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Phase II Environmental Site Assessment

Part of 3026 Solandt Road
Ottawa, Ontario

Prepared For

Colonnade Bridgeport

March 18, 2020

Report: PE4823-2

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EXECUTIVE SUMMARY

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Assessment

A Phase II ESA was conducted for part of the property addressed Part of 3026 Solandt, 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 Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the subject property. The subsurface investigation consisted of drilling five boreholes, four of which were instrumented with groundwater monitoring wells.

Soil samples were obtained from the boreholes and screened using visual observations and olfactory observations. Seven soil samples were submitted for laboratory analysis of Volatile Organic Compounds (VOCs), petroleum hydrocarbons (PHCs F_1-F_4), and/or metals. All soil samples are in compliance with the applicable MECP Standards.

Groundwater samples recovered from monitoring wells installed in BH2 - BH5 were submitted for analysis of VOCs and PHCs (F_1-F_4). No exceedances of the applicable MECP Standards were identified during the groundwater testing.

Recommendations

If the monitoring wells installed on the subject site are not going to be used in the future, or will be destroyed during site redevelopment, they should be abandoned according to Ontario Regulation 903. The wells will be registered with the MECP under this regulation. If you require additional information regarding registration of the monitoring wells please do not hesitate to contact our office.

1.0 INTRODUCTION

At the request of Ms. Bonnie Martell with Colonnade Bridgeport, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment of Part of 3026 Solandt Road, in the City of Ottawa, Ontario. The purpose of this Phase II ESA has been to address areas of potential environmental concern (APECs) identified on the Phase II Property, during the Phase I ESA conducted by Paterson in December 2019.

1.1 Site Description

Address:	Part of 3026 Solandt Road, Ottawa, Ontario.
Legal Description:	Part of Lot 7, Concession 4, Township of March City of Ottawa.
Property Identification Number(s):	04517-0629
Location:	The site is located on the south side of Solandt Road, on the southeast corner of the March Road and Solandt Road intersection, in the City of Ottawa, Ontario.
Latitude and Longitude:	45° 34’ 49” N, 75°91’ 22” W
Configuration:	Rectangular (Approximate)
Site Area:	1.5ha (approximate)
Zoning:	IG6 H (14) - Business Park Industrial Zone, Kanata North Business Park.
Current Use:	The subject site is currently vacant.
Services:	The subject site is in a municipally serviced area.

1.2 Property Ownership

The current owner of the site is Colonnade Bridgeport. Paterson was retained to complete this Phase II ESA by Ms. Bonnie Martell of Colonnade Bridgeport. Colonnade Bridgeport’s office is located at 100 Argyle Avenue, in Ottawa, Ontario. Ms. Martell can be contacted by telephone at 613-225-8118.

1.3 Current and Proposed Future Uses

The subject site is currently vacant. The site was last used for commercial purposes.

The proposed future use of the property does not require a Record of Site Condition, as the proposed use is a commercial office building.

1.4 Applicable Site Condition Standard

The site condition standards for the property were obtained from Table 3 of the document entitled “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”, prepared by the Ministry of the Environment, Conservation and Parks (MECP), April 2011. The MECP selected Table 7 Standards are based on the following considerations:

- ❒ Coarse-grained soil conditions
- ❒ Full Depth site conditions
- ❒ Non-potable groundwater conditions
- ❒ Commercial land use

Coarse grained soil standards were chosen as a conservative approach. Grain size analysis was not completed.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The subject property is situated in a commercial business park. The surface of the site generally consists of landscaped areas (grassed) or asphalt parking lots and walkways.

The site and regional topography are generally flat, with a slight slope to the east while the regional topography slopes gradually down to the northeast. Water drainage on the subject site occurs primarily via infiltration in the grassed areas, as well as sheet flow towards catch basins located on the adjacent streets and paved areas.

2.2 Past Investigations

Paterson completed a Phase I ESA for the subject site in December 2019. The Phase I ESA identified two Potentially Contaminating Activities (PCAs) resulting in Areas of Potential Environmental Concern (APECs) with respect to the subject property. Historically, a water and wastewater treatment company occupied the site. Based on the presence of this company and the waste generator numbers associated with it, an APEC was identified on site. Additionally, a retail fuel outlet is present to the west of the subject site. The presence of the retail fuel outlet is considered to represent an APEC on the subject site.

PCAs that represent APECs on the subject property, as well as the Contaminants of Potential Concern (CPCs) are presented below in Table 1.

Table 1
Areas of Potential Environmental Concern (APECs)

Area of Potential Environmental Concern	Location of APEC	Potentially Contaminating Activity	Location of PCA	Contaminants of Potential Concern	Media Potentially Impacted
APEC1 Historical Waste Generators	Southwest corner of subject site	Not Applicable	On-Site	Metals, VOCs, PHCs	Soil and/or Groundwater
APEC 2 Retail Fuel Outlet	West side of subject site	Item 28 – Gasoline and Associated Products Stored in Fixed Tanks.	Off-Site	PHCs BTEX	Groundwater

A Phase II ESA was recommended to address the aforementioned APECs.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted on December 11, 2019. The field program consisted of drilling five boreholes, four of which were instrumented with groundwater monitoring wells. Boreholes were drilled to depths ranging from 4.98 m to 8.99 m below the existing grade.

3.2 Media Investigated

During the subsurface investigation, soil samples and groundwater samples were obtained and submitted for laboratory analysis. The rationale for sampling and analyzing this media is based on the Contaminants of Potential Concern identified in the Phase I ESA. Contaminants of concern for soil and groundwater include petroleum hydrocarbons (PHCs, Fractions F_1 - F_4), benzene, toluene, ethylbenzene, and xylenes (BTEX), volatile organic compounds (VOCs), and metals.

3.3 Phase I Conceptual Site Model

Existing Buildings and Structures

No buildings or structures exist on the Phase I Property.

Geological and Hydrogeological Setting

According to mapping provided on the Geological Survey of Canada website, the Phase I Property is in an area of interbedded sandstone dolomite of the March formation and the drift thickness is 5 to 10 m. Groundwater is expected to flow in a northeast direction towards the Ottawa River.

Water Bodies

There is a creek just north of the study area.

Areas of Natural Significance

No areas of natural significance were identified on the Phase I Property or on other properties within the Phase I Study Area.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area is primarily commercial.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.1 of this report, one (1) PCA was identified on the Phase I Property. The PCA was identified as a result of the several waste generators associated with the historical use of the subject site. One (1) off-site PCA was identified within the Phase I Study Area: a retail fuel outlet approximately 30m west of the site (479 March Road). The off-site PCA does represent an APEC for the subject site based on the separation distance and suspected upgradient orientation in respect to the subject property.

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I ESA is considered to be sufficient to conclude that there are two PCAs that are considered to result in APECs on the Phase I Property. The 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

The subsurface investigation was conducted on December 11, 2019. The field program consisted of drilling 5 boreholes, 4 of which were instrumented with groundwater monitoring wells. Boreholes were drilled to depths ranging from 4.98 m to 8.99 m below the existing grade.

The boreholes were placed to address the aforementioned APECs. The boreholes were drilled with a track-mounted drill rig provided by George Downing Estate Drilling. Borehole locations are shown on Drawing PE4823-3 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

A total of 36 soil samples were obtained from the boreholes by means of sampling from split spoon sampling and grab samples. The depths at which grab samples, 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 fill material (in the footprint of the former building) comprised of brown silty sand, with gravel, underlain by silty clay and glacial till. The fill material was encountered in BH1, BH2, and BH4 during the drilling program and extended to depths ranging from 0.61 m to 2.13 m. The silty clay extended to glacial till or the maximum depth of investigation. Several boreholes were terminated on possible bedrock, ranging in depth between 4.98m to 8.99m below the existing ground surface.

The fill material identified during the field program to be imported engineered fill material or reworked native material and is not considered to represent an APEC.

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.

4.4 Groundwater Monitoring Well Installation

Four groundwater monitoring wells were installed on the subject site as part of the current Phase II investigation. The monitoring wells consisted of 32 mm diameter Schedule 40 threaded PVC risers and screens. A summary of the monitoring well construction details are listed below in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1. Upon completion, the borehole elevations were surveyed with respect to the fire hydrant located on Solandt ROad, adjacent to the subject property.

Table 2
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
BH2	80.90	4.98	3.48-4.98	3.04-4.98	1.22-3.04	Flushmount
BH3	80.85	6.70	5.20-6.70	4.32-6.70	2.44-4.32	Flushmount
BH4	80.99	5.89	4.39-5.89	3.96-5.89	1.83-3.96	Flushmount
BH5	80.21	8.99	5.99-8.99	5.49-8.99	2.13-5.49	Flushmount

4.5 Field Measurement of Water Quality Parameters

Groundwater sampling was conducted for the four monitoring wells installed on March 12, 2020. No water quality parameters were measured in the field at that time.

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. Groundwater samples were obtained from each monitoring well, using dedicated sampling equipment. Standing water was purged from each well prior to sampling. Samples were stored in coolers to reduce analyte volatilization during transportation.

Details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan in Appendix 1.

4.7 Analytical Testing

The following soil and groundwater samples were submitted for analysis:

Table 3
Soil Samples Submitted

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed				Rationale
		PHCs (F_1-F_4)	BTEX	Metals	VOCs	
BH1-SS7	4.57-5.18m Glacial Till	X	X		X	Assess soil for potential impacts within the former building footprint.
BH2-SS7	4.57-5.18m Silty Clay	X	X		X	
BH3-AU1	0-0.61m Fill Material			X		
BH3-SS7	4.57-5.18m Silty Clay	X	X		X	Assess soil for potential impacts within the former building footprint
BH4-SS3	1.52-2.13m Fill Material			X		Asses the fill material of unknown quality
BH4-SS7	4.57-5.18m Glacial Till	X	X		X	Assess soil for potential impacts within the former building footprint
BH5-SS6	6.09-6.71m Silty Clay	X	X		X	

Table 4
Groundwater Samples Submitted

Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed			Rationale
		PHCs (F_1-F_4)	BTEX	VOCs	
BH2-GW1	3.48-4.98m Overburden	X	X	X	Assess groundwater for potential impacts related to the former building
BH3-GW1	5.20-6.70m Overburden	X	X	X	
BH4-GW1	4.39-5.89m Overburden	X	X	X	
BH5-GW1	5.99-8.99m Overburden	X	X	X	Assess groundwater for potential impacts related to the former building and nearby retail fuel outlet
DUP				X	QA/QC

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

4.8 Residue Management

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

4.9 Elevation Surveying

Borehole elevations were surveyed with respect to the top spindle of a fire hydrant located on Solandt Road, just east of March Road and adjacent to the subject property. The top spindle of the fire hydrant is known to have a geodetic elevation of approximately 80.98 m above sea level.

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

Site soils generally consist of fill within the former building footprints, underlain by silty clay and glacial till. Practical refusal to augering occurred at depths between 4.98 and 8.99m. The groundwater was encountered in the overburden at approximately 1.5 m below the existing grade. 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 during the groundwater sampling event on March 12, 2020 using an electronic water level meter. Groundwater levels are summarized below in Table 5.

Table 5
Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH2	80.90	1.61	79.29	March 12, 2020
BH3	80.85	1.43	79.42	March 12, 2020
BH4	80.99	1.53	79.46	March 12, 2020
BH5	80.21	Ground Surface*	80.21	March 12, 2020
*Surface Water infiltration is suspected to have occurred prior to purging for sampling purposes.				

Based on the water levels and configuration of the borehole locations, the groundwater appears to flow in a southeasterly direction.

5.3 Fine/Coarse Soil Texture

No grain size analysis was completed for the subject site. Coarse grained soil standards were chosen as a conservative approach.

5.4 Field Screening

Fill material was identified in the area of the former building footprints during field screening however no significant indications of potential environmental concerns were identified in the soil samples. The fill material is considered to be imported engineered fill or reworked native material and is not considered to represent an environmental concern. The 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

Five soil samples were submitted for analysis of VOCs (including BTEX) and PHCs (F_1-F_4) and two soil samples were submitted for metals analysis. The results of the analytical testing are presented below in Tables 6, 7, and 8. The laboratory certificate of analysis is provided in Appendix 1.

Table 6
Analytical Test Results – Soil – BTEX and PHCs (F_1-F_4)

Parameter	MDL (µg/g)	Soil Samples (µg/g)					MECP Table 3 Commercial Standards (µg/g)
		December 11, 2019					
		BH1-SS7	BH2-SS7	BH3-SS7	BH4-SS7	BH5-SS6	
Benzene	0.02	nd	nd	nd	nd	nd	0.32
Ethylbenzene	0.05	nd	nd	nd	nd	nd	9.5
Toluene	0.05	nd	nd	nd	nd	nd	68
Xylenes (Total)	0.05	nd	nd	nd	nd	nd	26
PHC F_1	7	nd	nd	nd	nd	nd	55
PHC F_2	4	nd	nd	nd	nd	nd	230
PHC F_3	8	nd	nd	nd	nd	nd	1700
PHC F_4	6	nd	nd	nd	nd	nd	3300

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds selected MECP Standards

All BTEX and PHC concentrations are in compliance with the selected MECP Table 3 standards.

Table 7
Analytical Test Results – Soil – VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g)					MECP Table 3 Commercial Standards (µg/g)
		December 11, 2019					
		BH1-SS7	BH2-SS7	BH3-SS7	BH4-SS7	BH5-SS6	
Acetone	0.5	nd	nd	nd	nd	nd	16
Benzene	0.2	nd	nd	nd	nd	nd	0.32
Bromodichloromethane	0.05	nd	nd	nd	nd	nd	18
Bromoform	0.05	nd	nd	nd	nd	nd	0.61
Bromomethane	0.05	nd	nd	nd	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	nd	nd	nd	0.21
Chlorobenzene	0.05	nd	nd	nd	nd	nd	2.4
Chloroform	0.05	nd	nd	nd	nd	nd	0.47
Dibromochloromethane	0.05	nd	nd	nd	nd	nd	13
Dichlorodifluoromethane	0.05	nd	nd	nd	nd	nd	16
1,2-Dichlorobenzene	0.05	nd	nd	nd	nd	nd	6.8
1,3-Dichlorobenzene	0.05	nd	nd	nd	nd	nd	9.6
1,4-Dichlorobenzene	0.05	nd	nd	nd	nd	nd	0.2
1,1-Dichloroethane	0.05	nd	nd	nd	nd	nd	17

Table 7
Analytical Test Results – Soil – VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g) December 11, 2019					MECP Table 3 Commercial Standards (µg/g)
		BH1-SS7	BH2-SS7	BH3-SS7	BH4-SS7	BH5-SS6	
1,2-Dichloroethane	0.05	nd	nd	nd	nd	nd	0.05
1,1-Dichloroethylene	0.05	nd	nd	nd	nd	nd	0.064
cis-1,2-Dichloroethylene	0.05	nd	nd	nd	nd	nd	55
trans-1,2-Dichloroethylene	0.05	nd	nd	nd	nd	nd	1.3
1,2-Dichloropropane	0.05	nd	nd	nd	nd	nd	0.16
1,3-Dichloropropene, total	0.05	nd	nd	nd	nd	nd	0.18
Ethylbenzene	0.05	nd	nd	nd	nd	nd	9.5
Ethylene dibromide	0.05	nd	nd	nd	nd	nd	0.05
Hexane	0.05	nd	nd	nd	nd	nd	46
Methyl Ethyl Ketone	0.5	nd	nd	nd	nd	nd	70
Methyl Isobutyl Ketone	0.5	nd	nd	nd	nd	nd	31
Methyl tert-butyl ether	0.05	nd	nd	nd	nd	nd	11
Methylene Chloride	0.05	nd	nd	nd	nd	nd	1.6
Styrene	0.05	nd	nd	nd	nd	nd	34
1,1,1,2-Tetrachloroethane	0.05	nd	nd	nd	nd	nd	0.087
1,1,2,2-Tetrachloroethane	0.05	nd	nd	nd	nd	nd	0.05
Tetrachloroethylene	0.05	nd	nd	nd	nd	nd	4.5
Toluene	0.05	nd	nd	nd	nd	nd	68
1,1,1-Trichloroethane	0.05	nd	nd	nd	nd	nd	6.1
1,1,2-Trichloroethane	0.05	nd	nd	nd	nd	nd	0.05
Trichloroethylene	0.05	nd	nd	nd	nd	nd	0.91
Trichlorofluoromethane	0.05	nd	nd	nd	nd	nd	4
Vinyl Chloride	0.2	nd	nd	nd	nd	nd	0.032
Xylenes	0.05	nd	nd	nd	nd	nd	26

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds selected MECP Standards

All VOC parameters are in compliance with the applicable MECP standards.

Table 8
Analytical Test Results – Soil – Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g) December 11, 2019		MECP Table3 Commercial Standards (µg/g)
		BH3-AU1	BH4-SS3	
Antimony	1.0	nd	nd	40
Arsenic	1.0	4.1	2.6	18
Barium	1.0	223	72.1	670
Beryllium	0.5	0.9	0.5	8
Boron	5.0	7.5	8.6	120
Cadmium	0.5	nd	nd	1.9
Chromium	5.0	65.6	23	160
Cobalt	1.0	15.5	7.1	80
Copper	5.0	28.3	17.2	230
Lead	1.0	9.2	4.7	120

Table 8
Analytical Test Results – Soil – Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g) December 11, 2019		MECP Table3 Commercial Standards (µg/g)
		BH3-AU1	BH4-SS3	
Molybdenum	1.0	nd	nd	40
Nickel	5.0	33.7	13.9	270
Selenium	1.0	nd	nd	5.5
Silver	0.3	nd	nd	40
Thallium	1.0	nd	nd	3.3
Uranium	1.0	nd	nd	33
Vanadium	10.0	78.5	38.5	86
Zinc	20.0	103	39.3	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds selected MECP Standards

All metals parameters are in compliance with the 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 from monitoring wells installed in BH2, BH3, BH4, and BH5 were submitted for laboratory analysis of BTEX and PHCs (F_1-F_4), and VOCs. The groundwater samples were obtained from the screened intervals noted on Table 2. The results of the analytical testing are presented in the tables below. The laboratory certificates of analysis are provided in Appendix 1.

Table 9
Analytical Test Results – Groundwater – BTEX and PHCs (F_1-F_4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) March 12, 2020				MECP Table 3 Commercial Standards (µg/L)
		BH2-GW1	BH3-GW1	BH4-GW1	BH5-GW1	
Benzene	0.5	nd	nd	nd	nd	44
Ethylbenzene	0.5	nd	nd	nd	nd	2,300
Toluene	0.5	nd	nd	nd	nd	18,000
Xylenes	0.5	nd	nd	nd	nd	4,200
PHC F1	25	nd	nd	nd	nd	750
PHC F2	100	nd	nd	nd	nd	150
PHC F3	100	nd	nd	nd	nd	500
PHC F4	100	nd	nd	nd	nd	500

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds selected MECP Standards

No BTEX/PHC concentrations were identified above the laboratory detection limits. All groundwater samples are in compliance with the applicable standards.

Table 10
Analytical Test Results – Groundwater – VOCs

Parameter	MDL (µg/g)	Groundwater Samples (µg/g)				MECP Table 3 Commercial Standards (µg/g)
		March 12, 2020				
		BH2-GW1	BH3-GW1	BH4-GW1	BH5-GW1	
Acetone	0.5	nd	nd	nd	nd	130,000
Benzene	0.2	nd	nd	nd	nd	44
Bromodichloromethane	0.05	nd	nd	nd	nd	85,000
Bromoform	0.05	nd	nd	nd	nd	380
Bromomethane	0.05	nd	nd	nd	nd	5.6
Carbon Tetrachloride	0.05	nd	nd	nd	nd	0.79
Chlorobenzene	0.05	nd	nd	nd	nd	630
Chloroform	0.05	nd	nd	nd	nd	2.4
Dibromochloromethane	0.05	nd	nd	nd	nd	82,000
Dichlorodifluoromethane	0.05	nd	nd	nd	nd	4,400
1,2-Dichlorobenzene	0.05	nd	nd	nd	nd	4,600
1,3-Dichlorobenzene	0.05	nd	nd	nd	nd	9,600
1,4-Dichlorobenzene	0.05	nd	nd	nd	nd	8
1,1-Dichloroethane	0.05	nd	nd	nd	nd	320
1,2-Dichloroethane	0.05	nd	nd	nd	nd	1.6
1,1-Dichloroethylene	0.05	nd	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.05	nd	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.05	nd	nd	nd	nd	1.6
1,2-Dichloropropane	0.05	nd	nd	nd	nd	16
1,3-Dichloropropene, total	0.05	nd	nd	nd	nd	5.2
Ethylbenzene	0.05	nd	nd	nd	nd	2,300
Ethylene dibromide	0.05	nd	nd	nd	nd	0.25
Hexane	0.05	nd	nd	nd	nd	51
Methyl Ethyl Ketone	0.5	nd	nd	nd	nd	470,000
Methyl Isobutyl Ketone	0.5	nd	nd	nd	nd	140,000
Methyl tert-butyl ether	0.05	nd	nd	nd	nd	190
Methylene Chloride	0.05	nd	nd	nd	nd	610
Styrene	0.05	nd	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.05	nd	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.05	nd	nd	nd	nd	3.2
Tetrachloroethylene	0.05	nd	nd	nd	nd	1.6
Toluene	0.05	nd	nd	nd	nd	18,000
1,1,1-Trichloroethane	0.05	nd	nd	nd	nd	640
1,1,2-Trichloroethane	0.05	nd	nd	nd	nd	4.7
Trichloroethylene	0.05	nd	nd	nd	nd	1.6
Trichlorofluoromethane	0.05	nd	nd	nd	nd	2,500
Vinyl Chloride	0.2	nd	nd	nd	nd	0.5
Xylenes	0.05	nd	nd	nd	nd	4,200

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds selected MECP Standards

No VOC concentrations were identified above the laboratory detection limits. All groundwater samples are in compliance with the applicable standards.

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

5.7 Quality Assurance and Quality Control Results

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

As per Subsection 47(3) of O.Reg. 153/04, as amended by the Environmental Protection Act, a Certificate of Analysis has been received for each sample submitted for analysis and all Certificates of Analysis are appended to this report.

As per the Sampling an Analysis Plan, a duplicate groundwater sample was obtained during the groundwater sampling event and analyzed for VOCs.

The parameter concentrations for both the original and duplicate sample were below the laboratory detection limits, and as such, are considered acceptable. 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.

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 269/11 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

Table 11
Areas of Potential Environmental Concern (APECs)

Area of Potential Environmental Concern	Location of APEC	Potentially Contaminating Activity	Location of PCA	Contaminants of Potential Concern	Media Potentially Impacted
APEC1 Historical Waste Generators	Within the former building footprint	Not Applicable	On-Site	Metals, VOCs, PHCs	Soil and/or Groundwater
APEC 2 Retail Fuel Outlet	West side of subject site	Item 28 – Gasoline and Associated Products Stored in Fixed Tanks.	Off-Site	PHCs BTEX	Groundwater

No other PCAs are considered to have the potential to pose an environmental concern to the subject site.

Contaminants of Potential Concern

Contaminants of potential concern associated with the aforementioned PCAs include PHCs (F_1-F_4), BTEXs, VOCs, and metals in the soil and/or groundwater.

Subsurface Structures and Utilities

Underground service locates were completed prior to the subsurface investigation. Underground utilities on the subject property include hydro, telecommunication lines, water, natural gas and sewer services.

Physical Setting

Site Stratigraphy

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. The stratigraphy of the subject site generally consists of:

- Silty sand and gravel fill, in BH1, BH2, BH3, and BH4, extending between 0.63 and 1.52m below grade.
- Topsoil, in BH5, extending approximately 0.3m below the existing ground surface.
- Silty clay, extending from beneath the fill material (and topsoil in BH5) to depths ranging from approximately 4.57-6.70 m below grade;
- Glacial till was encountered in BH1 and BH4 beneath the silty clay material. The glacial till was the deepest unit investigated.

Hydrogeological Characteristics

Groundwater at the subject property was encountered within the silty clay. This unit is interpreted to function as a local aquifer at the subject site.

Groundwater levels were measured at the subject site on March 12, 2020, with groundwater encountered approximately 1.5m below the existing grade. Based on the water levels, a hydraulic gradient and flow direction was calculated. The groundwater on the site flows towards the south with a hydraulic gradient of approximately 0.004 m/m.

A perched water table, presumably due to meltwater was observed in BH5 during the groundwater sampling event. This groundwater condition was considered anomalous and was not included in the groundwater flow direction calculations.

Approximate Depth to Bedrock

Bedrock was not confirmed during the field program however several holes were terminated on suspected bedrock at depths ranging between 4.98 and 8.99m below the existing grade.

Approximate Depth to Water Table

The depth to the water table at the subject site varies between approximately 1.43-1.61m below the existing grade.

Sections 41 and 43.1 of the Regulation

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

Section 43.1 of the Regulation does not apply to the subject site as bedrock is located at a depth of greater than 2 m below the ground surface.

Fill Placement

Fill material identified during the site inspection consisted of silty sand with gravel and crushed stone. The fill material represents the former building pad and is considered engineered fill. The engineered fill material is not considered to represent an APEC.

Proposed Buildings and Other Structures

It is our understanding that the subject site is to be redeveloped with a commercial office tower in the northwest corner of the site.

Existing Buildings and Structures

There are no existing buildings and structures on the subject site.

Areas of Natural Significance and Water Bodies

No areas of natural significance or water bodies are present on or within the vicinity of the subject property.

Environmental Condition

Areas Where Contaminants are Present

Based on the analytical test results, there are no contaminants present on the subject site.

Types of Contaminants

There are no contaminants present on the Phase II ESA property.

Contaminated Media

There are no contaminants present on the Phase II ESA property.

What Is Known About Areas Where Contaminants Are Present

There are no contaminants present on the Phase II ESA property.

Distribution and Migration of Contaminants

There are no contaminants present on the Phase II ESA property.

Discharge of Contaminants

There are no contaminants present on the Phase II ESA property.

Climatic and Meteorological Conditions

There are no contaminants present on the Phase II ESA property.

Potential for Vapour Intrusion

There are no contaminants present on the Phase II ESA property.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for part of the property addressed Part of 3026 Solandt, 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 Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the subject property. The subsurface investigation consisted of drilling five boreholes, four of which were instrumented with groundwater monitoring wells.

Soil samples were obtained from the boreholes and screened using visual observations and olfactory observations. Seven soil samples were submitted for laboratory analysis of Volatile Organic Compounds (VOCs), petroleum hydrocarbons (PHCs F_1-F_4), and/or metals. All soil samples are in compliance with the applicable MECP Standards.

Groundwater samples recovered from monitoring wells installed in BH2 - BH5 were submitted for analysis of VOCs and PHCs (F_1-F_4). No exceedances of the applicable MECP Standards were identified during the groundwater testing.

Recommendations

If the monitoring wells installed on the subject site are not going to be used in the future, or will be destroyed during site redevelopment, they should be abandoned according to Ontario Regulation 903. The wells will be registered with the MECP under this regulation. If you require additional information regarding registration of the monitoring wells please do not hesitate to contact our office.

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 Colonnade Bridgeport. Notification from Colonnade Bridgeport and Paterson Group will be required prior to the release of this report to any other party.

Paterson Group Inc.

Michael Beaudoin, P.Eng., QP_{ESA}

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

Report Distribution:

- Colonnade Bridgeport
- Paterson Group Inc.

FIGURES

FIGURE 1 – KEY PLAN

Drawing PE4823-3 – Test Hole Location Plan

Drawing PE4823-4 – Analytical Testing Plan

Drawing PE4823-4A – Cross-Section A-A' - Analytical Testing Plan

FIGURE 1

KEY PLAN

#3000 SOLANDT ROAD
MULTI-USE COMMERCIAL

#3000 SOLANDT ROAD
MULTI-USE COMMERCIAL

#3000 SOLANDT ROAD
COMMERCIAL
(PARKING LOT)

#3001 SOLANDT ROAD
COMMERCIAL
(FLEX)

SOLANDT ROAD

ASPHALTIC CONCRETE

FORMER BUILDING LOCATION

BH 4
80.99
(79.46)

A'

79.45

79.4

(0.004m/m)

79.35

79.3

BH 2
80.90
(79.29)

FH - BM

BH 3
80.85
(79.42)

FORMER BUILDING LOCATION

BH 5
80.21
(80.21)

A

BH 1
81.07

#3026 SOLANDT ROAD
MULTI-USE COMMERCIAL

MARCH ROAD

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 80.90 GROUND SURFACE ELEVATION (m)
- (79.29) GROUNDWATER SURFACE ELEVATION (m)
- A — A' CROSS-SECTION LOCATION
- 79.3 GROUNDWATER CONTOUR
- (0.004m/m) APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

BM-TOP SPINDLE OF FIRE HYDRANT LOCATED ON SOLANDT ROAD. GEODETIC ELEVATION = 80.98m.

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NO.	REVISIONS	DATE	INITIAL
0			

COLONNADE BRIDGEPORT

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
3026 SOLANDT ROAD

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:750	Date: 03/2020
Drawn by: MPG	Report No.: PE4823-2
Checked by: MSD	PE4823-3
Approved by: MSD	Revision No.:

11x17

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#3000 SOLANDT ROAD
MULTI-USE COMMERCIAL

#3000 SOLANDT ROAD
MULTI-USE COMMERCIAL

#3000 SOLANDT ROAD
COMMERCIAL
(PARKING LOT)

#3001 SOLANDT ROAD
COMMERCIAL
(FLEX)

SOLANDT ROAD

ASPHALTIC CONCRETE

BH4-SS3 1.52-2.13m 11-Dec-19
Metals comply with MECP Table 3 Standards

BH4-SS7 4.57-5.18m 11-Dec-19
VOCs comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards

BH4-GW1 4.39-5.89m 12-March-20
VOCs comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards

BH2-SS7 4.57-5.18m 11-Dec-19
VOCs comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards

BH2-GW1 3.48-4.98m 12-March-20
VOCs comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards

BH3-AU1 0-0.61m 11-Dec-19
Metals comply with MECP Table 3 Standards

BH3-SS7 4.57-5.18m 11-Dec-19
VOCs comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards

BH3-GW1 5.20-6.70m 12-March-20
VOCs comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards

FORMER BUILDING LOCATION

BH 4
80.99
(79.46)

#3026 SOLANDT ROAD
MULTI-USE COMMERCIAL

BH 2
80.90
(79.29)

BH1-SS7 4.57-5.18m 11-Dec-19
VOCs comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards

FH - BM

BH 3
80.85
(79.42)

FORMER BUILDING LOCATION

BH 1
81.07

BH 5
80.21
(80.21)

BH5-SS6 6.09-6.71m 11-Dec-19
VOCs comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards

BH5-GW1 5.99-8.99m 12-March-20
VOCs comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards

MARCH ROAD

LEGEND:

SOIL PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 80.90 GROUND SURFACE ELEVATION (m)
- (79.29) GROUNDWATER SURFACE ELEVATION (m)

BM-TOP SPINDLE OF FIRE HYDRANT LOCATED ON SOLANDT ROAD. GEODETIC ELEVATION = 80.98m.

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NO.	REVISIONS	DATE	INITIAL
0			

COLONNADE BRIDGEPORT
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
3026 SOLANDT ROAD
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN

Scale: 1:750	Date: 03/2020
Drawn by: MPG	Report No.: PE4823-2
Checked by: MSD	PE4823-4
Approved by: MSD	Revision No.:

11x17

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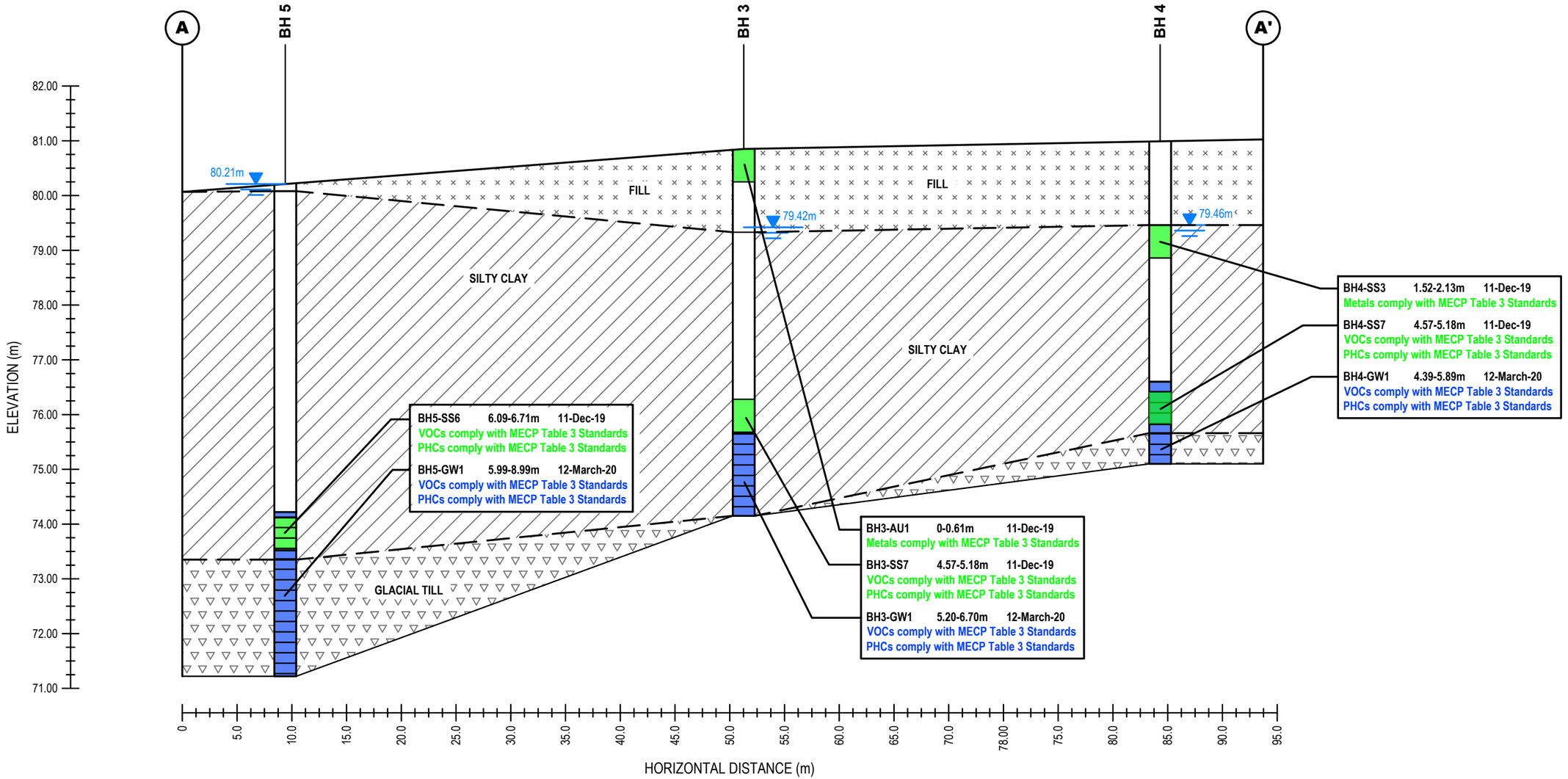

SOIL PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL
0			

COLONNADE BRIDGEPORT

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
3026 SOLANDT ROAD

OTTAWA, ONTARIO

Title:

CROSS-SECTION A-A'

Scale: AS SHOWN	Date: 03/2020
Drawn by: MPG	Report No.: PE4823-2
Checked by: MB	PE4823-4A
Approved by: MSD	Revision No.:

11x17

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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

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patersongroup

Sampling & Analysis Plan

Phase II Environmental Site Assessment
Part of 3026 Solandt Drive
Ottawa, Ontario

Prepared For

Colonnade Bridgeport.

December 2019

Report: PE4823-SAP

Table of Contents

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Colonnade Bridgeport to conduct a Phase II Environmental Site Assessment (Phase II ESA) for Part of 3026 Solandt Road, Ottawa, Ontario. Based on a Phase I ESA previously completed by Paterson for the subject property, the following subsurface investigation program, consisting of borehole drilling, was developed:

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-BH4	Within the former building footprint; to address potential concerns associated with the activities associated with the former operations.	To intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH5	Northwest corner of the site to address the off-site retail fuel outlet.	To intercept the groundwater table for the purpose of installing a groundwater monitoring well.

Borehole locations are shown on the 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 borehole drilling, monitoring wells will be installed in BH4-19, BH5-19 and BH6-19 for the collection of groundwater samples. Three (3) groundwater samples will be collected from the monitoring wells, and one (1) additional sample will be collected from BH1/MW1 (previously installed by Franz Environmental Inc. during a 2013 Phase II ESA conducted on the property), if sufficient groundwater is present, for a total of four (4) 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 groundwater at the subject site is based on the following general considerations:

- ❒ Groundwater monitoring wells should be installed in all boreholes with visual or olfactory evidence of soil contamination, in stratigraphic units where soil contamination was encountered, where those stratigraphic units are at or below the water table (i.e. a water sample can be obtained).
- ❒ Groundwater monitoring well screens should straddle the water table at sites where the contaminants of concern are suspected to be LNAPLs.
- ❒ 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

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
3026 Solandt Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4823

REMARKS

HOLE NO. BH 1

BORINGS BY CME 55 Power Auger **DATE** 2019 December 11

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	81.07
FILL: Brown silty sand with gravel, trace organics		AU	1				
		SS	2	58	50	1	80.07
1.52							
TOPSOIL		SS	3	8	15	2	79.07
2.29							
		SS	4	100	11		
Very stiff to stiff, brown **SILTY CLAY**						3	78.07
		SS	5	100	7		
		SS	6	100	4	4	77.07
4.57							
GLACIAL TILL: Grey silty sand with gravel		SS	7	79	50+		
5.00						5	76.07
End of Borehole							
Practical refusal to augering at 5.00m depth							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
3026 Solandt Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4823

REMARKS

HOLE NO. BH 2

BORINGS BY CME 55 Power Auger **DATE** 2019 December 11

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	80.90
FILL: Brown silty clay, some gravel, trace sand and organics		AU	1				
0.63							
		SS	2	54	14	1	79.90
		SS	3	71	15	2	78.90
Very stiff to stiff, brown **SILTY CLAY**		SS	4	100	12		
- with sand by 3.0m depth		SS	5	100	4	3	77.90
		SS	6	100	5	4	76.90
		SS	7	79	50+		
4.98							
End of Borehole							
Practical refusal to augering at 4.98m depth							
(GWL @ 1.61m - March 12, 2020)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
3026 Solandt Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4823

REMARKS

HOLE NO. BH 3

BORINGS BY CME 55 Power Auger **DATE** 2019 December 11

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	80.85
FILL: Brown silty clay, some organics		AU	1				
		SS	2	42	7	1	79.85
1.52							
		SS	3	83	15	2	78.85
		SS	4	100	14		
		SS	5	100	7	3	77.85
Very stiff to stiff, brown **SILTY CLAY**		SS	6	100	5	4	76.85
		SS	7	100	4	5	75.85
6.70						6	74.85
End of Borehole							
(GWL @ 1.43m - March 12, 2020)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
3026 Solandt Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4823

REMARKS

HOLE NO. BH 4

BORINGS BY CME 55 Power Auger **DATE** 2019 December 11

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	80.99
TOPSOIL 0.18		AU	1				
FILL: Brown silty sand with gravel		SS	2	25	11	1	79.99
1.50		SS	3	38	21	2	78.99
		SS	4	71	16		
Very stiff, brown **SILTY CLAY**		SS	5	100	9	3	77.99
		SS	6	100	5	4	76.99
5.33						5	75.99
GLACIAL TILL: Grey silty clay, some sand, trace gravel		SS	7	100	50+		
5.89							
End of Borehole							
Practical refusal to augering at 5.89m depth							
(GWL @ 1.53m - March 12, 2020)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
3026 Solandt Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4823

REMARKS

HOLE NO. BH 5

BORINGS BY CME 55 Power Auger **DATE** 2019 December 11

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	80.21
FILL: Brown silty sand, some organics		AU	1				
0.13							
		SS	2	75	15	1	79.21
		SS	3	83	11	2	78.21
		SS	4	100	6		
Very stiff to stiff, brown **SILTY CLAY**						3	77.21
- grey by 4.6m depth						4	76.21
						5	75.21
		SS	6	100	2	6	74.21
6.86							
GLACIAL TILL: Grey silty clay with sand, trace gravel		SS	7	100	2	7	73.21
7.32							
GLACIAL TILL: Grey silty sand with gravel and clay		SS	8	88	2	8	72.21
8.99							
End of Borehole							
Practical refusal to augering at 8.99m depth.							
(GWL @ ground surface - March 12, 2020)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

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

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

CONSOLIDATION TEST

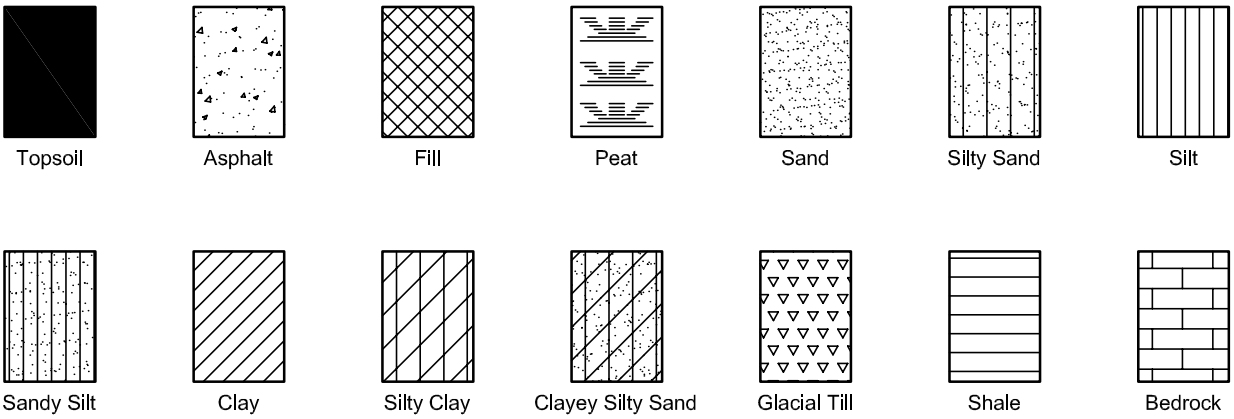
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

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

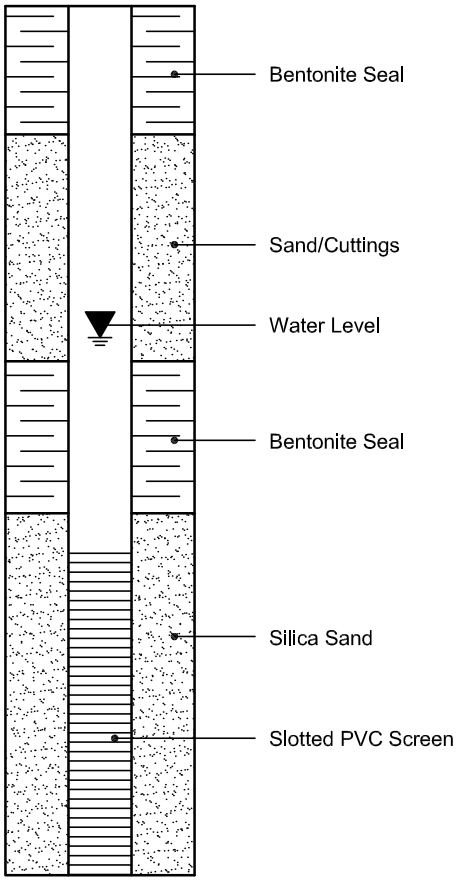
SYMBOLS AND TERMS (continued)

STRATA PLOT

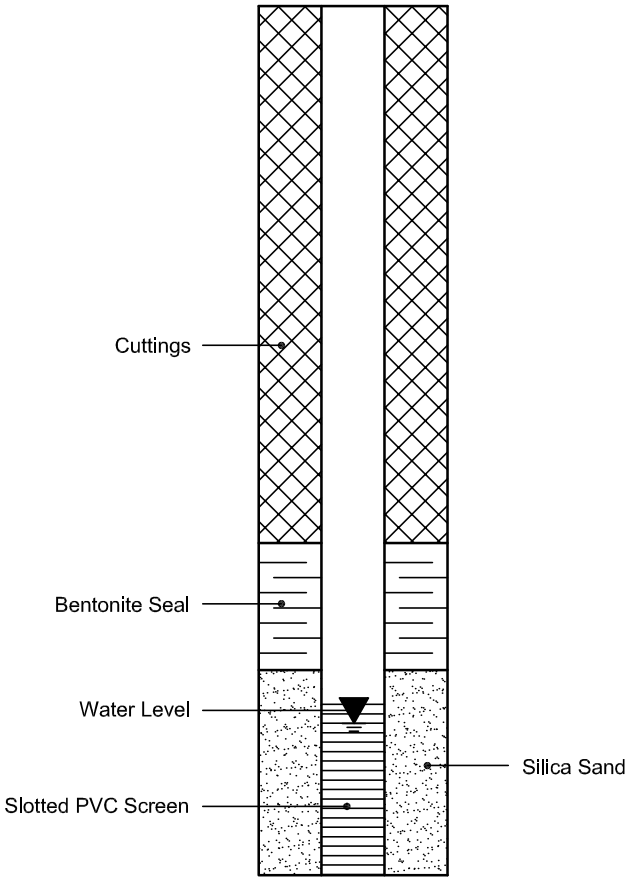


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO:
Project: PE4823
Custody: 51787

Report Date: 31-Dec-2019
Order Date: 20-Dec-2019

Order #: 1952062

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

Paracel ID	Client ID
1952062-01	BH1-SS7
1952062-02	BH2-SS7
1952062-03	BH3-AU1
1952062-04	BH3-SS7
1952062-05	BH4-SS3
1952062-06	BH4-SS7
1952062-07	BH5-SS6

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

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

Report Date: 31-Dec-2019
Order Date: 20-Dec-2019
Project Description: PE4823

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	24-Dec-19	30-Dec-19
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	23-Dec-19	30-Dec-19
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	27-Dec-19	27-Dec-19
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	24-Dec-19	30-Dec-19
Solids, %	Gravimetric, calculation	27-Dec-19	27-Dec-19

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO:

Report Date: 31-Dec-2019

Order Date: 20-Dec-2019

Project Description: PE4823

	Client ID:	BH1-SS7	BH2-SS7	BH3-AU1	BH3-SS7
	Sample Date:	11-Dec-19 09:00	11-Dec-19 09:00	11-Dec-19 09:00	11-Dec-19 09:00
	Sample ID:	1952062-01	1952062-02	1952062-03	1952062-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	72.7	72.1	73.5	67.0
Metals					
Antimony	1.0 ug/g dry	-	-	<1.0	-
Arsenic	1.0 ug/g dry	-	-	4.1	-
Barium	1.0 ug/g dry	-	-	223	-
Beryllium	0.5 ug/g dry	-	-	0.9	-
Boron	5.0 ug/g dry	-	-	7.5	-
Cadmium	0.5 ug/g dry	-	-	<0.5	-
Chromium	5.0 ug/g dry	-	-	65.6	-
Cobalt	1.0 ug/g dry	-	-	15.5	-
Copper	5.0 ug/g dry	-	-	28.3	-
Lead	1.0 ug/g dry	-	-	9.2	-
Molybdenum	1.0 ug/g dry	-	-	<1.0	-
Nickel	5.0 ug/g dry	-	-	33.7	-
Selenium	1.0 ug/g dry	-	-	<1.0	-
Silver	0.3 ug/g dry	-	-	<0.3	-
Thallium	1.0 ug/g dry	-	-	<1.0	-
Uranium	1.0 ug/g dry	-	-	<1.0	-
Vanadium	10.0 ug/g dry	-	-	78.5	-
Zinc	20.0 ug/g dry	-	-	103	-
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

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO:

Report Date: 31-Dec-2019

Order Date: 20-Dec-2019

Project Description: PE4823

	Client ID:	BH1-SS7	BH2-SS7	BH3-AU1	BH3-SS7
	Sample Date:	11-Dec-19 09:00	11-Dec-19 09:00	11-Dec-19 09:00	11-Dec-19 09:00
	Sample ID:	1952062-01	1952062-02	1952062-03	1952062-04
	MDL/Units	Soil	Soil	Soil	Soil
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 (dibromoethan	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
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Tetrachloroethylene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
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	106%	105%	-	107%
Dibromofluoromethane	Surrogate	96.8%	96.8%	-	97.3%
Toluene-d8	Surrogate	102%	103%	-	102%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	-	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	<6

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO:

Report Date: 31-Dec-2019

Order Date: 20-Dec-2019

Project Description: PE4823

	Client ID:	BH4-SS3	BH4-SS7	BH5-SS6	-
	Sample Date:	11-Dec-19 09:00	11-Dec-19 09:00	11-Dec-19 09:00	-
	Sample ID:	1952062-05	1952062-06	1952062-07	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	90.3	72.8	66.8	-
Metals					
Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	2.6	-	-	-
Barium	1.0 ug/g dry	72.1	-	-	-
Beryllium	0.5 ug/g dry	0.5	-	-	-
Boron	5.0 ug/g dry	8.6	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	5.0 ug/g dry	23.0	-	-	-
Cobalt	1.0 ug/g dry	7.1	-	-	-
Copper	5.0 ug/g dry	17.2	-	-	-
Lead	1.0 ug/g dry	4.7	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	5.0 ug/g dry	13.9	-	-	-
Selenium	1.0 ug/g dry	<1.0	-	-	-
Silver	0.3 ug/g dry	<0.3	-	-	-
Thallium	1.0 ug/g dry	<1.0	-	-	-
Uranium	1.0 ug/g dry	<1.0	-	-	-
Vanadium	10.0 ug/g dry	38.5	-	-	-
Zinc	20.0 ug/g dry	39.3	-	-	-
Volatiles					
Acetone	0.50 ug/g dry	-	<0.50	<0.50	-
Benzene	0.02 ug/g dry	-	<0.02	<0.02	-
Bromodichloromethane	0.05 ug/g dry	-	<0.05	<0.05	-
Bromoform	0.05 ug/g dry	-	<0.05	<0.05	-
Bromomethane	0.05 ug/g dry	-	<0.05	<0.05	-
Carbon Tetrachloride	0.05 ug/g dry	-	<0.05	<0.05	-
Chlorobenzene	0.05 ug/g dry	-	<0.05	<0.05	-
Chloroform	0.05 ug/g dry	-	<0.05	<0.05	-
Dibromochloromethane	0.05 ug/g dry	-	<0.05	<0.05	-
Dichlorodifluoromethane	0.05 ug/g dry	-	<0.05	<0.05	-
1,2-Dichlorobenzene	0.05 ug/g dry	-	<0.05	<0.05	-
1,3-Dichlorobenzene	0.05 ug/g dry	-	<0.05	<0.05	-
1,4-Dichlorobenzene	0.05 ug/g dry	-	<0.05	<0.05	-
1,1-Dichloroethane	0.05 ug/g dry	-	<0.05	<0.05	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO:

Report Date: 31-Dec-2019

Order Date: 20-Dec-2019

Project Description: PE4823

	Client ID:	BH4-SS3	BH4-SS7	BH5-SS6	-
	Sample Date:	11-Dec-19 09:00	11-Dec-19 09:00	11-Dec-19 09:00	-
	Sample ID:	1952062-05	1952062-06	1952062-07	-
	MDL/Units	Soil	Soil	Soil	-
1,2-Dichloroethane	0.05 ug/g dry	-	<0.05	<0.05	-
1,1-Dichloroethylene	0.05 ug/g dry	-	<0.05	<0.05	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	<0.05	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	<0.05	<0.05	-
1,2-Dichloropropane	0.05 ug/g dry	-	<0.05	<0.05	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	<0.05	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	<0.05	<0.05	-
1,3-Dichloropropene, total	0.05 ug/g dry	-	<0.05	<0.05	-
Ethylbenzene	0.05 ug/g dry	-	<0.05	<0.05	-
Ethylene dibromide (dibromoethar	0.05 ug/g dry	-	<0.05	<0.05	-
Hexane	0.05 ug/g dry	-	<0.05	<0.05	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	<0.50	<0.50	-
Methyl Isobutyl Ketone	0.50 ug/g dry	-	<0.50	<0.50	-
Methyl tert-butyl ether	0.05 ug/g dry	-	<0.05	<0.05	-
Methylene Chloride	0.05 ug/g dry	-	<0.05	<0.05	-
Styrene	0.05 ug/g dry	-	<0.05	<0.05	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	<0.05	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	<0.05	-
Tetrachloroethylene	0.05 ug/g dry	-	<0.05	<0.05	-
Toluene	0.05 ug/g dry	-	<0.05	<0.05	-
1,1,1-Trichloroethane	0.05 ug/g dry	-	<0.05	<0.05	-
1,1,2-Trichloroethane	0.05 ug/g dry	-	<0.05	<0.05	-
Trichloroethylene	0.05 ug/g dry	-	<0.05	<0.05	-
Trichlorofluoromethane	0.05 ug/g dry	-	<0.05	<0.05	-
Vinyl chloride	0.02 ug/g dry	-	<0.02	<0.02	-
m,p-Xylenes	0.05 ug/g dry	-	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	-	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	-	<0.05	<0.05	-
4-Bromofluorobenzene	Surrogate	-	104%	107%	-
Dibromofluoromethane	Surrogate	-	97.7%	97.3%	-
Toluene-d8	Surrogate	-	102%	103%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	<7	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	-	<4	<4	-
F3 PHCs (C16-C34)	8 ug/g dry	-	<8	<8	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO:

Report Date: 31-Dec-2019

Order Date: 20-Dec-2019

Project Description: PE4823

	Client ID:	BH4-SS3	BH4-SS7	BH5-SS6	-
	Sample Date:	11-Dec-19 09:00	11-Dec-19 09:00	11-Dec-19 09:00	-
	Sample ID:	1952062-05	1952062-06	1952062-07	-
	MDL/Units	Soil	Soil	Soil	-
F4 PHCs (C34-C50)	6 ug/g dry	-	<6	<6	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*9.59*		*ug/g*		*120*	*50-140*			
Surrogate: Dibromofluoromethane	*7.56*		*ug/g*		*94.5*	*50-140*			
Surrogate: Toluene-d8	*7.90*		*ug/g*		*98.7*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Metals									
Antimony	13.1	1.0	ug/g dry	12.6			3.6	30	
Arsenic	13.9	1.0	ug/g dry	14.1			1.4	30	
Barium	684	1.0	ug/g dry	695			1.6	30	
Beryllium	0.8	0.5	ug/g dry	0.8			10.4	30	
Boron	20.9	5.0	ug/g dry	20.2			3.5	30	
Cadmium	8.8	0.5	ug/g dry	9.1			3.8	30	
Chromium	66.6	5.0	ug/g dry	68.1			2.3	30	
Cobalt	15.9	1.0	ug/g dry	16.2			2.3	30	
Copper	184	5.0	ug/g dry	188			2.5	30	
Lead	1180	1.0	ug/g dry	1190			0.5	30	
Molybdenum	5.9	1.0	ug/g dry	5.7			3.1	30	
Nickel	56.4	5.0	ug/g dry	57.2			1.5	30	
Selenium	1.1	1.0	ug/g dry	1.0			3.0	30	
Silver	1.3	0.3	ug/g dry	1.1			11.7	30	
Thallium	ND	1.0	ug/g dry	ND			0.0	30	
Uranium	ND	1.0	ug/g dry	ND			0.0	30	
Vanadium	24.5	10.0	ug/g dry	24.9			1.7	30	
Zinc	2060	20.0	ug/g dry	2090			1.1	30	
Physical Characteristics									
% Solids	71.3	0.1	% by Wt.	72.7			2.0	25	
Volatiles									
Acetone	ND	0.50	ug/g dry	ND				50	
Benzene	ND	0.02	ug/g dry	ND				50	
Bromodichloromethane	ND	0.05	ug/g dry	ND				50	
Bromoform	ND	0.05	ug/g dry	ND				50	
Bromomethane	ND	0.05	ug/g dry	ND				50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND				50	
Chlorobenzene	ND	0.05	ug/g dry	ND				50	
Chloroform	ND	0.05	ug/g dry	ND				50	
Dibromochloromethane	ND	0.05	ug/g dry	ND				50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND				50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND				50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND				50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND				50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND				50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Ethylene dibromide (dibromoethane	ND	0.05	ug/g dry	ND				50	
Hexane	ND	0.05	ug/g dry	ND				50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND				50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND				50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND				50	
Methylene Chloride	ND	0.05	ug/g dry	ND				50	
Styrene	ND	0.05	ug/g dry	ND				50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND				50	

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

Report Date: 31-Dec-2019
Order Date: 20-Dec-2019
Project Description: PE4823

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND				50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND				50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND				50	
Trichloroethylene	ND	0.05	ug/g dry	ND				50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND				50	
Vinyl chloride	ND	0.02	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: 4-Bromofluorobenzene	*11.7*		*ug/g dry*		*106*	*50-140*			
Surrogate: Dibromofluoromethane	*10.6*		*ug/g dry*		*96.0*	*50-140*			
Surrogate: Toluene-d8	*11.4*		*ug/g dry*		*103*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	161	7	ug/g		80.5	80-120			
F2 PHCs (C10-C16)	92	4	ug/g	ND	83.7	60-140			
F3 PHCs (C16-C34)	269	8	ug/g	ND	99.9	60-140			
F4 PHCs (C34-C50)	145	6	ug/g	ND	84.8	60-140			
Metals									
Antimony	47.7		ug/L	5.1	85.3	70-130			
Arsenic	53.2		ug/L	5.6	95.0	70-130			
Barium	51.9		ug/L		104	70-130			
Beryllium	56.0		ug/L	ND	111	70-130			
Boron	58.5		ug/L	8.1	101	70-130			
Cadmium	53.6		ug/L	3.7	99.9	70-130			
Chromium	81.7		ug/L	27.3	109	70-130			
Cobalt	58.7		ug/L	6.5	104	70-130			
Copper	55.7		ug/L		111	70-130			
Lead	46.0		ug/L		92.1	70-130			
Molybdenum	54.4		ug/L	2.3	104	70-130			
Nickel	73.6		ug/L	22.9	101	70-130			
Selenium	49.8		ug/L	ND	98.8	70-130			
Silver	39.1		ug/L	0.4	77.4	70-130			
Thallium	44.1		ug/L	ND	88.1	70-130			
Uranium	45.1		ug/L	ND	89.9	70-130			
Vanadium	64.6		ug/L	10.0	109	70-130			
Zinc	54.9		ug/L		110	70-130			
Volatiles									
Acetone	7.13	0.50	ug/g		71.3	50-140			
Benzene	3.04	0.02	ug/g		75.9	60-130			
Bromodichloromethane	3.40	0.05	ug/g		85.0	60-130			
Bromoform	4.67	0.05	ug/g		117	60-130			
Bromomethane	4.53	0.05	ug/g		113	50-140			
Carbon Tetrachloride	3.64	0.05	ug/g		91.1	60-130			
Chlorobenzene	4.21	0.05	ug/g		105	60-130			
Chloroform	3.61	0.05	ug/g		90.1	60-130			
Dibromochloromethane	4.81	0.05	ug/g		120	60-130			
Dichlorodifluoromethane	3.82	0.05	ug/g		95.6	50-140			
1,2-Dichlorobenzene	4.33	0.05	ug/g		108	60-130			
1,3-Dichlorobenzene	4.49	0.05	ug/g		112	60-130			
1,4-Dichlorobenzene	4.27	0.05	ug/g		107	60-130			
1,1-Dichloroethane	3.24	0.05	ug/g		81.0	60-130			
1,2-Dichloroethane	3.40	0.05	ug/g		85.0	60-130			
1,1-Dichloroethylene	3.54	0.05	ug/g		88.4	60-130			
cis-1,2-Dichloroethylene	3.51	0.05	ug/g		87.8	60-130			
trans-1,2-Dichloroethylene	3.30	0.05	ug/g		82.5	60-130			
1,2-Dichloropropane	3.09	0.05	ug/g		77.3	60-130			
cis-1,3-Dichloropropylene	3.30	0.05	ug/g		82.5	60-130			
trans-1,3-Dichloropropylene	3.74	0.05	ug/g		93.4	60-130			
Ethylbenzene	4.20	0.05	ug/g		105	60-130			
Ethylene dibromide (dibromoethane	3.82	0.05	ug/g		95.4	60-130			
Hexane	2.94	0.05	ug/g		73.6	60-130			
Methyl Ethyl Ketone (2-Butanone)	8.31	0.50	ug/g		83.1	50-140			
Methyl Isobutyl Ketone	6.76	0.50	ug/g		67.6	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl tert-butyl ether	7.32	0.05	ug/g		73.2	50-140			
Methylene Chloride	2.94	0.05	ug/g		73.5	60-130			
Styrene	3.89	0.05	ug/g		97.2	60-130			
1,1,1,2-Tetrachloroethane	4.88	0.05	ug/g		122	60-130			
1,1,2,2-Tetrachloroethane	2.56	0.05	ug/g		64.1	60-130			
Tetrachloroethylene	4.38	0.05	ug/g		109	60-130			
Toluene	3.95	0.05	ug/g		98.7	60-130			
1,1,1-Trichloroethane	3.22	0.05	ug/g		80.4	60-130			
1,1,2-Trichloroethane	2.73	0.05	ug/g		68.2	60-130			
Trichloroethylene	3.55	0.05	ug/g		88.9	60-130			
Trichlorofluoromethane	3.44	0.05	ug/g		86.0	50-140			
Vinyl chloride	3.41	0.02	ug/g		85.3	50-140			
m,p-Xylenes	8.23	0.05	ug/g		103	60-130			
o-Xylene	4.13	0.05	ug/g		103	60-130			
Surrogate: 4-Bromofluorobenzene	*7.73*		*ug/g*		*96.7*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

PARACEL LABORATORIES

Paracel ID: 1952062

...urent Blvd. ...K1G 4J8 ...947 ...acellabs.com ...s.com

Paracel Order Number (Lab Use Only): 1952062

Chain Of Custody (Lab Use Only)

№ 51787

Client Name: Paterson	Project Ref: PE4823		Page 1 of 1
Contact Name: Mark D'Arcy	Quote #:		Turnaround Time
Address: 154 Colonnade Rd South	PO #:		☐ 1 day ☐ 3 day
	E-mail: mdarcy@patersongroup.ca		☐ 2 day ☒ Regular
Telephone: 613-226-7381			Date Required:

Regulation 153/04: ☐ Table 1 ☐ Res/Park ☐ Med/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ Table ___ For RSC: ☐ Yes ☒ No

Other Regulation: ☐ REG 558 ☐ PWQO ☐ CCME ☐ MISA ☐ SU - Sani ☐ SU - Storm Mun: ______ ☐ Other:

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Date	Time	PHC/VOCs	ICP Metals			
1	BH1-SS7	S		2	Dec 11/19		X		120 ml + 1 vial	✓
2	BH2-AU1	↓		1	↓		hold		120 mL	✓
3	BH2-SS7			2			X		120 ml + 1 vial	✓
4	BH3-AU1			1				X	120 ml	✓
5	BH3-SS7			2			X		120 ml + 1 vial	✓
6	BH4-SS3			2				X	↓	✓
7	BH4-SS7			2			X			✓
8	BH5-SS6	↓		2	↓		X		↓	✓
9										
10										

Comments: Please Put On Hold - analysis as per email. Proceeding per MoK

Method of Delivery: Paracel

Relinquished By (Sign): [signature]	Received By Driver/Depot: [signature] T. Rouse	Received at Lab: Sunep Dohmar	Verified By: [signature]
Relinquished By (Print): Samuel Bérubé	Date/Time: 20/12/19 3:40	Date/Time: DEC 20, 2019 04:43	Date/Time: 23 Dec 19
Date/Time:	Temperature: °C PH.	Temperature: 10.1 °C	pH Verified: ☐ By: 1542

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 29644
Project: PE4823
Custody: 126407

Report Date: 19-Mar-2020
Order Date: 13-Mar-2020

Order #: 2011661

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

Paracel ID	Client ID
2011661-01	BH2-GW1
2011661-02	BH3-GW1
2011661-03	BH4-GW1
2011661-04	BH5-GW1
2011661-05	DUP

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 19-Mar-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Mar-2020

Client PO: 29644

Project Description: PE4823

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	13-Mar-20	16-Mar-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	17-Mar-20	18-Mar-20
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	13-Mar-20	16-Mar-20

Certificate of Analysis

Report Date: 19-Mar-2020

Client: **Paterson Group Consulting Engineers**

Order Date: 13-Mar-2020

Client PO: 29644

Project Description: PE4823

	Client ID:	BH2-GW1	BH3-GW1	BH4-GW1	BH5-GW1
	Sample Date:	12-Mar-20 09:00	12-Mar-20 09:00	12-Mar-20 09:00	12-Mar-20 09:00
	Sample ID:	2011661-01	2011661-02	2011661-03	2011661-04
	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: 19-Mar-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Mar-2020

Client PO: 29644

Project Description: PE4823

	Client ID:	BH2-GW1	BH3-GW1	BH4-GW1	BH5-GW1
	Sample Date:	12-Mar-20 09:00	12-Mar-20 09:00	12-Mar-20 09:00	12-Mar-20 09:00
	Sample ID:	2011661-01	2011661-02	2011661-03	2011661-04
	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	122%	125%	125%	125%
Dibromofluoromethane	Surrogate	112%	111%	112%	112%
Toluene-d8	Surrogate	105%	105%	105%	107%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100

Certificate of Analysis

Report Date: 19-Mar-2020

Client: **Paterson Group Consulting Engineers**

Order Date: 13-Mar-2020

Client PO: **29644**

Project Description: PE4823

	Client ID:	DUP	-	-	-
	Sample Date:	12-Mar-20 09:00	-	-	-
	Sample ID:	2011661-05	-	-	-
	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	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
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-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	-	-	-
Ethylene dibromide (dibromoethane, 1	0.2 ug/L	<0.2	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-
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	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-

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Report Date: 19-Mar-2020

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Order Date: 13-Mar-2020

Client PO: 29644

Project Description: PE4823

	Client ID:	DUP	-	-	-
	Sample Date:	12-Mar-20 09:00	-	-	-
	Sample ID:	2011661-05	-	-	-
	MDL/Units	Water	-	-	-
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	-	-	-
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	127%	-	-	-
Dibromofluoromethane	Surrogate	117%	-	-	-
Toluene-d8	Surrogate	106%	-	-	-

Certificate of Analysis

Report Date: 19-Mar-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Mar-2020

Client PO: 29644

Project Description: PE4823

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	*84.3*		*ug/L*		*105*	*50-140*			
Surrogate: Dibromofluoromethane	*80.5*		*ug/L*		*101*	*50-140*			
Surrogate: Toluene-d8	*86.6*		*ug/L*		*108*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	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	ND	0.5	ug/L	ND			NC	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	*85.8*		*ug/L*		*107*	*50-140*			
Surrogate: Dibromofluoromethane	*86.2*		*ug/L*		*108*	*50-140*			
Surrogate: Toluene-d8	*85.5*		*ug/L*		*107*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1810	25	ug/L	ND	90.3	68-117			
F2 PHCs (C10-C16)	1470	100	ug/L	ND	91.8	60-140			
F3 PHCs (C16-C34)	4000	100	ug/L	ND	102	60-140			
F4 PHCs (C34-C50)	2410	100	ug/L	ND	97.2	60-140			
Volatiles									
Acetone	83.6	5.0	ug/L	ND	83.6	50-140			
Benzene	39.8	0.5	ug/L	ND	99.6	60-130			
Bromodichloromethane	37.6	0.5	ug/L	ND	93.9	60-130			
Bromoform	32.6	0.5	ug/L	ND	81.5	60-130			
Bromomethane	34.4	0.5	ug/L	ND	85.9	50-140			
Carbon Tetrachloride	34.3	0.2	ug/L	ND	85.7	60-130			
Chlorobenzene	35.8	0.5	ug/L	ND	89.6	60-130			
Chloroform	38.4	0.5	ug/L	ND	96.1	60-130			
Dibromochloromethane	35.0	0.5	ug/L	ND	87.5	60-130			
Dichlorodifluoromethane	38.6	1.0	ug/L	ND	96.6	50-140			
1,2-Dichlorobenzene	34.9	0.5	ug/L	ND	87.2	60-130			
1,3-Dichlorobenzene	35.2	0.5	ug/L	ND	88.0	60-130			
1,4-Dichlorobenzene	33.7	0.5	ug/L	ND	84.3	60-130			
1,1-Dichloroethane	37.9	0.5	ug/L	ND	94.8	60-130			
1,2-Dichloroethane	35.0	0.5	ug/L	ND	87.4	60-130			
1,1-Dichloroethylene	44.0	0.5	ug/L	ND	110	60-130			
cis-1,2-Dichloroethylene	39.3	0.5	ug/L	ND	98.2	60-130			
trans-1,2-Dichloroethylene	40.2	0.5	ug/L	ND	101	60-130			
1,2-Dichloropropane	40.4	0.5	ug/L	ND	101	60-130			
cis-1,3-Dichloropropylene	43.1	0.5	ug/L	ND	108	60-130			
trans-1,3-Dichloropropylene	38.1	0.5	ug/L	ND	95.2	60-130			
Ethylbenzene	38.4	0.5	ug/L	ND	95.9	60-130			
Ethylene dibromide (dibromoethane, 1,2-	37.2	0.2	ug/L	ND	92.9	60-130			
Hexane	39.7	1.0	ug/L	ND	99.2	60-130			
Methyl Ethyl Ketone (2-Butanone)	85.9	5.0	ug/L	ND	85.9	50-140			
Methyl Isobutyl Ketone	98.6	5.0	ug/L	ND	98.6	50-140			
Methyl tert-butyl ether	61.4	2.0	ug/L	ND	61.4	50-140			
Methylene Chloride	38.2	5.0	ug/L	ND	95.6	60-130			
Styrene	31.7	0.5	ug/L	ND	79.2	60-130			
1,1,1,2-Tetrachloroethane	33.0	0.5	ug/L	ND	82.6	60-130			
1,1,2,2-Tetrachloroethane	35.9	0.5	ug/L	ND	89.8	60-130			
Tetrachloroethylene	36.8	0.5	ug/L	ND	92.0	60-130			
Toluene	34.9	0.5	ug/L	ND	87.3	60-130			
1,1,1-Trichloroethane	33.6	0.5	ug/L	ND	83.9	60-130			
1,1,2-Trichloroethane	40.4	0.5	ug/L	ND	101	60-130			
Trichloroethylene	38.6	0.5	ug/L	ND	96.5	60-130			
Trichlorofluoromethane	32.7	1.0	ug/L	ND	81.8	60-130			
Vinyl chloride	35.0	0.5	ug/L	ND	87.4	50-140			
m,p-Xylenes	72.5	0.5	ug/L	ND	90.6	60-130			
o-Xylene	35.3	0.5	ug/L	ND	88.2	60-130			
Surrogate: 4-Bromofluorobenzene	*75.3*		*ug/L*		*94.1*	*50-140*			
Surrogate: Dibromofluoromethane	*81.0*		*ug/L*		*101*	*50-140*			
Surrogate: Toluene-d8	*76.9*		*ug/L*		*96.2*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

PARACEL LABORATORIES LTD.

Paracel ID: 2011661

Paracel Order Number (Lab Use Only): 2011661

Chain Of Custody (Lab Use Only) № 126407

Client Name: Paterson	Project Ref: PE4823
Contact Name: Mark D'Arcy	Quote #:
Address: 154 Colonnade Road	PO #: 29644
	E-mail: mdarcy@patersongroup.ca
Telephone: 613-226-7381	

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Turnaround Time
☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular
Date Required:

Regulation 153/04: ☐ Table 1 ☐ Res/Park ☐ Med/Fine; ☐ Table 2 ☐ Ind/Comm ☐ Coarse; ☒ Table 3 ☐ Agri/Other; ☐ Table ___; For RSC: ☐ Yes ☐ No

Other Regulation: ☐ REG 558 ☐ PWQO; ☐ CCME ☐ MISA; ☐ SU - Sani ☐ SU - Storm; Mun: ___; ☐ Other:

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	PHCs (F1-F4)					
1	BH2-GW1	GW		3	Mar 12/2020			X						X					✓
2	BH3-GW1	↓		↓				↓						↓					✓
3	BH4-GW1	↓		↓				↓						↓					✓
4	BH5-GW1	↓		↓				↓						↓					✓
5	DUP	↓		2				X											✓
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Paracel

Relinquished By (Sign): [signature]	Received By Driver/Depot: [signature]	Received at Lab: Suneeporn Dohmai	Verified By: [signature]
Relinquished By (Print): Mark St Pierre	Date/Time: 13/03/20 1:40	Date/Time: Mar 13, 2020 04.35	Date/Time: Mar 13 2020 17:36
Date/Time: Mar 13, 2020	Temperature: °C	Temperature: 6.8 °C	pH Verified: ☐ By: