.05	nd	nd	0.05	0.91
Trichlorofluoromethane	0.05	nd	nd	0.25	4
Vinyl Chloride	0.02	nd	nd	0.02	0.032
Xylenes	0.05	nd	nd	0.05	26

Notes:

- MDL – Method Detection Limit
- nt – not tested for this parameter
- nd – not detected above the MDL
- Value exceeds MECP Table 1 standards
- value exceeds selected MECP standards

No VOC parameters were detected in the soil samples analyzed. The results are in compliance with the selected MECP Table 3 commercial standards. The results are also in compliance with the MECP Table 1 standards.

Table 7 Maximum Concentrations – Soil			
Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
PHCs F ₃	12	BH2-21-SS7	6.10 – 6.71 m
PHCs F ₄	19		
<i>Notes:</i>			
<input type="checkbox"/> <u>Bold and Underlined</u> – value exceeds selected MECP standards			

All other parameter concentrations analyzed were below the laboratory detection limits. The laboratory certificates of analysis are provided in Appendix 1.

5.6 Groundwater Quality

Groundwater samples were recovered from the monitoring wells installed in boreholes BH1-21 – BH3-21 and submitted for laboratory analysis of PHC (F₁-F₄) and VOC parameters. The results of the analytical testing are presented below in Tables 8 and 9, as well as on the laboratory certificates of analysis included in Appendix 1.

Table 8 Analytical Test Results – Groundwater PHCs (F₁-F₄)					
Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 3 Commercial Groundwater Standards (µg/L)
		January 27, 2021			
		BH1-21-GW1	BH2-21-GW1	BH3-21-GW1	
PHC F ₁	25	nd	nd	nd	750
PHC F ₂	100	nd	nd	nd	150
PHC F ₃	100	nd	nd	nd	500
PHC F ₄	100	nd	nd	nd	500
<i>Notes:</i>					
<input type="checkbox"/> MDL – Method Detection Limit					
<input type="checkbox"/> nt – not tested for this parameter					
<input type="checkbox"/> nd – not detected above the MDL					
<input type="checkbox"/> <u>Bold and Underlined</u> – value exceeds selected MECP standards					

No PHC parameters were detected in the groundwater samples analyzed. The results are in compliance with the selected MECP Table 3 commercial standards.

Table 9 Analytical Test Results – Groundwater VOCs					
Parameter	MDL (µg/L)	Groundwater Samples (ug/L)			MECP Table 3 Commercial Groundwater Standards (µg/L)
		January 27, 2021			
		BH1-21-GW1	BH2-21-GW1	BH3-21-GW1	
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
Chloroform	0.5	nd	nd	nd	2.4
Dibromochloromethane	0.5	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	4,400
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
Ethylene Dibromide	0.2	nd	nd	nd	0.25
Hexane	1.0	nd	nd	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	140,000
Methyl tert-butyl ether	2.0	nd	nd	nd	190
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	3.3
1,1,1,2,2-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
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	nd	4,200

Notes:

- MDL – Method Detection Limit
- nt – not tested for this parameter
- nd – not detected above the MDL
- nd** – value exceeds selected MECP standards

No VOC parameters were detected in the groundwater samples analyzed. The results are in compliance with the selected MECP Table 3 commercial standards.

5.7 Quality Assurance and Quality Control Results

As per the Sampling and Analysis Plan, a duplicate soil sample was obtained from sample BH1-21-SS10 and submitted for laboratory analysis of VOC parameters. Similarly, a duplicate groundwater sample was obtained from the monitoring well installed in BH1-21 and submitted for laboratory analysis of VOC parameters.

No VOC parameter concentrations were detected in either the original or the duplicate soil and groundwater samples, respectively. As a result, 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.

All samples submitted as part of this Phase II ESA were handled in accordance with the analytical protocols 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 the Environmental Protection Act, the certificates of analysis have been received for each sample submitted for laboratory analysis and have been appended to this report.

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 153/04 amended by 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 described in Section 7.1 of the Phase I ESA report, as well as Section 2.2 of this report, the following PCAs, as described by Table 2 of O.Reg. 153/04, are considered to result in APECs on the subject site:

- Item 10: “Commercial Autobody Shops”*

This PCA was identified as a result of the presence of two (2) existing autobody shops, situated on the subject site, as well as one (1) existing off-site autobody shop, located approximately 35 m to the east at 50 Jamie Avenue.

- ☐ *Item 52: "Storage, Maintenance, Fuelling and Repair of Equipment, Vehicles, and Material Used to Maintain Transportation Systems"*

This PCA was identified as a result of the presence of one (1) former off-site auto service garage, located adjacent to the southwest of the subject site at 37 Bentley Avenue, as well as one (1) existing off-site auto dealership and service garage, located approximately 20 m to the north at 400 West Hunt Club Road.

Contaminants of Potential Concern

The contaminants of potential concern (CPCs) associated with the aforementioned APECs are considered to be:

- ☐ Volatile Organic Compounds (VOCs);
- ☐ Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- ☐ Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F₁-F₄);

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the subject site.

Subsurface Structures and Utilities

Underground service locates were completed prior to the subsurface investigation. Underground utilities on the subject site include electrical cables, natural gas pipelines, as well as municipal water and wastewater services.

Physical Setting

Site Stratigraphy

The stratigraphy of the subject site generally consists of:

- ☐ Pavement structure, consisting of a 0.07 m thick layer of asphaltic concrete over top of engineered fill (brown silty sand with crushed stone), extending to a depth of approximately 0.65 m below ground surface.
- ☐ Silty sand with trace silt seams; extending to a depth of at least 8.23 m below ground surface (deepest known depth based on borehole data).

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is provided in the Soil Profile and Test Data Sheets in Appendix 1.

Hydrogeological Characteristics

The groundwater at the subject site was encountered within the silty sand overburden unit at depths ranging from approximately 6.10 m to 6.43 m below the existing ground surface.

Based on the measured groundwater levels, the groundwater is interpreted to flow in an easterly direction.

Approximate Depth to Bedrock

Bedrock was not encountered in any of the boreholes at the time of the field drilling program.

According to the available geological mapping information, the bedrock in the area of the subject site is anticipated to lie at depths ranging from approximately 15 m to 25 m below ground surface.

Approximate Depth to Water Table

The depth to the water table is approximately 6.10 m to 6.43 m below the existing ground surface.

Sections 41 and 43.1 of Ontario Regulation 153/04

Section 41 of the Regulation does not apply to the subject site, as there are no bodies of water or areas of natural significance located on or within 30 m of the subject site. The subject site is therefore not considered to be environmentally sensitive.

Section 43.1 of the Regulation does not apply to the subject site, since the bedrock is situated at depths greater than 2 m below ground surface, and thus is not considered to be a shallow soil property.

Existing Buildings and Structures

The subject site is currently occupied with two (2) auto body repair shops, surrounded entirely by asphaltic concrete parking lots and laneways.

Water Bodies and Areas of Natural and Scientific Interest

No water bodies or areas of natural and scientific interest are known to exist within the Phase I study area. The nearest named water body with respect to the subject site is the Rideau River, located approximately 1.53 km to the southeast.

Fill Placement

Engineered fill material, consisting of brown silty sand with crushed stone, was identified beneath the asphaltic concrete ground surface and extended to a depth of approximately 0.60 m below ground grade. This material is not considered to be fill of unknown quality.

Proposed Buildings and Other Structures

It is our understanding that an infill addition is to be constructed in the space between the two (2) body shop buildings.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding the MECP Table 3 commercial standards were identified in the soil or groundwater beneath the subject site.

Types of Contaminants

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding the MECP Table 3 commercial standards were identified within the soil or groundwater on the subject site.

Contaminated Media

Based on the findings of this Phase II ESA, the soil and groundwater conditions are in compliance with the selected MECP Table 3 commercial standards.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding the MECP Table 3 commercial standards were identified within the soil or groundwater on the subject site.

Distribution and Migration of Contaminants

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding the MECP Table 3 commercial standards were identified within the soil or groundwater on the subject site.

Discharge of Contaminants

Based on the findings of this Phase II ESA, no contaminants have been discharged on the subject site.

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 via the infiltration of precipitation, and the migration of contaminants via groundwater levels and/or flow, which may fluctuate seasonally.

Based on the findings of the Phase II ESA, there are no contaminants of concern present on the subject property, and thus no contaminant distribution has occurred.

Potential for Vapour Intrusion

Based on the findings of the Phase II ESA, there is no potential for vapour intrusion on the subject property.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the properties addressed 36 & 40 Jamie Avenue, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the potentially contaminating activities (PCAs) that were identified during the January 2021 Phase I ESA and were considered to result in areas of potential environmental concern (APECs) on the subject site.

The subsurface investigation was conducted on January 22, 2021 and consisted of drilling three (3) boreholes (BH1-21 – BH3-21) throughout the subject site, all of which were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 7.62 m to 8.23 m below the existing grade and terminated within a layer of silty sand.

Two (2) soil samples were submitted for laboratory analysis of PHC (F₁-F₄) and VOC parameters. According to the analytical test results, all parameter concentrations in the soil samples analyzed comply with the selected MECP Table 3 commercial standards.

Three (3) groundwater samples were recovered and submitted for laboratory analysis of PHC (F₁-F₄) and VOC parameters. According to the analytical test results, all parameter concentrations in the groundwater samples analyzed comply with the selected MECP Table 3 commercial standards.

Recommendations

Monitoring Wells

If the groundwater monitoring wells installed on-site are not going to be used in the future, or will be destroyed during future construction activities, then they must be decommissioned according to Ontario Regulation 903 (Ontario Water Resources Act). The monitoring wells will be registered with the MECP under this regulation. Further information can be provided upon request in this regard.

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, 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 Star Motors of Ottawa. Permission and notification from the Star Motors of Ottawa and Paterson Group will be required prior to the release of this report to any other party.

Paterson Group Inc.



Nick Sullivan, B.Sc.



Mark S. D'Arcy, P.Eng., QP_{ESA}



Report Distribution:

- Star Motors of Ottawa
- Paterson Group Inc.

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE5124-3 – TEST HOLE LOCATION PLAN

DRAWING PE5124-4 – ANALYTICAL TESTING PLAN – SOIL

DRAWING PE5124-4A – CROSS SECTION A-A' – SOIL

**DRAWING PE5124-5 – ANALYTICAL TESTING PLAN –
GROUNDWATER**

DRAWING PE5124-5A – CROSS SECTION A-A' – GROUNDWATER

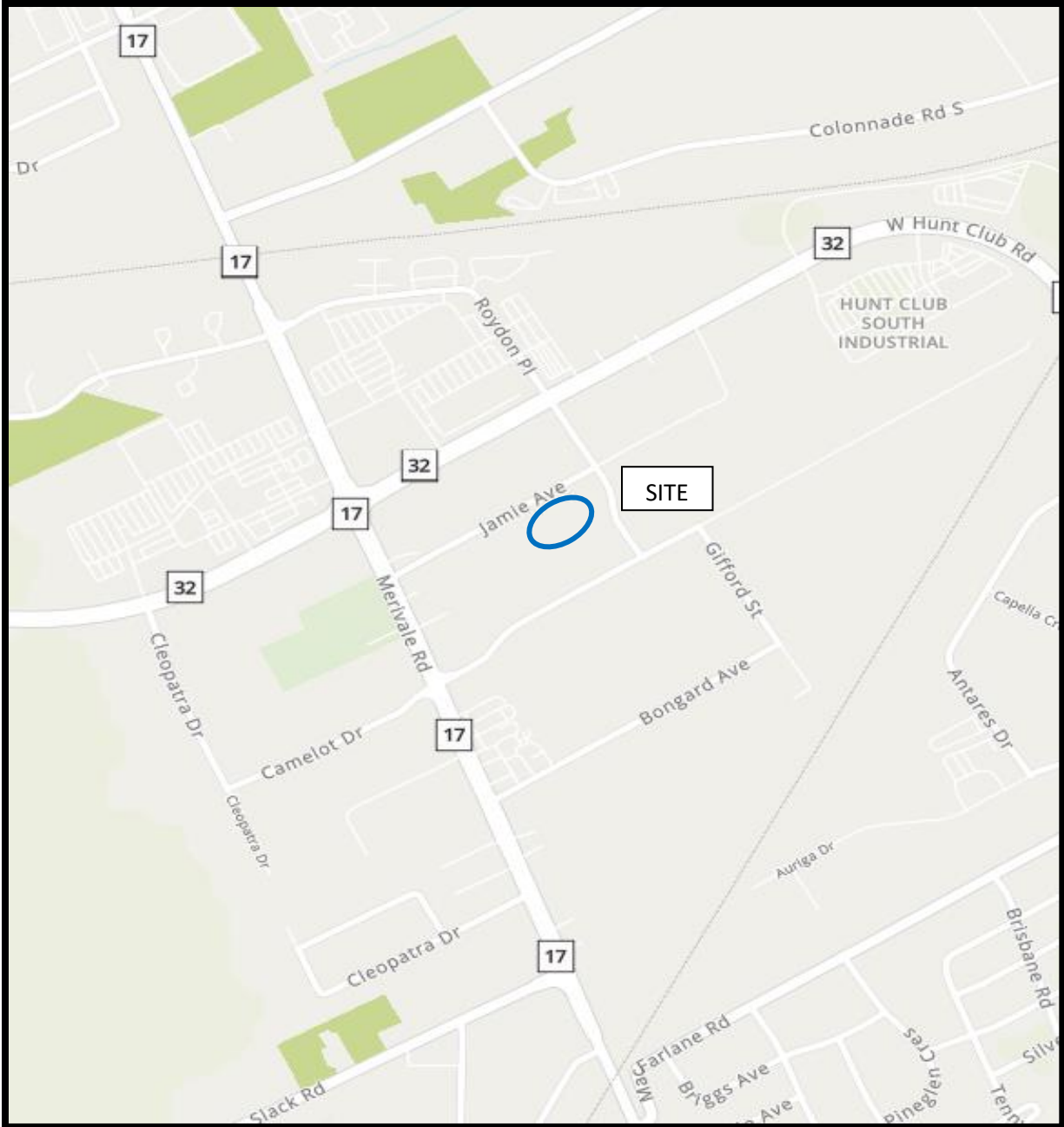


FIGURE 1
KEY PLAN

400 WEST HUNT CLUB ROAD
AUTO DEALERSHIP AND SERVICE GARAGE

35 JAMIE AVENUE
PARKING LOT

SIDEWALK

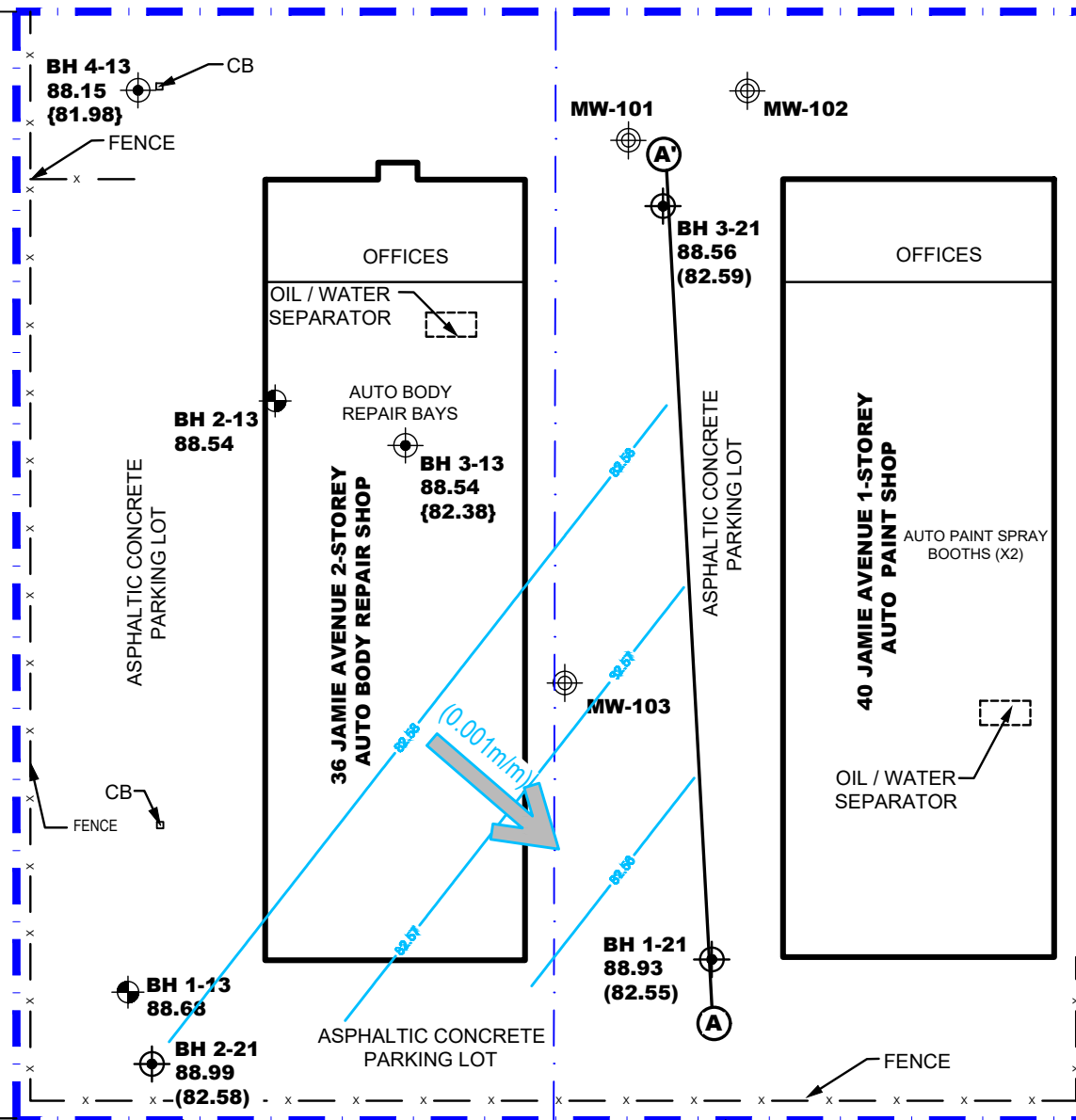
JAMIE AVENUE

SIDEWALK F.H.

30-32 JAMIE AVENUE
NEPEAN BUILDING SUPPLIES

48 JAMIE AVENUE
FRANCESCO'S COFFEE COMPANY INC.

50 JAMIE AVENUE
J R BODY SHOP



LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- MONITORING WELL LOCATION BY OTHERS
- 88.93 GROUND SURFACE ELEVATION (m)
- (82.55) GROUNDWATER SURFACE ELEVATION (m)
(JANUARY 28, 2021)
- {82.38} GROUNDWATER SURFACE ELEVATION (m)
(APRIL 11, 2013)
- CROSS SECTION
- GROUNDWATER CONTOUR (m)
- APPROX. GROUNDWATER FLOW DIRECTION
(HORIZONTAL HYDRAULIC GRADIENT)

GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS
ARE REFERENCED TO A GEODETIC DATUM.

35 BENTLEY AVENUE
UNIVERSAL TRUCK RENTAL OTTAWA

37 BENTLEY AVENUE
STAR MOTORS OF OTTAWA

39 BENTLEY AVENUE
CIVIC GLASS AND ALUMINIUM

43 BENTLEY AVENUE
UNITED BUILDING PRODUCTS

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consulting engineers

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Ottawa, Ontario K2E 7J5
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NO.	REVISIONS	DATE	INITIAL

STAR MOTORS OF OTTAWA
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
36 AND 40 JAMIE AVENUE

OTTAWA, ONTARIO

Title: **TEST HOLE LOCATION PLAN**

Scale: 1:400

Drawn by: YA

Checked by: NS

Approved by: MSD

Date: 02/2021

Report No.: PE5124-2

Dwg. No.: **PE5124-3**

Revision No.:

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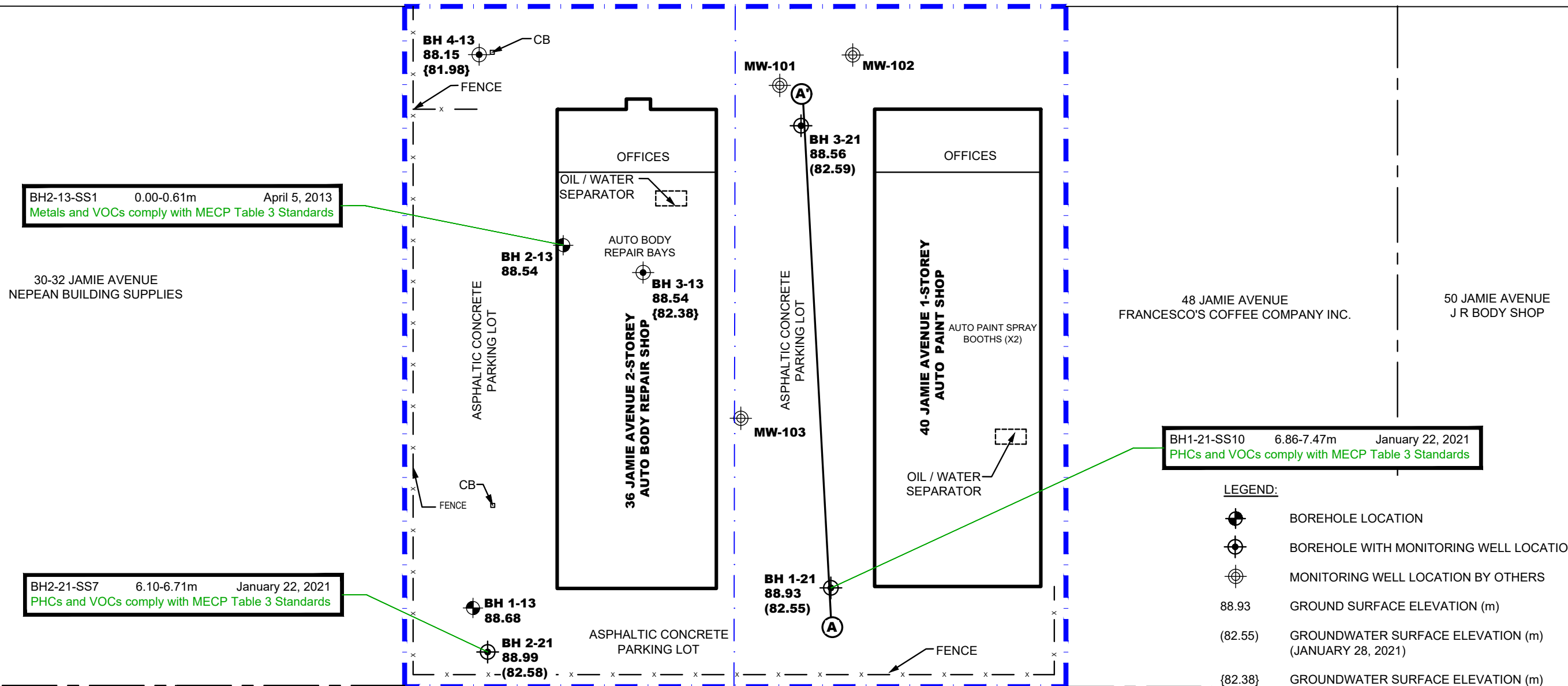
400 WEST HUNT CLUB ROAD
AUTO DEALERSHIP AND SERVICE GARAGE

35 JAMIE AVENUE
PARKING LOT

SIDEWALK

J A M I E A V E N U E

SIDEWALK F.H.



BH2-13-SS1 0.00-0.61m April 5, 2013
Metals and VOCs comply with MECP Table 3 Standards

30-32 JAMIE AVENUE
NEPEAN BUILDING SUPPLIES

BH2-21-SS7 6.10-6.71m January 22, 2021
PHCs and VOCs comply with MECP Table 3 Standards

BH1-21-SS10 6.86-7.47m January 22, 2021
PHCs and VOCs comply with MECP Table 3 Standards

- LEGEND:**
- BOREHOLE LOCATION
 - BOREHOLE WITH MONITORING WELL LOCATION
 - MONITORING WELL LOCATION BY OTHERS
 - 88.93 GROUND SURFACE ELEVATION (m)
 - (82.55) GROUNDWATER SURFACE ELEVATION (m) (JANUARY 28, 2021)
 - {82.38} GROUNDWATER SURFACE ELEVATION (m) (APRIL 11, 2013)
 - CROSS SECTION
- GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

35 BENTLEY AVENUE
UNIVERSAL TRUCK RENTAL OTTAWA

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

37 BENTLEY AVENUE
STAR MOTORS OF OTTAWA

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

39 BENTLEY AVENUE
CIVIC GLASS AND ALUMINIUM

43 BENTLEY AVENUE
UNITED BUILDING PRODUCTS

48 JAMIE AVENUE
FRANCESCO'S COFFEE COMPANY INC.

50 JAMIE AVENUE
J R BODY SHOP

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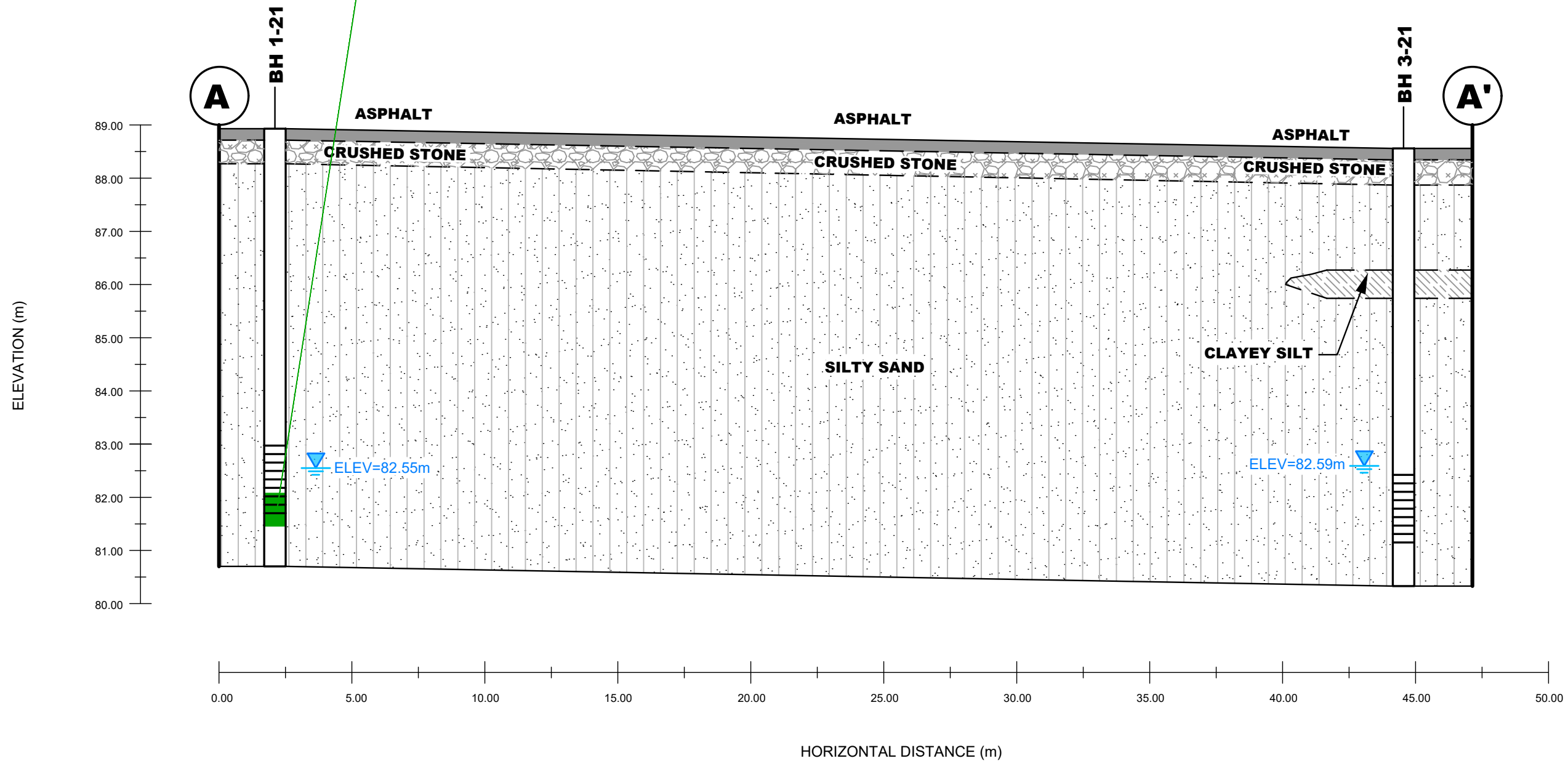
NO.	REVISIONS	DATE	INITIAL

STAR MOTORS OF OTTAWA
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
36 AND 40 JAMIE AVENUE
OTTAWA, ONTARIO
Title: **ANALYTICAL TESTING PLAN - SOIL**

Scale:	1:400	Date:	02/2021
Drawn by:	YA	Report No.:	PE5124-2
Checked by:	NS	Dwg. No.:	PE5124-4
Approved by:	MSD	Revision No.:	

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BH1-21-SS10 6.86-7.47m January 22, 2021
 PHCs and VOCs comply with MECP Table 3 Standards



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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 Ottawa, Ontario K2E 7J5
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NO.	REVISIONS	DATE	INITIAL

STAR MOTORS OF OTTAWA
 PHASE II - ENVIRONMENTAL SITE ASSESSMENT
 36 AND 40 JAMIE AVENUE
 OTTAWA, ONTARIO
 Title: **CROSS SECTION A-A' - SOIL**

Scale:	AS SHOWN	Date:	02/2021
Drawn by:	YA	Report No.:	PE5124-2
Checked by:	NS	Dwg. No.:	PE5124-4A
Approved by:	MSD	Revision No.:	

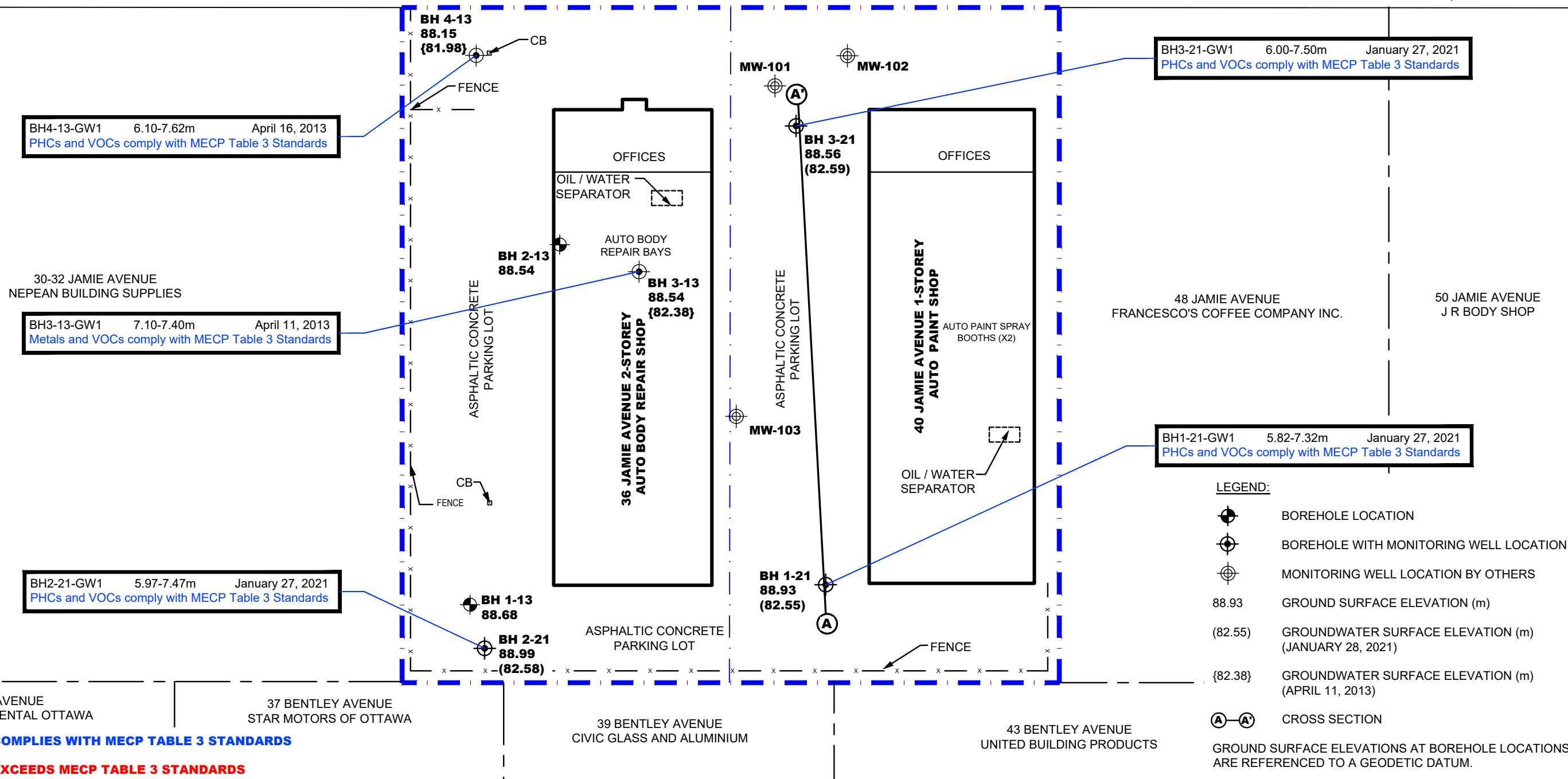
400 WEST HUNT CLUB ROAD
AUTO DEALERSHIP AND SERVICE GARAGE

35 JAMIE AVENUE
PARKING LOT

SIDEWALK

J A M I E A V E N U E

SIDEWALK F.H.



BH4-13-GW1 6.10-7.62m April 16, 2013
PHCs and VOCs comply with MECP Table 3 Standards

BH3-21-GW1 6.00-7.50m January 27, 2021
PHCs and VOCs comply with MECP Table 3 Standards

BH3-13-GW1 7.10-7.40m April 11, 2013
Metals and VOCs comply with MECP Table 3 Standards

BH1-21-GW1 5.82-7.32m January 27, 2021
PHCs and VOCs comply with MECP Table 3 Standards

BH2-21-GW1 5.97-7.47m January 27, 2021
PHCs and VOCs comply with MECP Table 3 Standards

- LEGEND:**
- BOREHOLE LOCATION
 - BOREHOLE WITH MONITORING WELL LOCATION
 - MONITORING WELL LOCATION BY OTHERS
 - 88.93 GROUND SURFACE ELEVATION (m)
 - (82.55) GROUNDWATER SURFACE ELEVATION (m) (JANUARY 28, 2021)
 - {82.38} GROUNDWATER SURFACE ELEVATION (m) (APRIL 11, 2013)
 - CROSS SECTION
- GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

STAR MOTORS OF OTTAWA
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
36 AND 40 JAMIE AVENUE

OTTAWA, ONTARIO

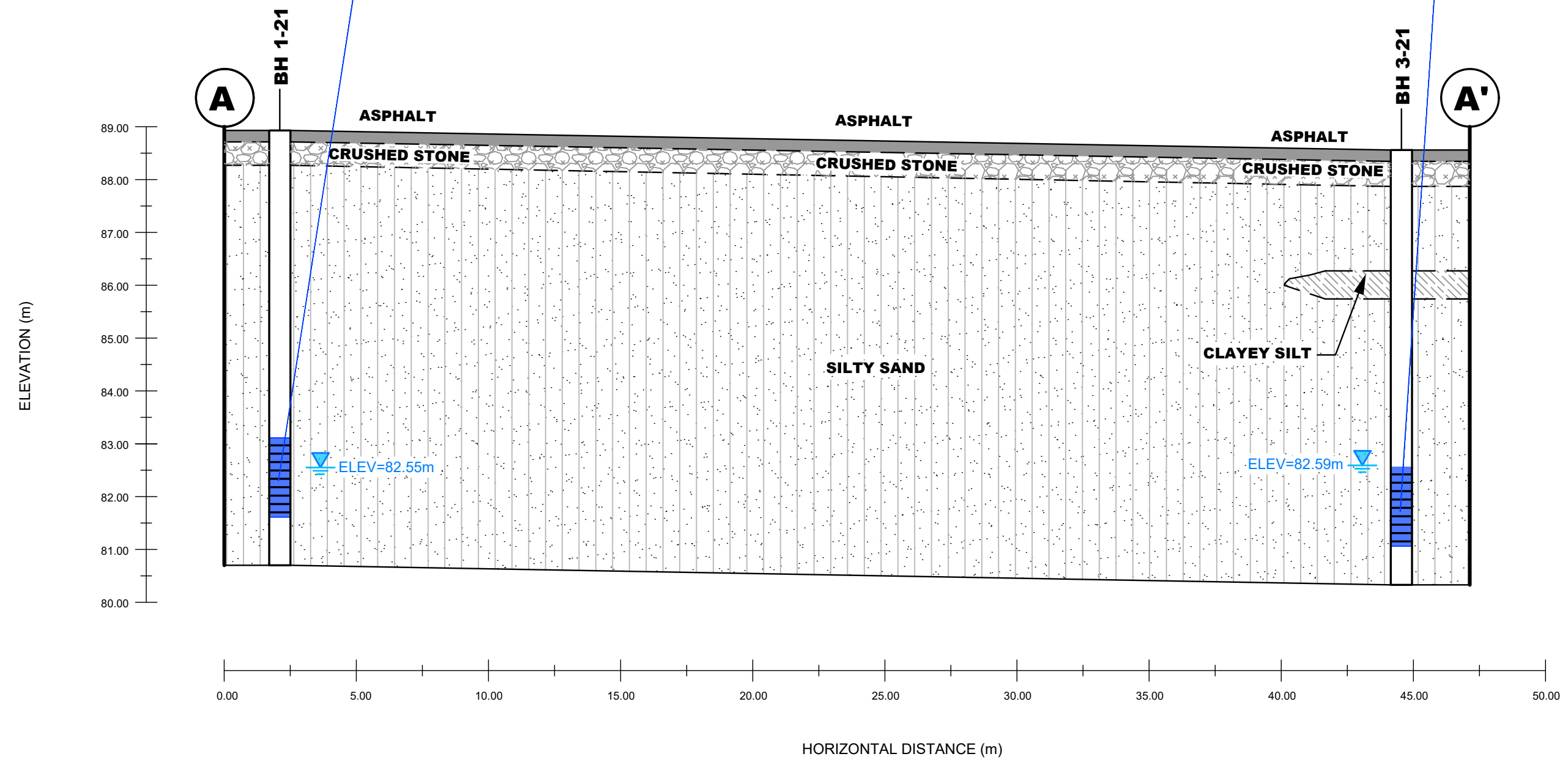
Title: **ANALYTICAL TESTING PLAN - GROUNDWATER**

Scale:	1:400	Date:	02/2021
Drawn by:	YA	Report No.:	PE5124-2
Checked by:	NS	Dwg. No.:	PE5124-5
Approved by:	MSD	Revision No.:	

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BH3-21-GW1 6.00-7.50m January 27, 2021
 PHCs and VOCs comply with MECP Table 3 Standards

BH1-21-GW1 5.82-7.32m January 27, 2021
 PHCs and VOCs comply with MECP Table 3 Standards



GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

STAR MOTORS OF OTTAWA
 PHASE II - ENVIRONMENTAL SITE ASSESSMENT
 36 AND 40 JAMIE AVENUE
 OTTAWA, ONTARIO
 Title: **CROSS SECTION A-A' - GROUNDWATER**

Scale:	AS SHOWN	Date:	02/2021
Drawn by:	YA	Report No.:	PE5124-2
Checked by:	NS	Dwg. No.:	PE5124-5A
Approved by:	MSD	Revision No.:	

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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

Sampling & Analysis Plan

Phase II – Environmental Site Assessment
36 & 40 Jamie Avenue
Ottawa, Ontario

Prepared For

Star Motors of Ottawa

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January 4, 2021

Report: PE5124-SAP

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1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Star Motors of Ottawa, to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for the property addressed 36 & 40 Jamie Avenue, in the City of Ottawa, Ontario.

Based on the findings of the Phase I ESA, the following subsurface investigation program was developed.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-21	Southern portion of the subject site; to assess for potential impacts resulting from the presence of two (2) existing on-site auto body repair shops, and an existing off-site auto body repair shop.	7-9 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH2-21	Southwestern portion of the subject site; to assess for potential impacts resulting from the presence of two (2) existing on-site auto body repair shops, and a former off-site auto service garage.	7-9 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH3-21	Northern portion of the subject site; to assess for potential impacts resulting from the presence of two (2) existing on-site auto body repair shops, an existing off-site auto dealership and service garage, and an existing off-site auto body repair shop.	7-9 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.

Borehole locations are shown on Drawing PE5124-3 – Test Hole Location Plan, appended to the main report.

At each borehole, split-spoon samples of the overburden soils will be obtained at 0.76 m (2'6") intervals until practical refusal to augering. All soil samples will be retained, and samples will be selected for submission following a preliminary screening analysis.

Following the borehole drilling, groundwater monitoring wells will be installed in all boreholes for 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:

- At least one sample from each borehole should be submitted, in order to delineate the horizontal extent of contamination across the site.
- At least one sample from each stratigraphic unit should be submitted, in order to delineate the vertical extent of contamination at the site.
- 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 MECP site condition standards.
- In boreholes with evidence of contamination as described above, a sample should be submitted from the stratigraphic unit below the 'worst-case' sample to determine whether the contaminant(s) have migrated downward.
- Parameters analyzed should be consistent with the Contaminants of Potential Concern identified in the Phase I ESA.

The analytical testing program for soil 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.
- 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 organic vapour meter or MiniRae photoionization detector (depending on contamination suspected)

Determining Borehole Locations

If conditions on site are not as suspected, 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.

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 0.6 m or 2') or semi-continuous (every 0.76 m or 2'6") 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

- 5' x 2" threaded sections of Schedule 40 PVC slotted well screen (5' x 1 ¼" if installing in cored hole in bedrock)
- 5' x 2" threaded sections of Schedule 40 PVC riser pipe (5' x 1 ¼" 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 with every laboratory submission.
- 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 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 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

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.

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
Existing Commercial Property - 36 Jamie Avenue
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located near the northeast corner of subject property.
Assumed elevation = 100.00m.

FILE NO. PE2963

REMARKS

HOLE NO. BH 1

BORINGS BY Portable Geoprobe

DATE April 5, 2013

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)				
GROUND SURFACE								○ Lower Explosive Limit %				
Asphaltic concrete	0.10					0	99.50	20	40	60	80	
FILL: Crushed stone	0.41	SS	1	25								
Brown SILTY SAND		SS	2	71		1	98.50					
		SS	3	67		2	97.50					
		SS	4	62		3	96.50					
		SS	5			4	95.50					
						5	94.50					
End of Borehole	5.49											

100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
Existing Commercial Property - 36 Jamie Avenue
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located near the northeast corner of subject property.
Assumed elevation = 100.00m.

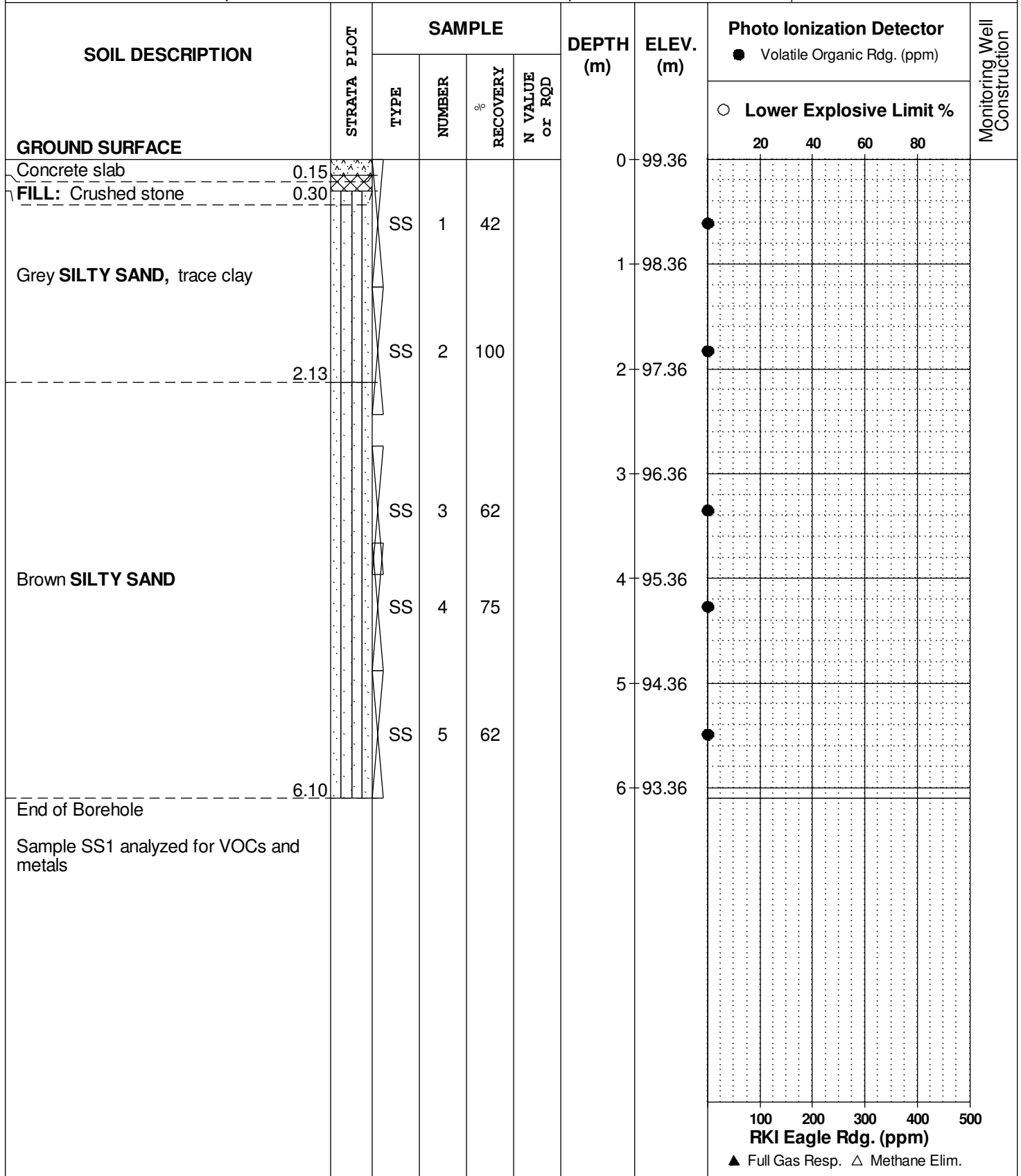
FILE NO.
PE2963

REMARKS

HOLE NO.
BH 2

BORINGS BY Portable Geoprobe

DATE April 5, 2013



Sample SS1 analyzed for VOCs and metals

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
Existing Commercial Property - 36 Jamie Avenue
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located near the northeast corner of subject property.
Assumed elevation = 100.00m.

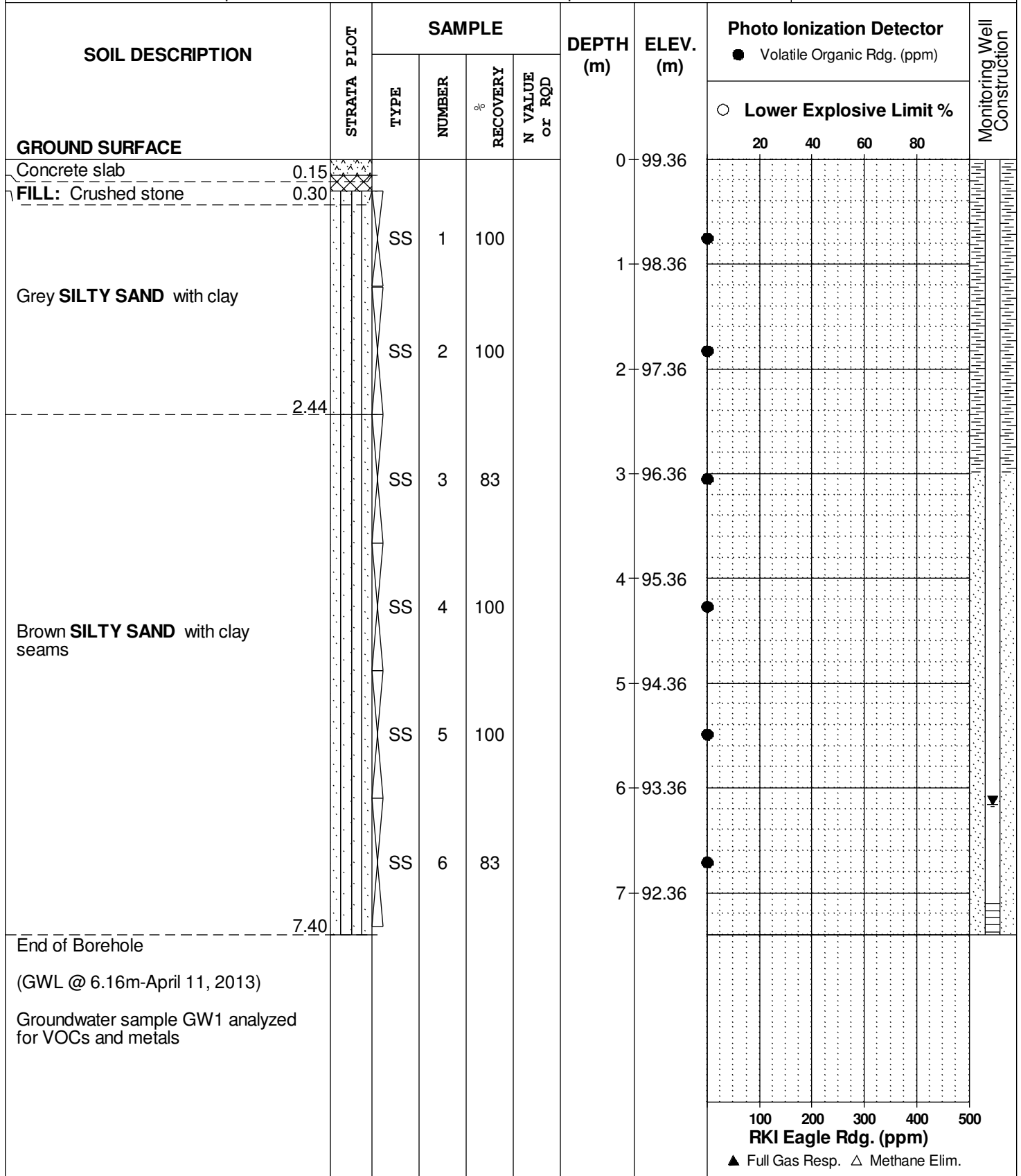
FILE NO. PE2963

REMARKS

HOLE NO. BH 3

BORINGS BY Portable Geoprobe

DATE April 5, 2013



SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
Existing Commercial Property - 36 Jamie Avenue
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located near the northeast corner of subject property.
Assumed elevation = 100.00m.

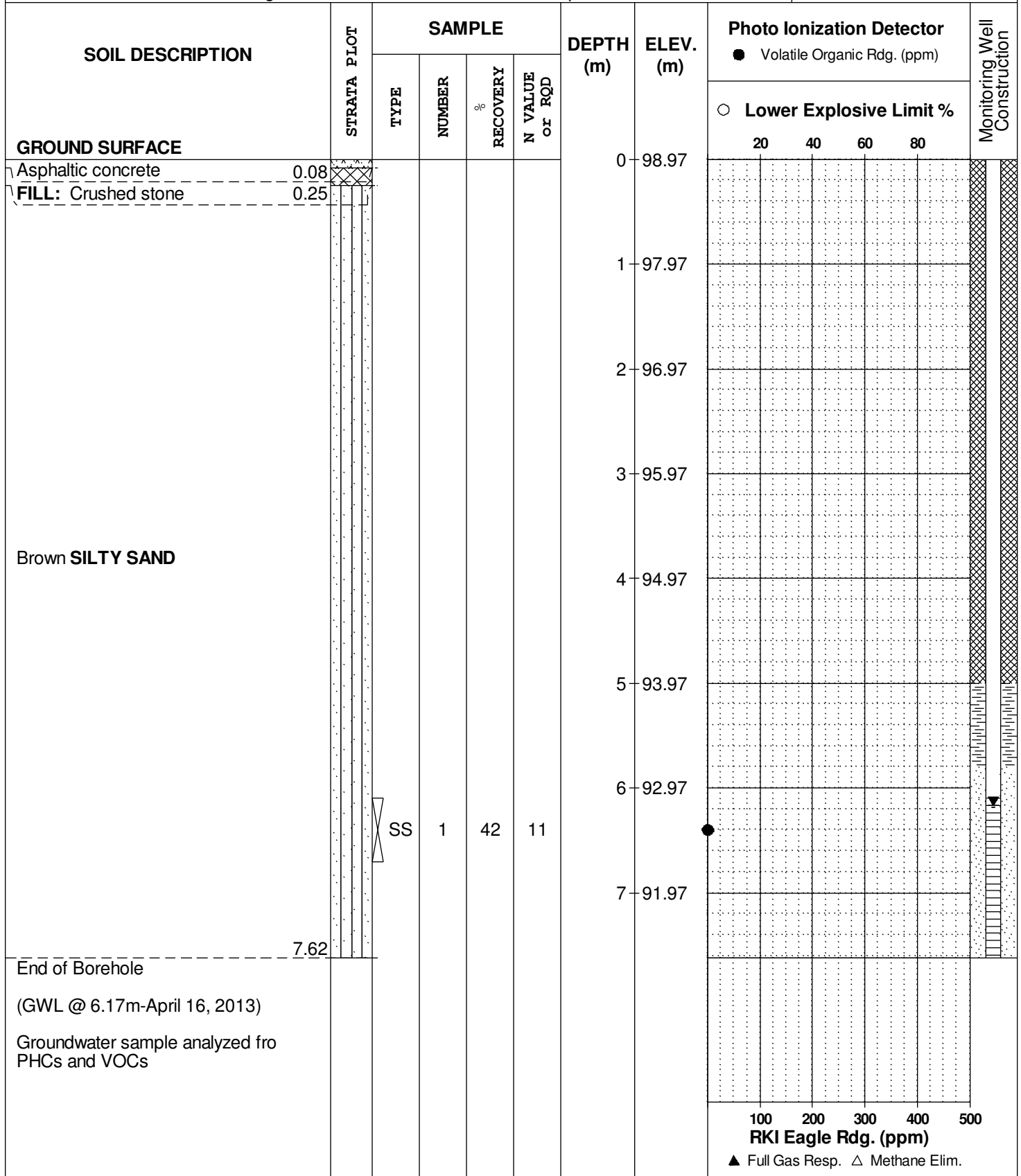
FILE NO. PE2963

REMARKS

HOLE NO. BH 4

BORINGS BY CME 55 Power Auger

DATE April 16, 2013



SOIL PROFILE AND TEST DATA

Phase II Environmental Site Assessment
Proposed Building Addition - 36 and 40 Jaime Avenue
Ottawa, Ontario

DATUM Geodetic

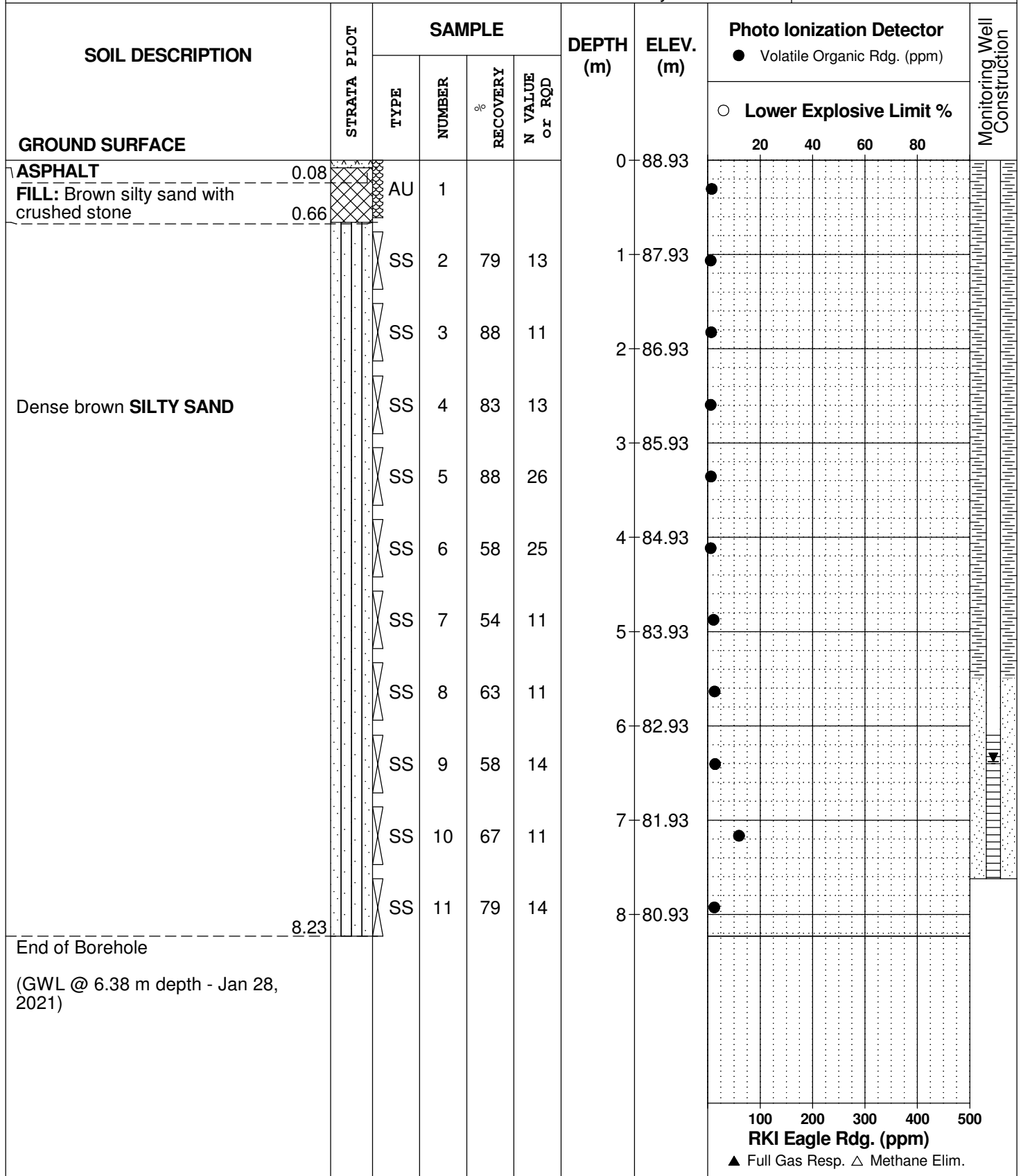
FILE NO. **PE5124**

REMARKS

HOLE NO. **BH 1-21**

BORINGS BY CME-55 Low Clearance Drill

DATE 2021 January 22



SOIL PROFILE AND TEST DATA

Phase II Environmental Site Assessment
Proposed Building Addition - 36 and 40 Jaime Avenue
Ottawa, Ontario

DATUM Geodetic

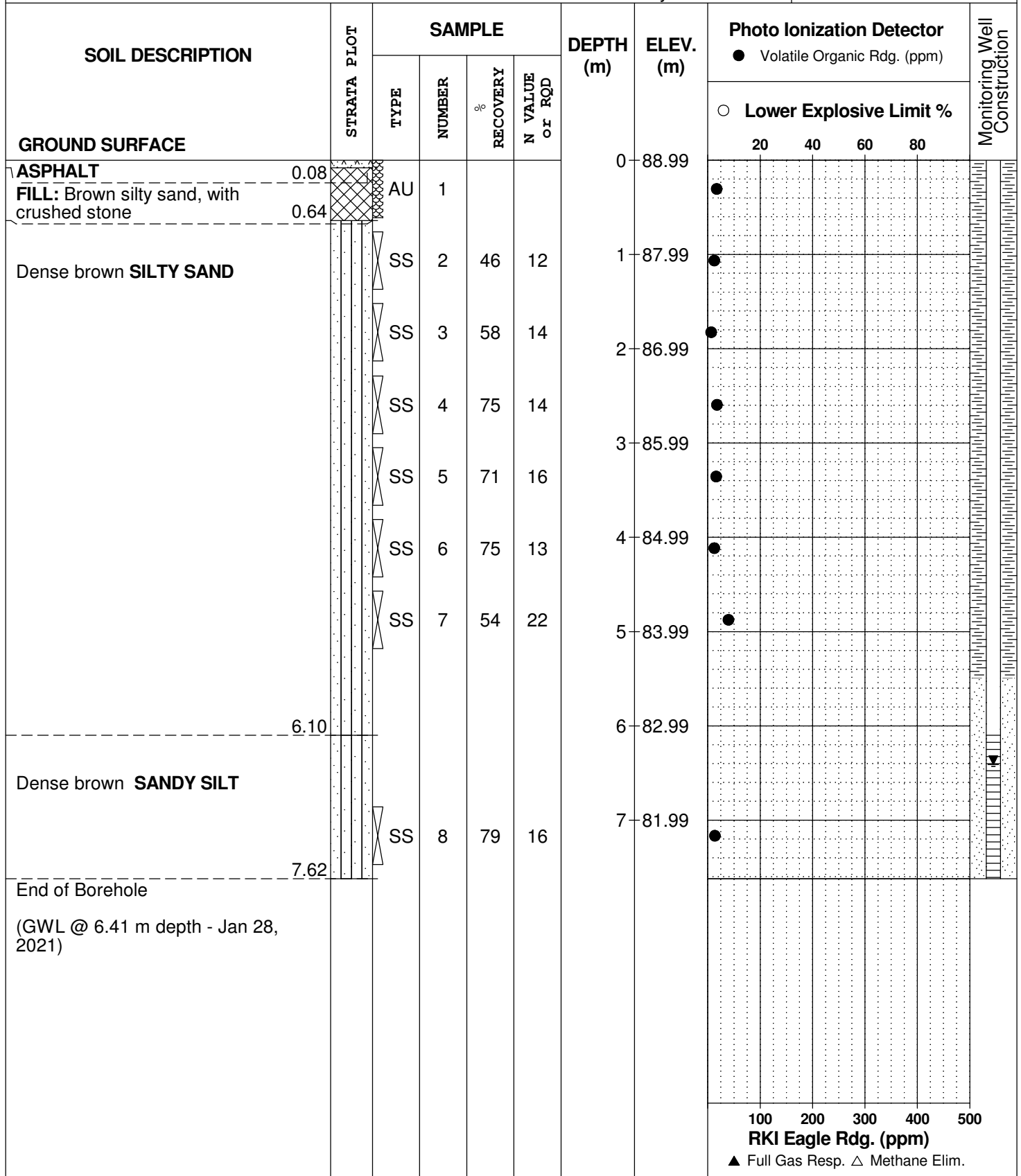
REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE 2021 January 22

FILE NO. **PE5124**

HOLE NO. **BH 2-21**



DATUM Geodetic

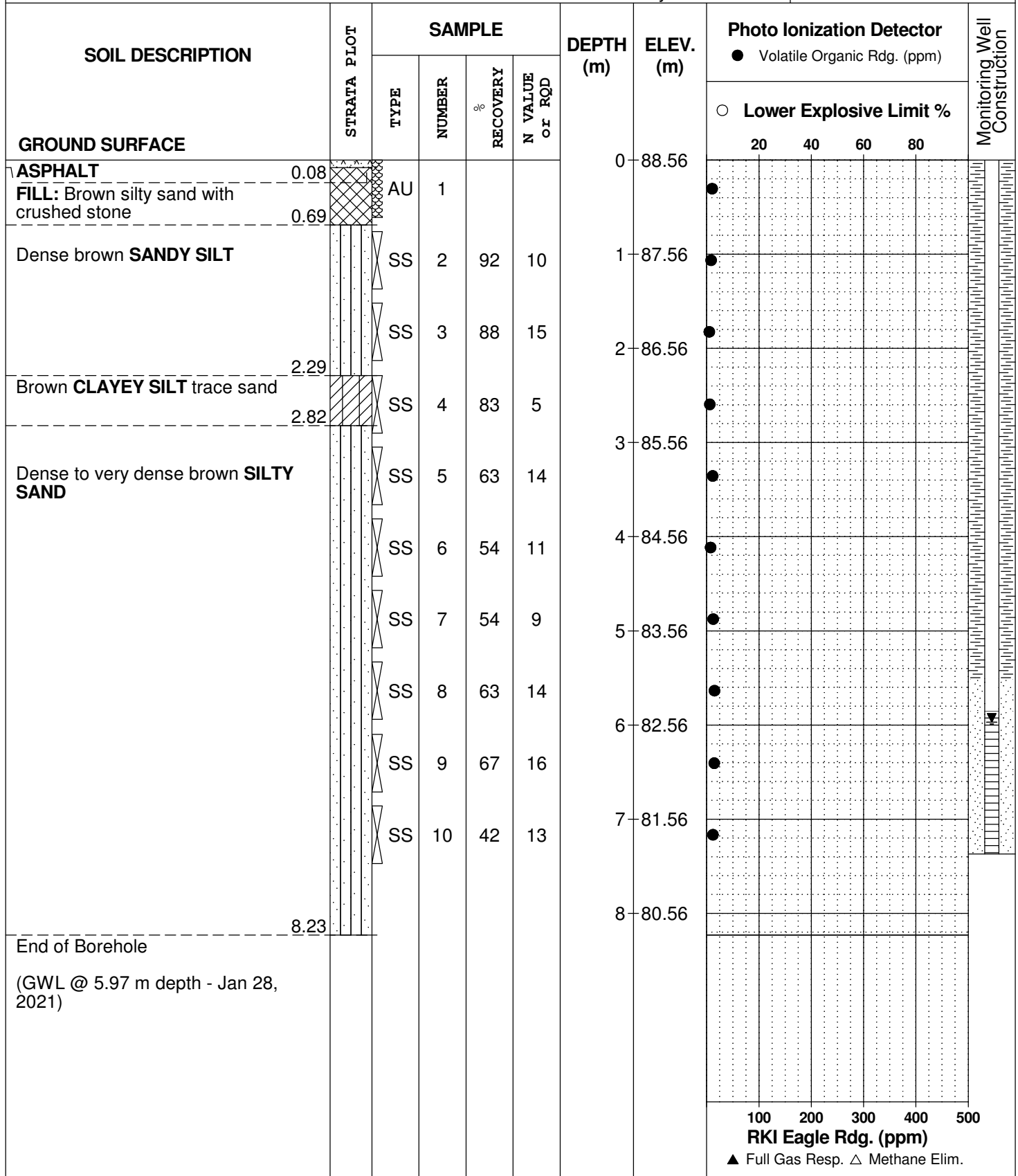
REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE 2021 January 22

FILE NO. **PE5124**

HOLE NO. **BH 3-21**



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 relative strength of cohesionless soils is the compactness condition, 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. An SPT N value of "P" denotes that the split-spoon sampler was pushed 300 mm into the soil without the use of a falling hammer.

Compactness Condition	'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 shear vane tests, unconfined compression tests, or occasionally by the Standard Penetration Test (SPT). Note that the typical correlations of undrained shear strength to SPT N value (tabulated below) tend to underestimate the consistency for sensitive silty clays, so Paterson reviews the applicable split spoon samples in the laboratory to provide a more representative consistency value based on tactile examination.

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, S_t , is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil. The classes of sensitivity may be defined as follows:

Low Sensitivity:	$S_t < 2$
Medium Sensitivity:	$2 < S_t < 4$
Sensitive:	$4 < S_t < 8$
Extra Sensitive:	$8 < S_t < 16$
Quick Clay:	$S_t > 16$

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 NQ or larger size core. However, it can be used on smaller core sizes, such as BQ, 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, generally recovered using a piston sampler
G	-	"Grab" sample from test pit or surface materials
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size BQ, NQ, HQ, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC%	-	Natural water 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)
D _{xx}	-	Grain size at 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
D ₁₀	-	Grain size at which 10% of the soil is finer (effective grain size)
D ₆₀	-	Grain size at which 60% of the soil is finer
C _c	-	Concavity coefficient = $(D_{30})^2 / (D_{10} \times D_{60})$
C _u	-	Uniformity coefficient = D_{60} / D_{10}

C_c and C_u are used to assess the grading of sands and gravels:

Well-graded gravels have: $1 < C_c < 3$ and $C_u > 4$

Well-graded sands have: $1 < C_c < 3$ and $C_u > 6$

Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.

C_c and C_u 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
C _{cr}	-	Recompression index (in effect at pressures below p' _c)
C _c	-	Compression index (in effect at pressures above p' _c)
OC Ratio		Overconsolidation ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
W _o	-	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.
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SYMBOLS AND TERMS (continued)

STRATA PLOT



Topsoil



Asphalt



Fill



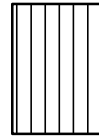
Peat



Sand



Silty Sand



Silt



Sandy Silt



Clay



Silty Clay



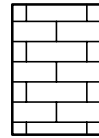
Clayey Silty Sand



Glacial Till



Shale



Bedrock

MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5

Attn: Luke Lopers

Client PO: 13900

Project: PE2963

Custody: 95993

Phone: (613) 226-7381

Fax: (613) 226-6344

Report Date: 15-Apr-2013

Order Date: 11-Apr-2013

Order #: 1315261

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

Paracel ID	Client ID
1315261-01	BH2-SS1

Approved By:



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

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**
Client PO: 13900

Project Description: PE2963

Report Date: 15-Apr-2013
Order Date: 11-Apr-2013

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
MOE Metals by ICP-OES, soil Reg 153	based on MOE E3470, ICP-OES	12-Apr-13	12-Apr-13
Solids, %	Gravimetric, calculation	15-Apr-13	15-Apr-13

Certificate of Analysis

Report Date: 15-Apr-2013

Order Date: 11-Apr-2013

 Client: **Paterson Group Consulting Engineers**

Project Description: PE2963

Client PO: 13900

Client ID:	BH2-SS1	-	-	-
Sample Date:	05-Apr-13	-	-	-
Sample ID:	1315261-01	-	-	-
MDL/Units	Soil	-	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	77.8	-	-	-
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Metals

Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	<1.0	-	-	-
Barium	1.0 ug/g dry	115	-	-	-
Beryllium	1.0 ug/g dry	<1.0	-	-	-
Boron	1.0 ug/g dry	2.8	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	1.0 ug/g dry	24.7	-	-	-
Cobalt	1.0 ug/g dry	6.1	-	-	-
Copper	1.0 ug/g dry	12.9	-	-	-
Lead	1.0 ug/g dry	4.3	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	1.0 ug/g dry	12.7	-	-	-
Selenium	1.0 ug/g dry	<1.0	-	-	-
Silver	0.5 ug/g dry	<0.5	-	-	-
Thallium	1.0 ug/g dry	<1.0	-	-	-
Uranium	1.0 ug/g dry	<1.0	-	-	-
Vanadium	1.0 ug/g dry	28.0	-	-	-
Zinc	1.0 ug/g dry	25.2	-	-	-

Certificate of Analysis

Report Date: 15-Apr-2013
Order Date: 11-Apr-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 13900

Project Description: PE2963

Method Quality Control: Blank

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

Certificate of Analysis

Report Date: 15-Apr-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 11-Apr-2013

Client PO: 13900

Project Description: PE2963

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1.0	ug/g dry	ND			0.0	30	
Arsenic	6.87	1.0	ug/g dry	5.83			16.4	30	
Barium	55.2	1.0	ug/g dry	56.1			1.7	30	
Beryllium	ND	1.0	ug/g dry	ND			0.0	30	
Boron	4.07	1.0	ug/g dry	3.41			17.8	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	13.3	1.0	ug/g dry	12.3			8.1	30	
Cobalt	6.51	1.0	ug/g dry	5.83			11.0	30	
Copper	25.9	1.0	ug/g dry	22.8			12.8	30	
Lead	129	1.0	ug/g dry	142			9.7	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	104	1.0	ug/g dry	107			3.1	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	ND	0.5	ug/g dry	ND			0.0	30	
Thallium	ND	1.0	ug/g dry	ND			0.0	30	
Uranium	ND	1.0	ug/g dry	ND			0.0	30	
Vanadium	15.2	1.0	ug/g dry	13.8			9.6	30	
Zinc	535	1.0	ug/g dry	539			0.7	30	
Physical Characteristics									
% Solids	86.8	0.1	% by Wt.	86.4			0.5	25	

Certificate of Analysis

Report Date: 15-Apr-2013
Order Date: 11-Apr-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 13900

Project Description: PE2963

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	242		ug/L	15.6	90.6	70-130			
Arsenic	342		ug/L	117	90.1	70-130			
Barium	250		ug/L	ND	99.9	70-130			
Beryllium	216		ug/L	2.53	85.4	70-130			
Boron	294		ug/L	68.2	90.3	70-130			
Cadmium	216		ug/L	8.78	83.1	70-130			
Chromium	496		ug/L	245	100	70-130			
Cobalt	337		ug/L	117	88.2	70-130			
Copper	747		ug/L	455	117	70-130			
Lead	243		ug/L	ND	97.1	70-130			
Molybdenum	210		ug/L	5.97	81.8	70-130			
Nickel	242		ug/L	ND	96.9	70-130			
Selenium	211		ug/L	12.0	79.6	70-130			
Silver	199		ug/L	1.07	79.2	70-130			
Thallium	195		ug/L	10.2	73.9	70-130			
Uranium	210		ug/L	3.76	82.6	70-130			
Vanadium	532		ug/L	276	102	70-130			
Zinc	246		ug/L	ND	98.2	70-130			

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**
Client PO: 13900

Project Description: PE2963

Report Date: 15-Apr-2013
Order Date: 11-Apr-2013

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5

Attn: Luke Lopers

Client PO: 13900

Project: PE2963

Custody: 95993

Phone: (613) 226-7381

Fax: (613) 226-6344

Report Date: 12-Apr-2013

Order Date: 8-Apr-2013

Order #: 1315030

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

Paracel ID	Client ID
1315030-01	BH2-SS1

Approved By:



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

Certificate of Analysis

Report Date: 12-Apr-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 8-Apr-2013

Client PO: 13900

Project Description: PE2963

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Solids, %	Gravimetric, calculation	9-Apr-13	9-Apr-13
VOCs by P&T GC-MS	EPA 8260 - P&T GC-MS	9-Apr-13	12-Apr-13

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Mississauga, ON L5N 6J3

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

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

Certificate of Analysis

Report Date: 12-Apr-2013

Client: Paterson Group Consulting Engineers

Order Date: 8-Apr-2013

Client PO: 13900

Project Description: PE2963

Client ID:	BH2-SS1	-	-	-
Sample Date:	05-Apr-13	-	-	-
Sample ID:	1315030-01	-	-	-
MDL/Units	Soil	-	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	80.1	-	-	-
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Volatiles

Acetone	0.50 ug/g dry	<0.50	-	-	-
Benzene	0.02 ug/g dry	<0.02	-	-	-
Bromodichloromethane	0.05 ug/g dry	<0.05	-	-	-
Bromoform	0.05 ug/g dry	<0.05	-	-	-
Bromomethane	0.05 ug/g dry	<0.05	-	-	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	-	-	-
Chlorobenzene	0.05 ug/g dry	<0.05	-	-	-
Chloroethane	0.05 ug/g dry	<0.05	-	-	-
Chloroform	0.05 ug/g dry	<0.05	-	-	-
Chloromethane	0.20 ug/g dry	<0.20	-	-	-
Dibromochloromethane	0.05 ug/g dry	<0.05	-	-	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dibromoethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloroethylene, total	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	-	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Hexane	0.05 ug/g dry	<0.05	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	-	-	-
Methyl Butyl Ketone (2-Hexanone)	2.00 ug/g dry	<2.00	-	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	-	-	-

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Certificate of Analysis

Report Date: 12-Apr-2013

 Client: **Paterson Group Consulting Engineers**

Order Date: 8-Apr-2013

Client PO: 13900

Project Description: PE2963

	Client ID:	BH2-SS1	-	-	-
	Sample Date:	05-Apr-13	-	-	-
	Sample ID:	1315030-01	-	-	-
	MDL/Units	Soil	-	-	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	-	-	-
Methylene Chloride	0.05 ug/g dry	<0.05	-	-	-
Styrene	0.05 ug/g dry	<0.05	-	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
1,2,4-Trichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	-	-	-
Trichloroethylene	0.05 ug/g dry	<0.05	-	-	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	-	-	-
1,3,5-Trimethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Vinyl chloride	0.02 ug/g dry	<0.02	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05	-	-	-
4-Bromofluorobenzene	Surrogate	119%	-	-	-
Dibromofluoromethane	Surrogate	108%	-	-	-
Toluene-d8	Surrogate	105%	-	-	-

Certificate of Analysis

Report Date: 12-Apr-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 8-Apr-2013

Client PO: 13900

Project Description: PE2963

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	9.90		ug/g		124	50-140			
Surrogate: Dibromofluoromethane	7.99		ug/g		99.8	50-140			
Surrogate: Toluene-d8	8.53		ug/g		107	50-140			

Certificate of Analysis

Report Date: 12-Apr-2013
Order Date: 8-Apr-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 13900

Project Description: PE2963

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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Physical Characteristics

% Solids	76.3	0.1	% by Wt.	77.0			0.9	25	
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Certificate of Analysis

Report Date: 12-Apr-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 8-Apr-2013

Client PO: 13900

Project Description: PE2963

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	6.29	0.50	ug/g	ND	62.9	50-140			
Benzene	3.82	0.02	ug/g	ND	95.6	60-130			
Bromodichloromethane	4.03	0.05	ug/g	ND	101	60-130			
Bromoform	4.61	0.05	ug/g	ND	115	60-130			
Bromomethane	4.45	0.05	ug/g	ND	111	50-140			
Carbon Tetrachloride	3.81	0.05	ug/g	ND	95.3	60-130			
Chlorobenzene	3.42	0.05	ug/g	ND	85.5	60-130			
Chloroethane	3.15	0.05	ug/g	ND	78.6	50-140			
Chloroform	3.68	0.05	ug/g	ND	92.1	60-130			
Chloromethane	5.16	0.20	ug/g	ND	129	50-140			
Dibromochloromethane	3.76	0.05	ug/g	ND	94.1	60-130			
Dichlorodifluoromethane	4.36	0.05	ug/g	ND	109	50-140			
1,2-Dibromoethane	3.52	0.05	ug/g	ND	87.9	60-130			
1,2-Dichlorobenzene	3.11	0.05	ug/g	ND	77.8	60-130			
1,3-Dichlorobenzene	3.34	0.05	ug/g	ND	83.6	60-130			
1,4-Dichlorobenzene	3.46	0.05	ug/g	ND	86.5	60-130			
1,1-Dichloroethane	3.44	0.05	ug/g	ND	85.9	60-130			
1,2-Dichloroethane	3.59	0.05	ug/g	ND	89.7	60-130			
1,1-Dichloroethylene	3.18	0.05	ug/g	ND	79.5	60-130			
cis-1,2-Dichloroethylene	3.29	0.05	ug/g	ND	82.3	60-130			
trans-1,2-Dichloroethylene	3.59	0.05	ug/g	ND	89.9	60-130			
1,2-Dichloropropane	3.68	0.05	ug/g	ND	92.1	60-130			
cis-1,3-Dichloropropylene	4.43	0.05	ug/g	ND	111	60-130			
trans-1,3-Dichloropropylene	4.18	0.05	ug/g	ND	104	60-130			
Ethylbenzene	3.31	0.05	ug/g	ND	82.8	60-130			
Hexane	3.79	0.05	ug/g	ND	94.7	60-130			
Methyl Ethyl Ketone (2-Butanone)	6.78	0.50	ug/g	ND	67.8	50-140			
Methyl Butyl Ketone (2-Hexanone)	7.04	2.00	ug/g	ND	70.4	50-140			
Methyl Isobutyl Ketone	6.75	0.50	ug/g	ND	67.5	50-140			
Methyl tert-butyl ether	8.19	0.05	ug/g	ND	81.9	50-140			
Methylene Chloride	3.30	0.05	ug/g	ND	82.4	60-130			
Styrene	3.19	0.05	ug/g	ND	79.6	60-130			
1,1,1,2-Tetrachloroethane	3.03	0.05	ug/g	ND	75.7	60-130			
1,1,2,2-Tetrachloroethane	3.22	0.05	ug/g	ND	80.6	60-130			
Tetrachloroethylene	3.74	0.05	ug/g	ND	93.6	60-130			
Toluene	3.44	0.05	ug/g	ND	85.9	60-130			
1,2,4-Trichlorobenzene	3.58	0.05	ug/g	ND	89.4	60-130			
1,1,1-Trichloroethane	4.07	0.05	ug/g	ND	102	60-130			
1,1,2-Trichloroethane	3.72	0.05	ug/g	ND	93.1	60-130			
Trichloroethylene	3.56	0.05	ug/g	ND	89.0	60-130			
Trichlorofluoromethane	3.73	0.05	ug/g	ND	93.2	50-140			
1,3,5-Trimethylbenzene	3.00	0.05	ug/g	ND	75.1	60-130			
Vinyl chloride	4.27	0.02	ug/g	ND	107	50-140			
m,p-Xylenes	5.72	0.05	ug/g	ND	71.4	60-130			
o-Xylene	3.10	0.05	ug/g	ND	77.5	60-130			
Surrogate: 4-Bromofluorobenzene	7.90		ug/g		98.7	50-140			

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**
Client PO: 13900

Project Description: PE2963

Report Date: 12-Apr-2013
Order Date: 8-Apr-2013

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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



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Chain of Custody
(Lab Use Only)
Nº 95993

OTTAWA • KINGSTON • NIAGARA • MISSISSAUGA • SARNIA

Client Name: <i>Peterson Group</i>	Project Reference: <i>PE 2963</i>	TAT: <input checked="" type="checkbox"/> Regular 13 Day 12 Day 11 Day Date Required: _____
Contact Name: <i>Luke Lopers</i>	Quote #	
Address: <i>154 Colonnade</i>	PO # <i>13900</i>	
Telephone: <i>613-226-7321</i>	Email Address: <i>llopers@petersongroup.ca</i>	

Criteria: | | O. Reg. 153/04 Table ___ 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

Parcel Order Number: <i>1315030</i>	Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP/MS	Hg	Cr-VI	B (HWS)							
				Date	Time														
Sample ID/Location Name																			
1				<i>BH2-SS1</i>	<i>Apr 5/13</i>		<i>X</i>												<i>120ml + vial</i>
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments: _____ Method of Delivery: *Paracel*

Relinquished By (Print & Sign):	Received by Driver/Depot: <i>T. House</i>	Received at Lab: <i>MC</i>	Verified By: <i>MC</i>
Date/Time:	<i>08/04/13 1:07 PM</i>	<i>Apr 8/13 1:50</i>	<i>Apr 8/13 2:16</i>
Date/Time:	Temperature: _____ °C	Temperature: <i>13.1</i> °C	pH Verified By: <i>N/A</i>

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5

Attn: Luke Lopers

Client PO: 13845

Project: PE2963

Custody: 97199

Phone: (613) 226-7381

Fax: (613) 226-6344

Report Date: 15-Apr-2013

Order Date: 11-Apr-2013

Order #: 1315232

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

Paracel ID	Client ID
1315232-01	BH3-GW1

Approved By:



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

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**
Client PO: 13845

Project Description: PE2963

Report Date: 15-Apr-2013
Order Date: 11-Apr-2013

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-MS	EPA 200.8 - ICP-MS	12-Apr-13	12-Apr-13
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	12-Apr-13	14-Apr-13

Certificate of Analysis

Report Date: 15-Apr-2013

Order Date: 11-Apr-2013

 Client: **Paterson Group Consulting Engineers**

Client PO: 13845

Project Description: PE2963

Client ID:	BH3-GW1	-	-	-
Sample Date:	11-Apr-13	-	-	-
Sample ID:	1315232-01	-	-	-
MDL/Units	Water	-	-	-

Metals

Antimony	0.5 ug/L	<0.5	-	-	-
Arsenic	1 ug/L	<1	-	-	-
Barium	1 ug/L	86	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-
Boron	10 ug/L	149	-	-	-
Cadmium	0.1 ug/L	<0.1	-	-	-
Chromium	1 ug/L	5	-	-	-
Cobalt	0.5 ug/L	10.4	-	-	-
Copper	0.5 ug/L	3.2	-	-	-
Lead	0.1 ug/L	0.1	-	-	-
Molybdenum	0.5 ug/L	29.4	-	-	-
Nickel	1 ug/L	9	-	-	-
Selenium	1 ug/L	1	-	-	-
Silver	0.1 ug/L	<0.1	-	-	-
Sodium	200 ug/L	152000	-	-	-
Thallium	0.1 ug/L	<0.1	-	-	-
Uranium	0.1 ug/L	2.4	-	-	-
Vanadium	0.5 ug/L	7.9	-	-	-
Zinc	5 ug/L	8	-	-	-

Volatiles

Acetone	5.0 ug/L	<5.0	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-
Chloroethane	1.0 ug/L	<1.0	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-
Chloromethane	3.0 ug/L	<3.0	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
1,2-Dibromoethane	0.2 ug/L	<0.2	-	-	-

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Certificate of Analysis

Report Date: 15-Apr-2013

Order Date: 11-Apr-2013

 Client: **Paterson Group Consulting Engineers**

Client PO: 13845

Project Description: PE2963

	Client ID: Sample Date: Sample ID:	BH3-GW1 11-Apr-13 1315232-01	-	-	-
	MDL/Units	Water	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethylene, total	0.5 ug/L	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-
Methyl Butyl Ketone (2-Hexanone)	10.0 ug/L	<10.0	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-

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Certificate of Analysis

Report Date: 15-Apr-2013

Order Date: 11-Apr-2013

Client: **Paterson Group Consulting Engineers**

Project Description: PE2963

Client PO: 13845

	Client ID:	BH3-GW1	-	-	-
	Sample Date:	11-Apr-13	-	-	-
	Sample ID:	1315232-01	-	-	-
	MDL/Units	Water	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	124%	-	-	-
Dibromofluoromethane	Surrogate	112%	-	-	-
Toluene-d8	Surrogate	111%	-	-	-

Certificate of Analysis

Report Date: 15-Apr-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 11-Apr-2013

Client PO: 13845

Project Description: PE2963

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	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						

Certificate of Analysis

Report Date: 15-Apr-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 11-Apr-2013

Client PO: 13845

Project Description: PE2963

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	37.0		ug/L		115	50-140			
Surrogate: Dibromofluoromethane	39.2		ug/L		123	50-140			
Surrogate: Toluene-d8	27.9		ug/L		87.1	50-140			

Certificate of Analysis

Report Date: 15-Apr-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 11-Apr-2013

Client PO: 13845

Project Description: PE2963

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	0.5	ug/L	ND			0.0	20	
Arsenic	ND	1	ug/L	ND			0.0	20	
Barium	24.0	1	ug/L	24.1			0.5	20	
Beryllium	ND	0.5	ug/L	ND			0.0	20	
Boron	30	10	ug/L	31			4.4	20	
Cadmium	ND	0.1	ug/L	ND			0.0	20	
Chromium	ND	1	ug/L	ND				20	
Cobalt	ND	0.5	ug/L	ND			0.0	20	
Copper	1.25	0.5	ug/L	1.27			1.1	20	
Lead	ND	0.1	ug/L	ND			0.0	20	
Molybdenum	1.51	0.5	ug/L	1.78			16.4	20	
Nickel	1.3	1	ug/L	1.4			8.3	20	
Selenium	1.6	1	ug/L	1.8			16.4	20	
Silver	0.24	0.1	ug/L	0.35			36.8	20	
Sodium	16400	200	ug/L	16500			0.7	20	
Thallium	ND	0.1	ug/L	ND			0.0	20	
Uranium	0.3	0.1	ug/L	0.3			9.5	20	
Vanadium	2.77	0.5	ug/L	2.84			2.5	20	
Zinc	ND	5	ug/L	ND			0.0	20	
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	

Certificate of Analysis

Report Date: 15-Apr-2013
Order Date: 11-Apr-2013

Client: **Paterson Group Consulting Engineers**
Client PO: 13845

Project Description: PE2963

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	39.1		ug/L	ND	122	50-140			
Surrogate: Dibromofluoromethane	31.0		ug/L	ND	96.8	50-140			
Surrogate: Toluene-d8	37.9		ug/L	ND	118	50-140			

Certificate of Analysis

Report Date: 15-Apr-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 11-Apr-2013

Client PO: 13845

Project Description: PE2963

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	50.3		ug/L	0.17	100	80-120			
Arsenic	56.0		ug/L	1.0	110	80-120			
Barium	71.0		ug/L	24.1	93.8	80-120			
Beryllium	48.5		ug/L	0.01	96.9	80-120			
Boron	72		ug/L	31	82.4	80-120			
Cadmium	46.4		ug/L	ND	92.8	80-120			
Chromium	50.9		ug/L	ND	102	80-120			
Cobalt	44.4		ug/L	0.06	88.6	80-120			
Copper	43.8		ug/L	1.27	85.1	80-120			
Lead	44.0		ug/L	0.06	87.9	80-120			
Molybdenum	46.3		ug/L	1.78	89.1	80-120			
Nickel	44.7		ug/L	1.4	86.7	80-120			
Selenium	57.4		ug/L	1.8	111	80-120			
Silver	45.6		ug/L	0.35	90.5	80-120			
Sodium	836		ug/L	ND	83.6	80-120			
Thallium	47.7		ug/L	0.05	95.4	80-120			
Uranium	47.4		ug/L	0.3	94.1	80-120			
Vanadium	44.9		ug/L	2.84	84.2	80-120			
Zinc	51		ug/L	1	100	80-120			
Volatiles									
Acetone	88.7	5.0	ug/L	ND	88.7	50-140			
Benzene	34.7	0.5	ug/L	ND	86.8	50-140			
Bromodichloromethane	32.8	0.5	ug/L	ND	82.0	50-140			
Bromoform	37.4	0.5	ug/L	ND	93.4	50-140			
Bromomethane	31.0	0.5	ug/L	ND	77.6	50-140			
Carbon Tetrachloride	31.7	0.2	ug/L	ND	79.2	50-140			
Chlorobenzene	41.0	0.5	ug/L	ND	102	50-140			
Chloroethane	29.8	1.0	ug/L	ND	74.4	50-140			
Chloroform	32.2	0.5	ug/L	ND	80.4	50-140			
Chloromethane	30.6	3.0	ug/L	ND	76.5	50-140			
Dibromochloromethane	38.1	0.5	ug/L	ND	95.2	50-140			
Dichlorodifluoromethane	23.5	1.0	ug/L	ND	58.7	50-140			
1,2-Dibromoethane	39.6	0.2	ug/L	ND	98.9	50-140			
1,2-Dichlorobenzene	41.2	0.5	ug/L	ND	103	50-140			
1,3-Dichlorobenzene	41.6	0.5	ug/L	ND	104	50-140			
1,4-Dichlorobenzene	37.8	0.5	ug/L	ND	94.4	50-140			
1,1-Dichloroethane	34.1	0.5	ug/L	ND	85.3	50-140			
1,2-Dichloroethane	31.7	0.5	ug/L	ND	79.3	50-140			
1,1-Dichloroethylene	31.7	0.5	ug/L	ND	79.3	50-140			
cis-1,2-Dichloroethylene	33.3	0.5	ug/L	ND	83.3	50-140			
trans-1,2-Dichloroethylene	38.7	0.5	ug/L	ND	96.8	50-140			
1,2-Dichloropropane	30.5	0.5	ug/L	ND	76.2	50-140			
cis-1,3-Dichloropropylene	30.8	0.5	ug/L	ND	77.0	50-140			
trans-1,3-Dichloropropylene	32.2	0.5	ug/L	ND	80.4	50-140			
Ethylbenzene	41.9	0.5	ug/L	ND	105	50-140			
Hexane	31.1	1.0	ug/L	ND	77.8	50-140			
Methyl Ethyl Ketone (2-Butanone)	97.2	5.0	ug/L	ND	97.2	50-140			
Methyl Butyl Ketone (2-Hexanone)	108	10.0	ug/L	ND	108	50-140			
Methyl Isobutyl Ketone	89.3	5.0	ug/L	ND	89.3	50-140			

Certificate of Analysis

Report Date: 15-Apr-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 11-Apr-2013

Client PO: 13845

Project Description: PE2963

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl tert-butyl ether	87.6	2.0	ug/L	ND	87.6	50-140			
Methylene Chloride	30.1	5.0	ug/L	ND	75.2	50-140			
Styrene	44.7	0.5	ug/L	ND	112	50-140			
1,1,1,2-Tetrachloroethane	41.0	0.5	ug/L	ND	103	50-140			
1,1,2,2-Tetrachloroethane	38.3	0.5	ug/L	ND	95.8	50-140			
Tetrachloroethylene	37.1	0.5	ug/L	ND	92.6	50-140			
Toluene	42.4	0.5	ug/L	ND	106	50-140			
1,2,4-Trichlorobenzene	36.6	0.5	ug/L	ND	91.4	50-140			
1,1,1-Trichloroethane	34.5	0.5	ug/L	ND	86.2	50-140			
1,1,2-Trichloroethane	32.3	0.5	ug/L	ND	80.8	50-140			
Trichloroethylene	31.5	0.5	ug/L	ND	78.8	50-140			
Trichlorofluoromethane	32.5	1.0	ug/L	ND	81.4	50-140			
1,3,5-Trimethylbenzene	42.7	0.5	ug/L	ND	107	50-140			
Vinyl chloride	29.6	0.5	ug/L	ND	74.0	50-140			
m,p-Xylenes	96.3	0.5	ug/L	ND	120	50-140			
o-Xylene	49.1	0.5	ug/L	ND	123	50-140			
Surrogate: 4-Bromofluorobenzene	25.0		ug/L		78.3	50-140			

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**
Client PO: 13845

Project Description: PE2963

Report Date: 15-Apr-2013
Order Date: 11-Apr-2013

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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



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Client Name: <u>Paterson Group</u>	Project Reference: <u>PE2963</u>	TAT: <input type="checkbox"/> Regular <input checked="" type="checkbox"/> 3 Day
Contact Name: <u>Luke Lopez</u>	Quote #	<input type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day
Address: <u>154 Colonnade Road South, Ottawa</u>	PO # <u>13845</u>	Date Required: _____
Telephone: <u>613-226-7381</u>	Email Address: <u>llopez@patersongroup.ca</u>	

Criteria: O. Reg. 153/04 Table 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															
Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		PHCs FI-F4+BTEX	VOCs	PAHs	Metals by ICP/MS	Hg	Cr-VI	B (HWS)							
				Date	Time														
1 BH3-GW1	GW		3	April 11/13		X	X												
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments: Metals Field Filtered Method of Delivery: Walki

Relinquished By (Print & Sign): <u>[Signature]</u>	Received by Driver/Depot: <u>[Signature]</u>	Received at Lab: <u>[Signature]</u>	Verified By: <u>[Signature]</u>
Date/Time: <u>Apr 11/13 5:20</u>	Temperature: _____ °C	Date/Time: <u>Apr 11/13 5:18p</u>	Date/Time: <u>Apr 11/13 5:49</u>
		Temperature: <u>15.6°C</u>	pH Verified By: <u>MJC</u>

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5

Attn: Luke Lopers

Client PO: 13846

Project: PE2963

Custody: 92456

Phone: (613) 226-7381

Fax: (613) 226-6344

Report Date: 18-Apr-2013

Order Date: 16-Apr-2013

Order #: 1316086

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

Paracel ID	Client ID
1316086-01	BH4-GW1

Approved By:



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

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**
Client PO: 13846

Project Description: PE2963

Report Date: 18-Apr-2013
Order Date: 16-Apr-2013

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	17-Apr-13	18-Apr-13
PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	17-Apr-13	18-Apr-13
VOCs by P&T GC-MS	EPA 624 - P&T GC-MS	17-Apr-13	18-Apr-13

Certificate of Analysis

Report Date: 18-Apr-2013

Order Date: 16-Apr-2013

 Client: **Paterson Group Consulting Engineers**

Client PO: 13846

Project Description: PE2963

Client ID:	BH4-GW1	-	-	-
Sample Date:	16-Apr-13	-	-	-
Sample ID:	1316086-01	-	-	-
MDL/Units	Water	-	-	-

Volatiles

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

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

Certificate of Analysis

Report Date: 18-Apr-2013

Order Date: 16-Apr-2013

Client: **Paterson Group Consulting Engineers**

Client PO: 13846

Project Description: PE2963

	Client ID:	BH4-GW1	-	-	-
	Sample Date:	16-Apr-13	-	-	-
	Sample ID:	1316086-01	-	-	-
	MDL/Units	Water	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-
1,2,4-Trichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	121%	-	-	-
Dibromofluoromethane	Surrogate	125%	-	-	-
Toluene-d8	Surrogate	96.0%	-	-	-

Hydrocarbons

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

Certificate of Analysis

Report Date: 18-Apr-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 16-Apr-2013

Client PO: 13846

Project Description: PE2963

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						
1,1,1,2,2-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	38.1		ug/L		119	50-140			
Surrogate: Dibromofluoromethane	39.4		ug/L		123	50-140			
Surrogate: Toluene-d8	33.5		ug/L		105	50-140			

Certificate of Analysis

Report Date: 18-Apr-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 16-Apr-2013

Client PO: 13846

Project Description: PE2963

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	39.4		ug/L	ND	123	50-140			
Surrogate: Dibromofluoromethane	38.8		ug/L	ND	121	50-140			
Surrogate: Toluene-d8	32.9		ug/L	ND	103	50-140			

Certificate of Analysis

Report Date: 18-Apr-2013

Client: **Paterson Group Consulting Engineers**

Order Date: 16-Apr-2013

Client PO: 13846

Project Description: PE2963

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1700	25	ug/L	ND	84.8	68-117			
F2 PHCs (C10-C16)	1720	100	ug/L	ND	95.5	60-140			
F3 PHCs (C16-C34)	3730	100	ug/L	ND	100	60-140			
F4 PHCs (C34-C50)	2200	100	ug/L	ND	88.7	60-140			
Volatiles									
Acetone	127	5.0	ug/L	ND	127	50-140			
Benzene	50.8	0.5	ug/L	ND	127	50-140			
Bromodichloromethane	49.3	0.5	ug/L	ND	123	50-140			
Bromoform	37.2	0.5	ug/L	ND	93.0	50-140			
Bromomethane	48.3	0.5	ug/L	ND	121	50-140			
Carbon Tetrachloride	47.0	0.2	ug/L	ND	118	50-140			
Chlorobenzene	42.5	0.5	ug/L	ND	106	50-140			
Chloroethane	43.7	1.0	ug/L	ND	109	50-140			
Chloroform	46.8	0.5	ug/L	ND	117	50-140			
Chloromethane	46.2	3.0	ug/L	ND	116	50-140			
Dibromochloromethane	39.9	0.5	ug/L	ND	99.7	50-140			
Dichlorodifluoromethane	38.4	1.0	ug/L	ND	96.0	50-140			
1,2-Dibromoethane	41.3	0.2	ug/L	ND	103	50-140			
1,2-Dichlorobenzene	40.6	0.5	ug/L	ND	101	50-140			
1,3-Dichlorobenzene	40.8	0.5	ug/L	ND	102	50-140			
1,4-Dichlorobenzene	37.6	0.5	ug/L	ND	94.0	50-140			
1,1-Dichloroethane	46.0	0.5	ug/L	ND	115	50-140			
1,2-Dichloroethane	47.5	0.5	ug/L	ND	119	50-140			
1,1-Dichloroethylene	45.3	0.5	ug/L	ND	113	50-140			
cis-1,2-Dichloroethylene	46.7	0.5	ug/L	ND	117	50-140			
trans-1,2-Dichloroethylene	49.8	0.5	ug/L	ND	124	50-140			
1,2-Dichloropropane	46.2	0.5	ug/L	ND	116	50-140			
cis-1,3-Dichloropropylene	42.2	0.5	ug/L	ND	105	50-140			
trans-1,3-Dichloropropylene	46.7	0.5	ug/L	ND	117	50-140			
Ethylbenzene	42.2	0.5	ug/L	ND	105	50-140			
Hexane	44.8	1.0	ug/L	ND	112	50-140			
Methyl Ethyl Ketone (2-Butanone)	136	5.0	ug/L	ND	136	50-140			
Methyl Butyl Ketone (2-Hexanone)	111	10.0	ug/L	ND	111	50-140			
Methyl Isobutyl Ketone	124	5.0	ug/L	ND	124	50-140			
Methyl tert-butyl ether	117	2.0	ug/L	ND	117	50-140			
Methylene Chloride	42.4	5.0	ug/L	ND	106	50-140			
Styrene	44.8	0.5	ug/L	ND	112	50-140			
1,1,1,2-Tetrachloroethane	41.3	0.5	ug/L	ND	103	50-140			
1,1,2,2-Tetrachloroethane	40.4	0.5	ug/L	ND	101	50-140			
Tetrachloroethylene	38.2	0.5	ug/L	ND	95.5	50-140			
Toluene	44.0	0.5	ug/L	ND	110	50-140			
1,2,4-Trichlorobenzene	32.7	0.5	ug/L	ND	81.7	50-140			
1,1,1-Trichloroethane	47.2	0.5	ug/L	ND	118	50-140			
1,1,2-Trichloroethane	47.7	0.5	ug/L	ND	119	50-140			
Trichloroethylene	46.3	0.5	ug/L	ND	116	50-140			
Trichlorofluoromethane	46.7	1.0	ug/L	ND	117	50-140			
1,3,5-Trimethylbenzene	40.9	0.5	ug/L	ND	102	50-140			
Vinyl chloride	43.0	0.5	ug/L	ND	108	50-140			
m,p-Xylenes	101	0.5	ug/L	ND	127	50-140			

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Sarnia, ON N7T 5T7

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**
Client PO: 13846

Project Description: PE2963

Report Date: 18-Apr-2013
Order Date: 16-Apr-2013

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	52.4	0.5	ug/L	ND	131	50-140			
Surrogate: 4-Bromofluorobenzene	23.9		ug/L		74.6	50-140			

Certificate of Analysis

Client: **Paterson Group Consulting Engineers**
Client PO: 13846

Project Description: PE2963

Report Date: 18-Apr-2013
Order Date: 16-Apr-2013

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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



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Chain of Custody
(Lab Use Only)
Nº 92456

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Client Name: Paterson Group	Project Reference: PE2963	TAT: <input type="checkbox"/> Regular <input type="checkbox"/> 3 Day
Contact Name: Luke Lopers	Quote #	<input checked="" type="checkbox"/> 2 Day <input type="checkbox"/> 1 Day
Address: 154 Colonnade Road South, Ottawa	PO # 13846	Date Required: April 18, 2013
Telephone: 613 226-7381	Email Address: llopers@patersongroup.ca	By 5PM

Criteria: O. Reg. 153/04 Table 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: 1316086		Matrix	Air Volume	# of Containers	Sample Taken		PHCs FI-F4+BTEX	VOCs	PAHs	Metals by ICP/MS	Hg	CrVI	B (HWS)							
Sample ID/Location Name					Date	Time														
1	BH4-GW1	GW		3	April 16/13		XX													
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments: **Please Contact Luke if Sediment limit exceeded.** Method of Delivery: **Walk in**

Relinquished By (Print & Sign): 	Received by Driver/Depot:	Received at Lab: MYC [Signature]	Verified By: MYC [Signature]
Date/Time: April 16, 2013	Temperature: _____ °C	Date/Time: Apr 16/13 4:41	Date/Time: Apr 16/13 5:52
		Temperature: 12.0 °C	pH Verified By: N/A

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Nick Sullivan

Client PO: 31747
Project: PE5124
Custody: 59232

Report Date: 1-Feb-2021
Order Date: 26-Jan-2021

Order #: 2105194

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

Parcel ID	Client ID
2105194-01	BH1-21-SS10
2105194-02	BH2-21-SS7
2105194-03	DUP1

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 26-Jan-2021

Client PO: 31747

Project Description: PE5124

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	27-Jan-21	27-Jan-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	27-Jan-21	28-Jan-21
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	29-Jan-21	1-Feb-21
Solids, %	Gravimetric, calculation	29-Jan-21	27-Jan-21

Certificate of Analysis

Report Date: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 26-Jan-2021

Client PO: 31747

Project Description: PE5124

Client ID:	BH1-21-SS10	BH2-21-SS7	DUP1	-
Sample Date:	22-Jan-21 09:00	22-Jan-21 09:00	22-Jan-21 09:00	-
Sample ID:	2105194-01	2105194-02	2105194-03	-
MDL/Units	Soil	Soil	Soil	-

Physical Characteristics

% Solids	0.1 % by Wt.	80.5	80.3	81.6	-
----------	--------------	------	------	------	---

Volatiles

Acetone	0.50 ug/g dry	<0.50	<0.50	<0.50	-
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Bromodichloromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Bromoform	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Bromomethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Chlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Chloroform	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Dibromochloromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Hexane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	<0.50	<0.50	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	<0.50	<0.50	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Methylene Chloride	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Styrene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-

Certificate of Analysis

Report Date: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 26-Jan-2021

Client PO: 31747

Project Description: PE5124

	MDL/Units	Client ID: Sample Date: Sample ID:	BH1-21-SS10 22-Jan-21 09:00 2105194-01	BH2-21-SS7 22-Jan-21 09:00 2105194-02	DUP1 22-Jan-21 09:00 2105194-03	- - - -
		Soil	Soil	Soil		
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-	-
Trichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-	-
Vinyl chloride	0.02 ug/g dry	<0.02	<0.02	<0.02	-	-
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	-	-
4-Bromofluorobenzene	Surrogate	98.3%	97.1%	106%	-	-
Dibromofluoromethane	Surrogate	93.2%	94.3%	98.4%	-	-
Toluene-d8	Surrogate	105%	106%	122%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	12	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	19	-	-

Certificate of Analysis

Report Date: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 26-Jan-2021

Client PO: 31747

Project Description: PE5124

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	7.71		ug/g		96.4	50-140			
Surrogate: Dibromofluoromethane	7.09		ug/g		88.7	50-140			
Surrogate: Toluene-d8	8.30		ug/g		104	50-140			

Certificate of Analysis

Report Date: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 26-Jan-2021

Client PO: 31747

Project Description: PE5124

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			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Physical Characteristics									
% Solids	92.6	0.1	% by Wt.	93.5			1.0	25	
Volatiles									
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g dry	ND			NC	50	
Bromoform	ND	0.05	ug/g dry	ND			NC	50	
Bromomethane	ND	0.05	ug/g dry	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
Chloroform	ND	0.05	ug/g dry	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g dry	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2)	ND	0.05	ug/g dry	ND			NC	50	
Hexane	ND	0.05	ug/g dry	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g dry	ND			NC	50	
Styrene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	10.2		ug/g dry		99.1	50-140			
Surrogate: Dibromofluoromethane	9.74		ug/g dry		94.3	50-140			
Surrogate: Toluene-d8	11.0		ug/g dry		107	50-140			

Certificate of Analysis

Report Date: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 26-Jan-2021

Client PO: 31747

Project Description: PE5124

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	214	7	ug/g	ND	107	80-120			
F2 PHCs (C10-C16)	97	4	ug/g	ND	98.1	60-140			
F3 PHCs (C16-C34)	281	8	ug/g	ND	115	60-140			
F4 PHCs (C34-C50)	184	6	ug/g	ND	120	60-140			
Volatiles									
Acetone	9.25	0.50	ug/g	ND	92.5	50-140			
Benzene	3.36	0.02	ug/g	ND	84.0	60-130			
Bromodichloromethane	3.84	0.05	ug/g	ND	96.0	60-130			
Bromoform	3.10	0.05	ug/g	ND	77.6	60-130			
Bromomethane	3.71	0.05	ug/g	ND	92.8	50-140			
Carbon Tetrachloride	3.50	0.05	ug/g	ND	87.5	60-130			
Chlorobenzene	3.64	0.05	ug/g	ND	91.0	60-130			
Chloroform	3.70	0.05	ug/g	ND	92.6	60-130			
Dibromochloromethane	3.60	0.05	ug/g	ND	90.1	60-130			
Dichlorodifluoromethane	4.95	0.05	ug/g	ND	124	50-140			
1,2-Dichlorobenzene	3.76	0.05	ug/g	ND	93.9	60-130			
1,3-Dichlorobenzene	3.87	0.05	ug/g	ND	96.6	60-130			
1,4-Dichlorobenzene	3.87	0.05	ug/g	ND	96.8	60-130			
1,1-Dichloroethane	3.54	0.05	ug/g	ND	88.6	60-130			
1,2-Dichloroethane	3.41	0.05	ug/g	ND	85.1	60-130			
1,1-Dichloroethylene	3.68	0.05	ug/g	ND	92.1	60-130			
cis-1,2-Dichloroethylene	3.48	0.05	ug/g	ND	87.0	60-130			
trans-1,2-Dichloroethylene	3.63	0.05	ug/g	ND	90.8	60-130			
1,2-Dichloropropane	3.39	0.05	ug/g	ND	84.6	60-130			
cis-1,3-Dichloropropylene	3.47	0.05	ug/g	ND	86.7	60-130			
trans-1,3-Dichloropropylene	3.22	0.05	ug/g	ND	80.5	60-130			
Ethylbenzene	4.12	0.05	ug/g	ND	103	60-130			
Ethylene dibromide (dibromoethane, 1,2-	3.85	0.05	ug/g	ND	96.2	60-130			
Hexane	3.51	0.05	ug/g	ND	87.8	60-130			
Methyl Ethyl Ketone (2-Butanone)	8.38	0.50	ug/g	ND	83.8	50-140			
Methyl Isobutyl Ketone	7.39	0.50	ug/g	ND	73.9	50-140			
Methyl tert-butyl ether	8.60	0.05	ug/g	ND	86.0	50-140			
Methylene Chloride	3.35	0.05	ug/g	ND	83.7	60-130			
Styrene	3.77	0.05	ug/g	ND	94.2	60-130			
1,1,1,2-Tetrachloroethane	3.82	0.05	ug/g	ND	95.5	60-130			
1,1,2,2-Tetrachloroethane	3.27	0.05	ug/g	ND	81.7	60-130			
Tetrachloroethylene	3.96	0.05	ug/g	ND	99.1	60-130			
Toluene	3.93	0.05	ug/g	ND	98.3	60-130			
1,1,1-Trichloroethane	3.67	0.05	ug/g	ND	91.7	60-130			
1,1,2-Trichloroethane	3.48	0.05	ug/g	ND	87.0	60-130			
Trichloroethylene	4.00	0.05	ug/g	ND	100	60-130			
Trichlorofluoromethane	4.04	0.05	ug/g	ND	101	50-140			
Vinyl chloride	3.79	0.02	ug/g	ND	94.8	50-140			
m,p-Xylenes	7.51	0.05	ug/g	ND	93.8	60-130			
o-Xylene	3.71	0.05	ug/g	ND	92.9	60-130			
Surrogate: 4-Bromofluorobenzene	7.80		ug/g		97.5	50-140			
Surrogate: Dibromofluoromethane	8.40		ug/g		105	50-140			
Surrogate: Toluene-d8	8.00		ug/g		100	50-140			

Certificate of Analysis

Report Date: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 26-Jan-2021

Client PO: 31747

Project Description: PE5124

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.

NC: Not Calculated

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.
- When reported, data for F4G has been processed using a silica gel cleanup.



Laurent Blvd.
Box K1G 4J8
947
racellabs.com
www.paracellabs.com

Parcel Order Number (Lab Use Only) 2105194	Chain Of Custody (Lab Use Only) No 59232
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Client Name: Paterson Group	Project Ref: PE5124	Page 1 of 1
Contact Name: Nick Sullivan	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular
Address: 154 Colonnade Rd. S.	PO #: 31747	
Telephone: 613-226-7381	E-mail: nsullivan@patersongroup.ca	

Regulation 153/04		Other Regulation		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)		Required Analysis																		
<input type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park	<input type="checkbox"/> Med/Fine	<input type="checkbox"/> REG 558	<input type="checkbox"/> PWQO	Matrix	Air Volume	# of Containers	Sample Taken		VOCs	PHCs F1-F4													
<input type="checkbox"/> Table 2	<input checked="" type="checkbox"/> Ind/Comm	<input checked="" type="checkbox"/> Coarse	<input type="checkbox"/> CCME	<input type="checkbox"/> MISA				Date	Time															
<input checked="" type="checkbox"/> Table 3	<input type="checkbox"/> Agri/Other		<input type="checkbox"/> SU - Sani	<input type="checkbox"/> SU - Storm																				
For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No		Mun: _____		Other: _____																				
Sample ID/Location Name																								
1	BH1-21-5510	S	2	Jan 22/21	AM	X	X																	
2	BH2-21-557	S	2	↓	↓	X	X																	
3	DUPI	S	1	↓	↓	X																		
4																								
5																								
6																								
7																								
8																								
9																								
10																								

Comments:		Method of Delivery: FACEL COURIER	
Relinquished By (Sign): <i>N. Sullivan</i>	Received By Driver/Depot: <i>A. DEWINE</i>	Received at Lab: <i>[Signature]</i>	Verified By: <i>[Signature]</i>
Relinquished By (Print): Nick Sullivan	Date/Time: 26/01/21 3:10	Date/Time: 1-26-21 16:45	Date/Time: 1-26-21 18:14
Date/Time: January 26, 2021	Temperature: _____ °C PH	Temperature: 8.9 °C	pH Verified: <input type="checkbox"/> By: _____

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Nick Sullivan

Client PO: 31764
Project: PE5124
Custody: 59238

Report Date: 1-Feb-2021
Order Date: 28-Jan-2021

Order #: 2105386

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

Parcel ID	Client ID
2105386-01	BH1-21-GW1
2105386-02	BH2-21-GW1
2105386-03	BH3-21-GW1
2105386-04	DUP 1

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 01-Feb-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 28-Jan-2021

Client PO: 31764

Project Description: **PE5124**

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	28-Jan-21	28-Jan-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	29-Jan-21	29-Jan-21
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	28-Jan-21	29-Jan-21

Certificate of Analysis

Report Date: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 28-Jan-2021

Client PO: 31764

Project Description: PE5124

Client ID:	BH1-21-GW1	BH2-21-GW1	BH3-21-GW1	DUP 1
Sample Date:	27-Jan-21 12:00	27-Jan-21 12:00	27-Jan-21 12:00	27-Jan-21 12:00
Sample ID:	2105386-01	2105386-02	2105386-03	2105386-04
MDL/Units	Water	Water	Water	Water

Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis

Report Date: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 28-Jan-2021

Client PO: 31764

Project Description: PE5124

	Client ID:	BH1-21-GW1	BH2-21-GW1	BH3-21-GW1	DUP 1
	Sample Date:	27-Jan-21 12:00	27-Jan-21 12:00	27-Jan-21 12:00	27-Jan-21 12:00
	Sample ID:	2105386-01	2105386-02	2105386-03	2105386-04
	MDL/Units	Water	Water	Water	Water
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	115%	113%	125%	116%
Dibromofluoromethane	Surrogate	101%	101%	102%	101%
Toluene-d8	Surrogate	116%	115%	115%	115%

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: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 28-Jan-2021

Client PO: 31764

Project Description: PE5124

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						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	89.6		ug/L		112	50-140			
Surrogate: Dibromofluoromethane	77.0		ug/L		96.2	50-140			
Surrogate: Toluene-d8	91.9		ug/L		115	50-140			

Certificate of Analysis

Report Date: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 28-Jan-2021

Client PO: 31764

Project Description: PE5124

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			NC	30	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	3.27	0.5	ug/L	3.05			7.0	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	19.7	0.5	ug/L	19.8			0.7	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	82.7		ug/L		103	50-140			
Surrogate: Dibromofluoromethane	80.5		ug/L		101	50-140			
Surrogate: Toluene-d8	92.8		ug/L		116	50-140			

Certificate of Analysis

Report Date: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 28-Jan-2021

Client PO: 31764

Project Description: PE5124

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1840	25	ug/L	ND	92.0	68-117			
F2 PHCs (C10-C16)	1700	100	ug/L	ND	106	60-140			
F3 PHCs (C16-C34)	4440	100	ug/L	ND	113	60-140			
F4 PHCs (C34-C50)	3100	100	ug/L	ND	125	60-140			
Volatiles									
Acetone	86.2	5.0	ug/L	ND	86.2	50-140			
Benzene	39.8	0.5	ug/L	ND	99.4	60-130			
Bromodichloromethane	38.4	0.5	ug/L	ND	96.1	60-130			
Bromoform	40.8	0.5	ug/L	ND	102	60-130			
Bromomethane	43.3	0.5	ug/L	ND	108	50-140			
Carbon Tetrachloride	40.6	0.2	ug/L	ND	101	60-130			
Chlorobenzene	42.1	0.5	ug/L	ND	105	60-130			
Chloroform	39.2	0.5	ug/L	ND	98.1	60-130			
Dibromochloromethane	40.6	0.5	ug/L	ND	102	60-130			
Dichlorodifluoromethane	37.9	1.0	ug/L	ND	94.8	50-140			
1,2-Dichlorobenzene	40.6	0.5	ug/L	ND	102	60-130			
1,3-Dichlorobenzene	44.7	0.5	ug/L	ND	112	60-130			
1,4-Dichlorobenzene	36.5	0.5	ug/L	ND	91.2	60-130			
1,1-Dichloroethane	38.9	0.5	ug/L	ND	97.3	60-130			
1,2-Dichloroethane	40.6	0.5	ug/L	ND	101	60-130			
1,1-Dichloroethylene	38.3	0.5	ug/L	ND	95.8	60-130			
cis-1,2-Dichloroethylene	37.6	0.5	ug/L	ND	94.1	60-130			
trans-1,2-Dichloroethylene	39.3	0.5	ug/L	ND	98.3	60-130			
1,2-Dichloropropane	40.9	0.5	ug/L	ND	102	60-130			
cis-1,3-Dichloropropylene	39.4	0.5	ug/L	ND	98.6	60-130			
trans-1,3-Dichloropropylene	40.3	0.5	ug/L	ND	101	60-130			
Ethylbenzene	38.6	0.5	ug/L	ND	96.5	60-130			
Ethylene dibromide (dibromoethane, 1,2-	42.8	0.2	ug/L	ND	107	60-130			
Hexane	38.0	1.0	ug/L	ND	95.0	60-130			
Methyl Ethyl Ketone (2-Butanone)	85.1	5.0	ug/L	ND	85.1	50-140			
Methyl Isobutyl Ketone	85.9	5.0	ug/L	ND	85.9	50-140			
Methyl tert-butyl ether	104	2.0	ug/L	ND	104	50-140			
Methylene Chloride	38.7	5.0	ug/L	ND	96.8	60-130			
Styrene	40.1	0.5	ug/L	ND	100	60-130			
1,1,1,2-Tetrachloroethane	42.3	0.5	ug/L	ND	106	60-130			
1,1,2,2-Tetrachloroethane	39.4	0.5	ug/L	ND	98.4	60-130			
Tetrachloroethylene	42.6	0.5	ug/L	ND	107	60-130			
Toluene	39.7	0.5	ug/L	ND	99.2	60-130			
1,1,1-Trichloroethane	43.6	0.5	ug/L	ND	109	60-130			
1,1,2-Trichloroethane	42.2	0.5	ug/L	ND	106	60-130			
Trichloroethylene	41.5	0.5	ug/L	ND	104	60-130			
Trichlorofluoromethane	39.4	1.0	ug/L	ND	98.6	60-130			
Vinyl chloride	32.8	0.5	ug/L	ND	82.0	50-140			
m,p-Xylenes	88.4	0.5	ug/L	ND	110	60-130			
o-Xylene	39.6	0.5	ug/L	ND	99.0	60-130			
Surrogate: 4-Bromofluorobenzene	91.6		ug/L		114	50-140			
Surrogate: Dibromofluoromethane	77.2		ug/L		96.5	50-140			
Surrogate: Toluene-d8	80.0		ug/L		100	50-140			

Certificate of Analysis

Report Date: 01-Feb-2021

Client: Paterson Group Consulting Engineers

Order Date: 28-Jan-2021

Client PO: 31764

Project Description: PE5124

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.
NC: Not Calculated

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.
- When reported, data for F4G has been processed using a silica gel cleanup.



1st Blvd.
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abs.com
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Parcel Order Number
(Lab Use Only)

2105386

Chain Of Custody
(Lab Use Only)

No 59238

Client Name: Paterson Group

Project Ref: PE5124

Page 1 of 1

Contact Name: Nick Sullivan

Quote #:

Turnaround Time

Address:
154 Colonnade Rd. S.

PO #: 31764

1 day

3 day

Telephone: 613-226-7381

E-mail: nsullivan@patersongroup.ca

2 day

Regular

Date Required: _____

Regulation 153/04		Other Regulation		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)			Required Analysis															
<input type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park	<input type="checkbox"/> Med/Fine	<input type="checkbox"/> REG 558	<input type="checkbox"/> PWQO	Matrix	Air Volume	# of Containers	Sample Taken Date	Time	PHS	Fr-FH	VOCs										
<input type="checkbox"/> Table 2	<input checked="" type="checkbox"/> Ind/Comm	<input checked="" type="checkbox"/> Coarse	<input type="checkbox"/> CCME	<input type="checkbox"/> MISA																		
<input checked="" type="checkbox"/> Table 3	<input type="checkbox"/> Agri/Other		<input type="checkbox"/> SU - Sani	<input type="checkbox"/> SU - Storm																		
Mun: _____																						
For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No																						
Sample ID/Location Name																						
1	BHI-21-GW1				GW		3	Jan 27/21	PM	X	X	X										
2	BH2-21-GW1				↓		3			X	X	X										
3	BH3-21-GW1				↓		3			X	X	X										
4	DUP 1				↓		2			X	X	X										
5																						
6																						
7																						
8																						
9																						
10																						

Comments: _____ Method of Delivery: PARACEL COURIER

Relinquished By (Sign): N. Sullivan

Received By Driver/Depot: A. Deane

Received at Lab: Suneeporn Dohmai

Verified By: [Signature]

Relinquished By (Print): Nick Sullivan

Date/Time: 28/01/21 10:20

Date/Time: Jan 28, 2021 12:25

Date/Time: Jan 28, 2021 13:05

Date/Time: Jan 28/21

Temperature: _____ °C AM

Temperature: 9.3 °C

pH Verified: By: NA