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Phase II Environmental Site Assessment

406 Bank Street
Ottawa, Ontario

Prepared For

12291444 Canada Inc.

December 7, 2020

Report: PE5088-2

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the property addressed 406 Bank Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address 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 Phase I and Phase II Property.

The Phase II ESA consisted of drilling four (4) boreholes on the Phase II Property, two (2) of which were constructed with groundwater monitoring well installations.

The soil profile generally consisted of fill material (crushed stones, silty sand with silty clay, gravel and traces of organics with some demolition debris), underlain by a layer of silty clay. Boreholes were terminated at a maximum depth of 9.75 m below the ground surface (mbgs). Soil samples were obtained from the boreholes and screened using vapour measurements along with visual and olfactory observations. A high vapour reading in soil sample BH2-SS5 was noted as well as a hydrocarbon odour in BH2-SS4. No staining or other unusual odour was noted during the subsurface investigation.

Soil samples were selected based on visual and olfactory observations in combination with vapour screening results and location relative to the water table. Soil samples were obtained from the boreholes and screened using visual observations and organic vapour measurements. A total of eight (8) soil samples were submitted for laboratory analysis of a combination of benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, F1-F4) polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) and/or metals. Petroleum hydrocarbon fractions F2 and F3 were identified on the southwestern corner of the Phase II Property at concentrations exceeding the MECP Table 3 Standards. All other parameter concentrations identifed were in compliance with the selected MECP Table 3 Standards.

Groundwater samples from monitoring wells installed in BH1 and BH2 as well as an existing well BH1/MW1, were recovered and analysed for a combination of PHC, VOCs and metal parameters. All groundwater samples were in compliance with the MECP Table 3 Standards.

Conclusion

Based on the findings of this Phase II ESA, fill material impacted with PHC F2-F3 concentrations in excess of the MECP Table 3 Standards, is present on the southwest corner of the Phase II Property.

All of the groundwater results are in compliance with the selected MECP Table 3 Standards.

It is our understanding that the subject site is to be redeveloped with a multi-storey residential building with one underground level.

It is our recommendation that an environmental site remediation program, involving the removal of all impacted fill material, be completed concurrently with the site redevelopment.

It is also recommended that Paterson personnel be onsite during construction activities to direct the excavation and segregation of impacted soil and to conduct confirmatory sampling as required. All impacted soil is to be disposed of at a licenced landfill site.

Prior to offsite disposal at a licenced landfill site, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

It is expected that groundwater monitoring wells will be abandoned in accordance with O.Reg.903, at the time of construction excavation.

1.0 INTRODUCTION

At the request of 12291444 Canada Inc., Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the property addressed 406 Bank Street, 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 November of 2020.

1.1 Site Description

Address:	406 Bank Street, Ottawa, Ontario.
Legal Description:	Part of Lot 21 West Bank Street, Part 1 of RP 4R-20717, in the City of Ottawa.
Location:	The site is located on the northwest corner of the Bank Street at Florence Street intersection, in the City of Ottawa, Ontario. Refer to Figure 1 - Key Plan in the Figures section following the text.
PIN:	04119-0323
Latitude and Longitude:	45° 24’ 47.07" N, 75° 41' 40.91" W
Configuration:	Rectangular
Area:	294 m^2 (approximately)

1.2 Property Ownership

The subject property is currently owned by 12291444 Canada Inc. Paterson was retained to complete this Phase II ESA by Mr. Kevin Hu of 12291444 Canada Inc.

1.3 Current and Proposed Future Uses

The Phase II Property is presently vacant land that was formerly used for both commercial and residential purposes. It is our understanding that the site is to be redeveloped with a mixed-use 6-storey residential building with one basement level. The ground level of the development will be used as commercial retail space.

It is our understanding that the Phase II Property will be redeveloped with a multi-storey residential building with two (2) levels of underground parking.

1.4 Applicable Site Condition Standard

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

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

Section 35 of O.Reg. 153/04 does apply to the Phase II Property in that the property relies upon municipal drinking water.

Section 41 of O.Reg. 153/04 does not apply to the Phase II Property, as the property is not within 30m of an environmentally sensitive area.

Section 43.1 of O.Reg. 153/04 does not apply to the Phase II Property in that the property is not a Shallow Soil property and the property is not within 30m of a water body.

The intended use of the Phase II Property is residential; therefore, the Residential Standards have been selected for the purpose of this Phase II ESA.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is situated in an urban area surrounded by various sized commercial and residential structures. Site topography is relatively flat and at the grade of Bank Street and Florence Street. Site drainage consists primarily of surface infiltration with some overflow drainage to the catch basins located on the adjacent streets. The regional topography slopes down in a northerly direction towards the Ottawa River. The Phase II Property is situated within a municipally serviced area.

2.2 Past Investigations

The following engineering report was reviewed as part of this assessment.

- "Preliminary Geotechnical Investigation, Vacant Property, 406 – 408 Bank Street, Ottawa, Ontario," prepared by DST Consulting Engineers Inc. (DST), dated January 2006.

A preliminary Geotechnical Investigation was conducted by DST, in which four (4) boreholes were placed on the subject site. Three (3) of the four (4) boreholes were instrumented with monitoring wells. Fill material of an unknown quality associated with the reported fire that destroyed the former on-site building was identified during the subsurface program.

The general soil profile was reported as consisting of surficial sand, followed by fill material (silty sand with gravel, and fragments of demolition debris and traces of ash), underlain by silty clay, followed by silty sand or till.

Based on the review of this report, fill material of an unknown quality is expected to be present on the Phase I Property, and as such, it is considered to represent an APEC.

A Phase I ESA was recently completed by Paterson. Based on the findings of the Phase I ESA, three (3) potentially contaminating activities (PCAs) were considered to result in areas of potential environmental concern (APECs) on the Phase I and Phase II Property, as presented in Table 1.

Table 1: Potentially Contaminating Activities and Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1: Resulting from fill material of unknown quality	Across the entire Phase I Property	PCA 30 – Importation of Fill Material of Unknown Quality	On-site	PAHs Metals Hg, CrVI	Soil
APEC 2: Resulting from the former presence of a paint and oil store	Northern portion of the Phase I Property	PCA 39 – Paints Manufacturing, Processing and Bulk Storage	Off-site	Metals Hg, CrVI	Groundwater

Table 1: Potentially Contaminating Activities and Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 3: Resulting from a former automotive repair garage and former UST nest	Western portion of the Phase I Property	PCA 52 – Storage, maintenance, fuelling and repairing of equipment, vehicles, and materials used to maintain transportation systems PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	Off-site	VOCs PHCs Metals	Soil and 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 November 10, 2020, in conjunction with a Geotechnical Investigation. The field program consisted of drilling four (4) boreholes, two (2) of which were completed as groundwater monitoring wells. Boreholes were drilled to depths ranging from approximately 3.66 to 9.75m below the ground surface (mbgs).

3.2 Media Investigated

During the subsurface investigation, soil samples and groundwater samples were obtained and submitted for laboratory analysis. The rationale for sampling and analyzing these media is based on the Contaminants of Potential Concern identified in the Phase I ESA.

Contaminants of concern for soil and groundwater include petroleum hydrocarbons (PHCs, fractions F_1-F_4), volatile organic compounds (VOCs), polycyclic aromatic hydrocarbons (PAHs), and metals (including mercury, hexavalent chromium).

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

According to the Geological Survey of Canada website, the bedrock in the area of the Phase I Property is reported to consist of shale of the Billings Formation. The overburden is reported to consist of alluvial sediments (sand and silt) of depths ranging from 10 to 25 m over the entire site. The previous subsurface investigation conducted by DST confirms the reported geology.

Groundwater beneath the Phase I Property is expected to flow in a northerly direction.

Fill Placement

Based on the findings of a previous subsurface investigation in combination with observations at the time of the site visit, fill material of an unknown quality is present on the Phase I Property. The presence of fill of an unknown quality represents an APEC on the Phase I Property.

Existing Buildings and Structures

The Phase I Property is a vacant lot with remnants of the former building foundation along the eastern and northern property boundary. No other buildings or structures are present on-site.

Subsurface Structures and Utilities

No services are expected to be present on-site. There is one monitoring well situated on the northwest corner of the Phase I Property. No other subsurface structures are located on the subject site.

Water Bodies and Areas of Natural Significance

No areas of natural significance or water bodies were identified on the Phase I Property or within a 250 m search radius.

Drinking Water Wells

There are no potable water wells on the Phase I Property.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area consists of residential and commercial (offices, cafes, and retailers) properties.

Potentially Contaminating Activities (PCAs) and Areas of Potential Environmental Concern (APECs)

As per Section 7.1 of the Phase I Property, four (4) PCAs are considered to result APECs on the Phase I Property. These APECs are summarized in Table 1 in Section 2.2. of this report, along with their respective locations and contaminants of potential concern (CPCs) on the Phase I Property.

Contaminants of Potential Concern (CPCs)

As per the APECs identified in Table 1, the contaminants of potential concern (CPCs) in soil and/or groundwater include:

- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Petroleum hydrocarbons (PHCs, Fractions F_1-F_4);
- Polyaromatic hydrocarbons (PAHs);
- Volatile organic compounds (VOCs); and
- Metals including Mercury (Hg) and Hexavalent Chromium (CrVI).

The CPCs are expected to be present in the soil and/or groundwater of the Phase I 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 on-site and off-site PCAs that have resulted in APECs on the Phase I Property.

A variety of independent sources were consulted as part of this assessment, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Deviations from Sampling and Analysis Plan

The Sampling and Analysis Plan for this project is included in Appendix 1 of this report. There were no deviations from the Sampling and Analysis Plan.

3.5 Impediments

No physical impediments were encountered during the field portion of the Phase II ESA.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was conducted on November 10, 2020, in conjunction with a Geotechnical Investigation, and consisted of drilling four (4) boreholes on the Phase II Property. Two (2) of the boreholes were completed with groundwater monitoring well installations (BH1 and BH2). The boreholes were placed to address the aforementioned areas of potential environmental concern (APECs) and to provide coverage of the proposed building footprint. The boreholes were drilled with a track mounted power auger drill rig. The track mounted drill rig was provided by George Downing Estate Drilling of Hawkesbury, Ontario. Borehole locations are shown on Drawing PE5088-3 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

A total of twenty-eight (28) soil samples were obtained from the boreholes by means of split spoon sampling and grab sampling from augering flights. The depths at which split spoon samples and auguring samples were obtained from the boreholes are shown as "**SS**" and "**AU**" on the Soil Profile and Test Data Sheets, appended to this report.

Site soils generally consisted of fill material (a mixture of crushed stone, silty sand with silty clay, gravel, demolition debris and traces of organics), underlain by a layer of silty clay.

The boreholes were terminated at a maximum depth of 9.75 m below the ground surface.

4.3 Field Screening Measurements

All soil samples collected underwent a preliminary screening procedure, which included visual screening for colour and evidence of deleterious fill, as well as screening with a photo ionization detector (PID). The detection limit is 0.1 ppm, with a precision of +/- 2 ppm or 10% of the reading.

The soil vapours were measured by inserting the analyzer probe into the nominal headspace above the soil sample. Samples were then agitated, and the peak readings recorded. The vapour readings were generally less than 5 ppm, with the exception of soil sample BH2-SS5, where an elevated PID reading of 40 ppm was noted. No staining was noted during the field program. A petroleum hydrocarbon odour was observed at BH2-SS4. Both soil samples (BH2-SS4 and BH2-SS5) were submitted for PHC (F1-F4) analyses.

All of the soil samples were therefore selected for analysis based on a combination of visual appearance and location.

Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

4.4 Groundwater Monitoring Well Installation

Two (2) groundwater monitoring wells were installed on the Phase II Property, in BH1 and BH2. The monitoring wells consisted of 51 mm diameter Schedule 40 threaded PVC risers and screens. 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.

Table 2: Monitoring Well Construction Details

Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1	71.50	6.16	3.16-6.16	2.75-6.16	0.18-2.75	Stick-up
BH2	71.36	6.16	3.16-6.16	2.75-6.16	0.18-2.75	Stick-up
BHMW1	71.61	5.20	2.2-5.20	2.0-2.20	0.18-2.0	Stick-up

4.5 Field Measurement of Water Quality Parameters

Groundwater sampling was conducted at BH1, BH2 and BHMW1 (DST) on November 18, 2020. Water levels were the only parameters measured.

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

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

Table 4: Soil Samples Submitted

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed				Rationale
		PHCs (F_1-F_4)	VOCs/ BTEX	PAHs	Metal	
BH1-AU1	0-0.76m Fill			X		Assess the quality if the fill material.
BH2-AU1	0-0.76m Fill			X	X	Assess the quality if the fill material.
BH2-SS4	2.29-2.89m Fill	X	X		X	Assess the potential soil impact identified during the field program – hydrocarbon odour.
BH2-SS5	3.05-3.66m Native	X	X			Vertical delineation purposes of potential soil impact.
BH3-SS6	3.81-4.42m Native	X	X			Assess the potential soil impact due to former off-site paint and oil shop.
BH4-SS2/SS3	0.760-2.13m Fill				X	Assess the quality if the fill material.
BH4-SS4/SS5	3.05-3.66m Native	X				Assess the potential soil impact due to the former off-site automotive repair garage.
DUP	0-0.76m Fill				X	Duplicate sample (BH2-AU1) for QA/QC purposes.

Table 5: Groundwater Samples Submitted

Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed			Rationale
		PHCs (F_1-F_4)	VOCs	Metals	
BH1-GW1	3.16-6.16m Native	X	X	X	Assess the potential groundwater impact due to the former off-site paint and oil shop.
BH2-GW2	2.93-5.93m Native	X	X		Assess the potential groundwater impact due to the former off-site automotive repair garage and UST.

Table 5: Groundwater Samples Submitted					
Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed			Rationale
		PHCs (F_1-F_4)	VOCs	Metals	
MW1	2.20-5.20m Native	X	X		Assess the potential groundwater impact due to the former use of the neighbouring properties to the north and west.
DUP	3.16-6.16m Native			X	Duplicate sample (BH1-GW1) for QA/QC purposes.

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

4.8 Residue Management

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

4.9 Elevation Surveying

An elevation survey of all borehole locations was completed by Paterson at the time of the subsurface investigation. All boreholes were surveyed geodetically by Paterson.

4.10 Quality Assurance and Quality Control Measures

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

5.0 REVIEW AND EVALUATION

5.1 Geology

Site soils generally consisted of fill material (a mixture of crushed stone, silty sand with silty clay, gravel, demolition debris and traces of organics), underlain by a layer of silty clay. The site stratigraphy is shown on Drawings PE5088-4A, 5A and 6A.

Groundwater was encountered within the native silty clay at depths ranging from approximately 3.16 to 4.27 mbgs.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling event on November 18, 2020, using an electronic water level meter. Groundwater levels are summarized below in Table 6. All measurements are relative to set magnetic washer and nail in the concrete curb on the northeastern portion of the Phase II Property.

Table 6: Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1	71.50	3.57	67.93	November 18, 2020
BH2	71.36	4.27	67.09	November 18, 2020
BHMW1	71.61	3.16	68.45	November 18, 2020

Based on the groundwater elevations measured during the November 2020 sampling event, groundwater contour mapping was completed. Groundwater contours are shown on Drawing PE5088-3 - Groundwater Contour Plan. Based on the contour mapping, groundwater flow beneath the Phase II Property appears to flow towards the west. A horizontal hydraulic gradient of approximately 0.007 m/m was calculated.

No free product was observed in the monitoring wells sampled at the Phase II Property.

5.3 Fine-Coarse Soil Texture

Coarse-grained soil standards were selected as a conservative approach for the Phase II Property.

5.4 Soil: Field Screening

Field screening of the soil samples collected during drilling resulted in organic vapour readings ranging from 0 to 38.2 ppm. Field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

5.5 Soil Quality

A total of seven (7) soil samples, including a duplicate, were submitted for analysis of a combination of PHCs (F1-F4), VOCs, PAHs and/or metals. The results of the analytical testing are presented below in Tables 7, 8, 9 and 10. The laboratory certificates of analysis are provided in Appendix 1.

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

Parameter	MDL (µg/g)	Soil Samples (µg/g) November 10, 2020				MECP Table 3 Residential Standards (µg/g)
		BH2-SS4	BH2-SS5	BH3-SS6	BH4-SS4/SS5	
Benzene	0.02	nd	nd	nd	nd	0.21
Ethylbenzene	0.05	nd	nd	nd	nd	2
Toluene	0.05	nd	nd	nd	nd	2.3
Xylene	0.05	nd	nd	nd	nd	3.1
PHC F1	7	nd	nd	nd	nd	55
PHC F2	4	**400**	nd	nd	nd	98
PHC F3	8	**635**	nd	nd	nd	300
PHC F4	6	nd	nd	nd	nd	2,800

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

Concentrations of PHC F2 and F3 in soil sample BH2-SS4 exceeded the selected MECP Table 3 Residential Standards. No other parameters were identified in the remaining soil samples and were in compliance with the respective Table 3 Standards or were not detected above the method detection limit.

Table 8: Analytical Test Results – Soil (VOCs)				
Parameter	MDL (µg/g)	Soil Samples (µg/g) November 10, 2020		MECP Table 3 Residential Standards (µg/g)
		BH2-SS4	BH3-SS6	
Acetone	0.50	nd	nd	16
Benzene	0.02	nd	nd	0.21
Bromodichloromethane	0.05	nd	nd	13
Bromoform	0.05	nd	nd	0.27
Bromomethane	0.05	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	0.05
Chlorobenzene	0.05	nd	nd	2.4
Chloroform	0.05	nd	nd	0.05
Dibromochloromethane	0.05	nd	nd	9.4
m-Dichlorobenzene	0.20	nd	nd	16
o-Dichlorobenzene	0.05	nd	nd	3.4
p-Dichlorobenzene	0.05	nd	nd	4.8
Dichlorodifluoromethane	0.05	nd	nd	0.083
1,1-Dichloroethane	0.05	nd	nd	3.5
1,2-Dichloroethane	0.05	nd	nd	0.05
1,1-Dichlroethylene	0.05	nd	nd	0.05
c-1,2-Dichloroethylene	0.05	nd	nd	3.4
t-1,2-Dichloroethylene	0.05	nd	nd	0.084
1,2-Dichloropropane	0.05	nd	nd	0.05
c-1,3-Dichloropropene	0.05	nd	nd	0.05
Ethylbenzene	0.05	nd	nd	2
Ethylene Dibromide	0.05	nd	nd	0.05
Hexane	0.05	nd	nd	2.8
Methyl Ethyl Ketone	0.5	nd	nd	16
Methyl Isobutyl Ketone	0.5	nd	nd	1.7
Methyl tert-Butyl Ether	0.05	nd	nd	0.75
Methylene Chloride	0.05	nd	nd	0.1
Styrene	0.05	nd	nd	0.7
1,1,1,2-Tetrachloroethane	0.50	nd	nd	0.058
1,1,2,2-Tetrachloroethane	0.05	nd	nd	0.05
Tetrachloroethylene	0.05	nd	nd	0.28
Toluene	0.05	nd	nd	2.3
1,1,1-Trichloroethane	0.05	nd	nd	0.38
1,1,2-Trichloroethane	0.05	nd	nd	0.05
Trichloroethylene	0.05	nd	nd	0.061
Trichlorofluoromethane	0.05	nd	nd	4
Vinyl Chloride	0.02	nd	nd	0.02
Xylenes	0.05	nd	nd	3.1

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

No VOC concentrations were identified in the soil samples analyzed. Analytical test results comply with the selected MECP Table 3 Residential Standards.

Table 9: Analytical Test Results – Soil (PAHs)

Parameter	MDL (µg/g)	Soil Samples (µg/g) November 10, 2020		MECP Table 3 Residential (µg/g)
		BH1-AU1	BH2-AU1	
Acenaphthene	0.02	nd	nd	7.9
Acenaphthylene	0.02	nd	nd	0.15
Anthracene	0.02	nd	nd	0.67
Benzo[a]anthracene	0.02	nd	nd	0.5
Benzo[a]pyrene	0.02	nd	nd	0.3
Benzo[b]fluoranthene	0.02	nd	nd	0.78
Benzo[g,h,i]perylene	0.02	nd	nd	6.6
Benzo[k]fluoranthene	0.02	nd	nd	0.78
Chrysene	0.02	nd	nd	7
Dibenzo[a,h]anthracene	0.02	nd	nd	0.1
Flouranthene	0.02	nd	nd	0.69
Fluorene	0.02	nd	nd	62
Indeno[1,2,3-cd]pyrene	0.02	nd	nd	0.38
1-Methylnaphthalene	0.02	nd	nd	0.99
2-Methylnaphthalene	0.02	nd	nd	0.99
Methylnaphthalene (1&2)	0.04	nd	nd	0.99
Naphthalene	0.01	nd	nd	0.6
Phenanthrene	0.02	nd	nd	6.2
Pyrene	0.02	nd	nd	78

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

No PAH concentrations were identified in the soil samples analyzed. Analytical test results comply with the selected MECP Table 3 Residential Standards.

Table 10: Analytical Test Results – Soil (Metals)

Parameter	MDL (µg/g)	Soil Samples (µg/g) November 10, 2020				MECP Table 3 Residential Standards (µg/g)
		BH2-AU1	BH2-SS4	BH4-SS2/SS3	DUP	
Antimony	1.0	nd	nd	nd	nd	7.5
Arsenic	1.0	2.1	1.8	1.2	2.1	18
Barium	1.0	43.3	32.8	23.7	33.1	390
Beryllium	1.0	nd	nd	nd	nd	4
Boron	1.0	nd	nd	nd	nd	1.5
Cadmium	0.5	nd	nd	nd	nd	1.2
Chromium	1.0	11.9	9.7	7.2	11.4	160
Chromium (IV)	0.2	nd	NA	nd	NA	8
Cobalt	1.0	4.0	4.1	3.9	3.9	22
Copper	1.0	11.2	9.2	9.5	11.9	140
Lead	1.0	15.0	4.8	2.9	6.3	120
Mercury	0.1	nd	NA	nd	NA	0.27
Molybdenum	1.0	nd	nd	nd	nd	6.9
Nickel	1.0	9.4	7.1	5.9	8.0	100
Selenium	1.0	nd	nd	nd	nd	2.4
Silver	0.5	nd	nd	nd	nd	20
Thallium	1.0	nd	nd	nd	nd	1
Uranium	1.0	nd	nd	nd	nd	23
Vanadium	1.0	18.6	19.3	16.1	20.1	86
Zinc	1.0	26.6	nd	nd	26.8	340

Notes:
- MDL – Method Detection Limit
- NA – not analyzed for this parameter
- nd – not detected above the MDL

Metal parameters were identified in each of the soil samples submitted for analytical testing. All soil samples submitted for analytical testing comply with the MECP Table 3 Residential Standards.

The maximum concentrations of analyzed parameters in the soil at the site are summarized below in Table 11.

Table 11: Maximum Concentrations – Soil			
Parameter	**Maximum Concentration (µg/g)**	**Borehole**	**Depth Interval (m BGS)**
PHC F2	**400**	BH2-SS4	2.29-2.89; native
PHC F3	**635**	BH2-SS4	2.29-2.89; native
Arsenic	2.1	BH2-AU1	0-0.76; fill
Barium	43.3	BH2-AU1	0-0.76; fill
Chromium	11.9	BH2-AU1	0-0.76; fill
Cobalt	4.0	BH2-AU1	0-0.76; fill
Copper	11.9	BH2-AU1	0-0.76; fill
Lead	15.0	BH2-AU1	0-0.76; fill
Nickel	9.4	BH2-AU1	0-0.76; fill
Vanadium	20.1	BH2-AU1	0-0.76; fill
Zinc	26.8	BH2-AU1	0-0.76; fill

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

All other parameter concentrations were below laboratory detection limits.

5.6 Groundwater Quality

Groundwater samples from monitoring wells installed in BH1 and BH2 as well as an existing well BHMW1, were submitted for laboratory analysis of PHC, VOC and/or metal parameters. The groundwater samples were obtained from the screened intervals noted on Table 2. The results of the analytical testing are presented below in Tables 12, 13 and 14. The laboratory certificates of analysis are provided in Appendix 1.

Table 12: Analytical Test Results – Groundwater (PHCs (F1-F4))					
Parameter	**MDL (µg/L)**	**Groundwater Samples (µg/L) November 18, 2020**			**MECP Table 3 Standards (µg/L)**
		BH1-GW1	**BHMW1**	**BH2-GW1**	
PHC F1	25	nd	nd	nd	750
PHC F2	100	nd	nd	nd	150
PHC F3	100	nd	nd	nd	500
PHC F4	100	nd	nd	nd	500

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

No PHC parameters were detected above the laboratory method detection limits in any of the groundwater samples submitted for analytical testing. The results are considered to be in compliance with the MECP Table 3 Standards.

Table 14: Analytical Test Results – Groundwater (VOCs)					
Parameter	**MDL (µg/L)**	**Groundwater Samples (µg/L) November 18, 2020**			**MECP Table 3 Standards (µg/L)**
		BH1-GW1	**BHMW1**	**BH2-GW1**	
Acetone	5.0	nd	nd	nd	130,000
Benzene	0.5	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	85,000
Bromoform	0.5	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	630
Chloroethane	1.0	nd	nd	nd	nv
Chloroform	0.5	nd	nd	nd	2.4
Chloromethane	3.0	nd	nd	nd	nv
Dibromochloromethane	0.5	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	4,400
1,2-Dibromoethane	0.2	nd	nd	nd	0.25
1,2-Dichlorobenzene	0.5	nd	nd	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	16
1,3-Dichloropropene	0.5	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	2,300
Hexane	1.0	nd	nd	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	470,000
Methyl Butyl Ketone	10.0	nd	nd	nd	nv
Methyl Isobutyl Ketone	5.0	nd	nd	nd	140,000
Methyl tert-butyl Ether	2.0	nd	nd	nd	1900
Methylene Chloride	5.0	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	3.4
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	1.6
Toluene	0.5	nd	nd	nd	18,000
1,1,1-Trichloroethane	0.5	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	2,500
1,3,5-Trimethylbenzene	0.5	nd	nd	nd	nv
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	nd	4,200

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

VOC parameters were not detected above the laboratory method detection limits in any of the groundwater samples analysed. The results are in compliance with the MECP Table 3 Standards.

Table 14: Analytical Test Results – Groundwater (Metals)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) November 18, 2020		MECP Table 3 Standards (µg/L)
		BH1-GW1	DUP	
Antimony	0.5	nd	nd	20,000
Arsenic	1	1	2	1,900
Barium	1	107	99	29,000
Beryllium	0.5	nd	nd	67
Boron	10	126	119	45,000
Cadmium	0.1	nd	nd	2.7
Chromium	1	nd	nd	810
Chromium (VI)	10	nd	NA	140
Cobalt	0.5	nd	nd	66
Copper	0.5	1.3	3.2	87
Lead	0.1	nd	nd	25
Mercury	0.1	nd	NA	0.29
Molybdenum	0.5	15.1	15.3	9,200
Nickel	1	nd	nd	490
Selenium	1	6	6	63
Silver	0.1	nd	nd	1.5
Sodium	200	126000	121000	2,300,000
Thallium	0.1	nd	nd	510
Uranium	0.1	3.5	3.6	420
Vanadium	0.5	2.5	2.8	250
Zinc	5	nd	6	1,100

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

All of the detected metal parameters were in compliance with the MECP Table 3 Standards.

The maximum concentrations of analyzed parameters in the groundwater at the site are summarized below in Table 15.

Table 15: Maximum Concentrations – Groundwater			
Parameter	**Maximum Concentration (µg/L)**	**Borehole**	**Screened Interval (m BGS)**
Arsenic	2	DUP	3.16-6.16m
Barium	107	BH1-GW1	3.16-6.16m
Boron	126		3.16-6.16m
Copper	3.2	DUP	3.16-6.16m
Molybdenum	15.3		3.16-6.16m
Selenium	6		3.16-6.16m
Sodium	126000	BH1-GW1	3.16-6.16m
Uranium	3.6		3.16-6.16m
Vanadium	2.8		3.16-6.16m
Zinc	6		3.16-6.16m

All other parameter concentrations were below laboratory detection limits.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of the November 2020 sampling events 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, a Certificate of Analysis has been received for each sample submitted for analysis. The Certificates of Analysis are appended to this report.

A duplicate soil sample and groundwater sample (DUP) were obtained from BH2-AU1 and BH1-GW1 and analyzed for metals. Test results for the duplicate soil and groundwater samples and RPD calculations are provided below in Tables 16 and 17.

TABLE 16: QA/QC Results –Soils (Metals)				
Parameter	**BH2-AU1**	**DUP**	**RPD (%)**	**QA/QC Results**
Arsenic	2.1	2.1	0	Within the acceptable range
Barium	43.3	33.1	27	Outside the acceptable range
Chromium	11.9	11.4	4	Within the acceptable range
Cobalt	4.0	3.9	3	Within the acceptable range
Copper	11.2	11.9	6	Within the acceptable range
Lead	15.0	6.3	82	Outside the acceptable range
Nickel	9.4	8.0	16	Within the acceptable range
Vanadium	18.6	20.1	8	Within the acceptable range
Zinc	26.6	26.8	1	Within the acceptable range

TABLE 17: QA/QC Results – Groundwater (Metals)				
Parameter	**BH1-GW1**	**DUP**	**RPD (%)**	**QA/QC Results**
Arsenic	1	2	67	Outside the acceptable range
Barium	107	99	8	Within the acceptable range
Boron	126	119	6	Within the acceptable range
Copper	1.3	3.2	84	Outside the acceptable range
Molybdenum	15.1	15.3	1	Within the acceptable range
Selenium	6	6	0	Within the acceptable range
Sodium	126000	121000	4	Within the acceptable range
Uranium	3.5	3.6	3	Within the acceptable range
Vanadium	2.5	2.8	11	Within the acceptable range

The majority of the RPD results are within the acceptable range, with the exception of a few parameters. It is not uncommon that very small or very high concentrations or values will yield higher RPD values, and as such, the RPD value is not an accurate measure in these cases.

Based on the analytical laboratory results, it is our opinion that the overall 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. 153/0, as a amended by the the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

As indicated in the Phase I-ESA report and Section 2.2 of this report, the PCAs that are considered to result in APECs on the Phase I and Phase II Property:

- APEC 1: Resulting from the presence of fill material of unknown quality on the Phase I Property, associated with the reported fire which destroyed the former building, followed by a demolition in 2005 (PCA 30);
- APEC 2: Resulting from the historical presence of a paint and oil store at 394-404 Bank Street (PCA 39); and

- APEC 3: Resulting from the historical operations of an off-site automotive repair garage and a former UST located on the south side of the 7-11 Florence Street property (PCA 52, PCA 28).

The remaining off-site PCAs were not considered to result in APECs based on their separation distances and/or orientations (down or cross-gradient) with respect to the subject land in combination of the underlying impermeable clay layer.

Contaminants of Potential Concern

Based on the APECs identified on the Phase II Property, the contaminants of potential concern (CPCs) are:

- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Petroleum hydrocarbons (PHCs, Fractions F_1-F_4);
- Polyaromatic hydrocarbons (PAHs);
- Volatile organic compounds (VOCs); and
- Metals including Mercury (Hg) and Hexavalent Chromium (CrVI).

Subsurface Structures and Utilities

No services are expected to be present on-site. There is one monitoring well situated on the northwest corner of the Phase II Property. No other subsurface structures are located on the subject site.

Physical Setting

Site Stratigraphy

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is illustrated on Drawings PE5088-4A, 5A and 6A - Cross-Section A-A'. Stratigraphy consists of:

- Fill material generally consisting of crushed stone, silty sand with silty clay, gravel, and traces of organics with some demolition debris, and was identified at each borehole location, extending to depths ranging from 1.37 to 3.05 m below the ground surface (mbgs). Groundwater was not encountered in this soil layer.

- Native silty clay was identified at each of the boreholes beneath the fill material, extending to depths ranging from 3.66 to 8.38 mbgs. BH3 and BH4 were terminated in this layer at 4.42 and 3.66 mbgs, respectively. Groundwater was encountered in this layer at BH1 and BH2.
- Glacial till was identified beneath the silty clay layer at BH1 and BH2 and terminated in this layer at 9.75 mbgs.

Hydrogeological Characteristics

Groundwater at the Phase II Property was encountered in the native silty clay.

Water levels were measured at the subject site on November 18, 2020, at depths ranging from 3.16 to 4.27 mbgs. Based on the groundwater elevations measured during this monitoring event, groundwater contour mapping was completed and the horizontal hydraulic gradient for the subject site was calculated. Groundwater flow at the subject site was in a westerly direction, with a hydraulic gradient of approximately 0.007 m/m.

Approximate Depth to Bedrock

Bedrock was not encountered during the field program.

Approximate Depth to Water Table

Depth to water table at the subject site varies between approximately 3.16 and 4.27 m below existing grade.

Sections 41 and 43.1 of the Regulation

Section 41 of the Regulation (Site Condition Standards, Environmentally Sensitive Areas) does not apply to the subject site as the Phase II Property is not within 30m of an environmentally sensitive area.

Section 43.1 of the Regulation does not apply to the subject site in that the subject site is not a Shallow Soil Property and is not within 30 m of a water body.

Fill Placement

Based on the findings of a previous subsurface investigation, fill material consisting of crushed stone, silty sand with silty clay and traces of organics with some demolition debris was identified across the Phase II Property and extended to depth ranging from 1.37 to 3.05 mbgs.

Proposed Buildings and Other Structures

It is our understanding that the site is to be redeveloped with a mixed-use 6-storey building with one basement level.

Existing Buildings and Structures

There are no buildings or structures currently present on the Phase II Property.

Water Bodies

There are no water bodies on the subject land or within the 250 m search area.

Areas of Natural Significance

No areas of natural significance are present on or within the vicinity of the Phase II Property.

Environmental Condition

Areas Where Contaminants are Present

Based on the analytical results, PHC (F2 and F3) concentrations in excess of the selected MECP Table 3 Standards were identified on the southwest corner of the Phase II Property. The PHC impact appears to be isolated in the fill material only.

The groundwater results were in compliance with the selected MECP Table 3 Standards. Analytical test results are shown on Drawings PE5088-4, 5 and 6 – Analytical Testing Plans.

Types of Contaminants

Based on the PCAs resulting in APECs on the Phase II Property in combination with the analytical test results, the contaminants of concern (CPCs) in the soil includes PHCs (F2 and F3). No other CPCs were identified on the Phase II Property.

As noted previously, the groundwater at the Phase II Property is clean; no contaminants of concern were detected above the laboratory method detection limits, with the exception of several metal parameters which are in compliance with MECP Table 3 standards.

Contaminated Media

Based on the results of the Phase II ESA, the fill material on the southwest corner of the Phase II Property is impacted with PHCs (F2-F3) in excess of the MECP Table 3 Standards. PHCs were not identified in the underlying native soils, and as such, the contamination appears to be isolated within the fill layer. Groundwater samples obtained from the Phase II Property were in compliance with the selected MECP Standards.

What Is Known About Areas Where Contaminants Are Present

PHC impacts present in the fill layer may be associated with the past use of the adjacent site to the west or with the imputation of fill material.

Groundwater at the Phase II Property complies with the MECP Table 3 standards.

Distribution and Migration of Contaminants

As previously noted, impacted fill material is present on the southwest corner of the Phase I Property. Based on analytical testing of the underlying native soil and groundwater, no PHC impact was identified.

Please refer to Drawings PE5088-4A, 5A and 6A– Cross Section A-A, which depict the vertical distribution of contaminants based on the available information to date.

Discharge of Contaminants

PHCs are considered to have been directly discharged to the soil through a release associated with the historical use of the adjacent property as a garage or through historical infilling.

Climatic and Meteorological Conditions

In general, climatic and meteorological conditions have the potential to affect contaminant distribution. Two (2) ways by which climatic and meteorological conditions may affect contaminant distribution include the downward leaching of contaminants by means of the infiltration of precipitation, and the migration of contaminants via groundwater levels and/or flow, which may fluctuate seasonally.

Leaching may have affected migration over the years, although minimal based on the testing of the underlying soil, and as such, leaching is not considered an issue on the Phase II Property.

The fluctuation of groundwater levels is not considered to affect contaminant transport as the groundwater beneath the Phase II Property is in compliance with MECP Table 3 standards.

Potential for Vapour Intrusion

There are no building structures currently present on the Phase II Property and therefore no potential for vapour intrusion.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the property addressed 406 Bank Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address 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 Phase I and Phase II Property.

The Phase II ESA consisted of drilling four (4) boreholes on the Phase II Property, two (2) of which were constructed with groundwater monitoring well installations.

The soil profile generally consisted of fill material (crushed stones, silty sand with silty clay, gravel and traces of organics with some demolition debris), underlain by a layer of silty clay. Boreholes were terminated at a maximum depth of 9.75 m below the ground surface (mbgs). Soil samples were obtained from the boreholes and screened using vapour measurements along with visual and olfactory observations. A high vapour reading in soil sample BH2-SS5 was noted as well as a hydrocarbon odour in BH2-SS4. No staining or other unusual odour was noted during the subsurface investigation.

Soil samples were selected based on visual and olfactory observations in combination with vapour screening results and location relative to the water table. Soil samples were obtained from the boreholes and screened using visual observations and organic vapour measurements. A total of eight (8) soil samples were submitted for laboratory analysis of a combination of benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, F1-F4) polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) and/or metals. Petroleum hydrocarbon fractions F2 and F3 were identified on the southwestern corner of the Phase II Property at concentrations exceeding the MECP Table 3 Standards. All other parameter concentrations identifed were in compliance with the selected MECP Table 3 Standards.

Groundwater samples from monitoring wells installed in BH1 and BH2 as well as an existing well BH1/MW1, were recovered and analysed for a combination of PHC, VOCs and metal parameters. All groundwater samples were in compliance with the MECP Table 3 Standards.

Conclusion

Based on the findings of this Phase II ESA, fill material impacted with PHC F2-F3 concentrations in excess of the MECP Table 3 Standards, is present on the southwest corner of the Phase II Property.

All of the groundwater results are in compliance with the selected MECP Table 3 Standards.

It is our understanding that the subject site is to be redeveloped with a multi-storey residential building with one underground level.

It is our recommendation that an environmental site remediation program, involving the removal of all impacted fill material, be completed concurrently with the site redevelopment.

It is also recommended that Paterson personnel be onsite during construction activities to direct the excavation and segregation of impacted soil and to conduct confirmatory sampling as required. All impacted soil is to be disposed of at a licenced landfill site.

Prior to offsite disposal at a licenced landfill site, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

It is expected that groundwater monitoring wells will be abandoned in accordance with O.Reg.903, at the time of construction excavation.

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared under the supervision of a Qualified Person 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 12291444 Canada Inc. and notification from 12291444 Canada Inc. and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.

Mandy Witteman, B.Eng., M.A.Sc.

Karyn Munch, P.Eng., QP$_{ESA}$

Report Distribution:

- 12291444 Canada Inc.
- Paterson Group

FIGURES

Figure 1 - Key Plan

PE5088-3 – Test Hole Location Plan & Groundwater Contour Plan

Drawing PE5088-4– Analytical Testing Plan – Soil (PHCs)

Drawing PE5088-4A - Cross-Section A-A’ – Soil (PHCs)

Drawing PE5088-5– Analytical Testing Plan – Soil (BTEX, Metals, PAHs)

Drawing PE5088-5A - Cross-Section A-A’ – Soil (BTEX, Metals, PAHs)

Drawing PE5088-6– Analytical Testing Plan –Groundwater (Metals, PHCs, VOCs)

Drawing PE5088-6A - Cross-Section A-A’ – Groundwater (Metals, PHCs, VOCs)

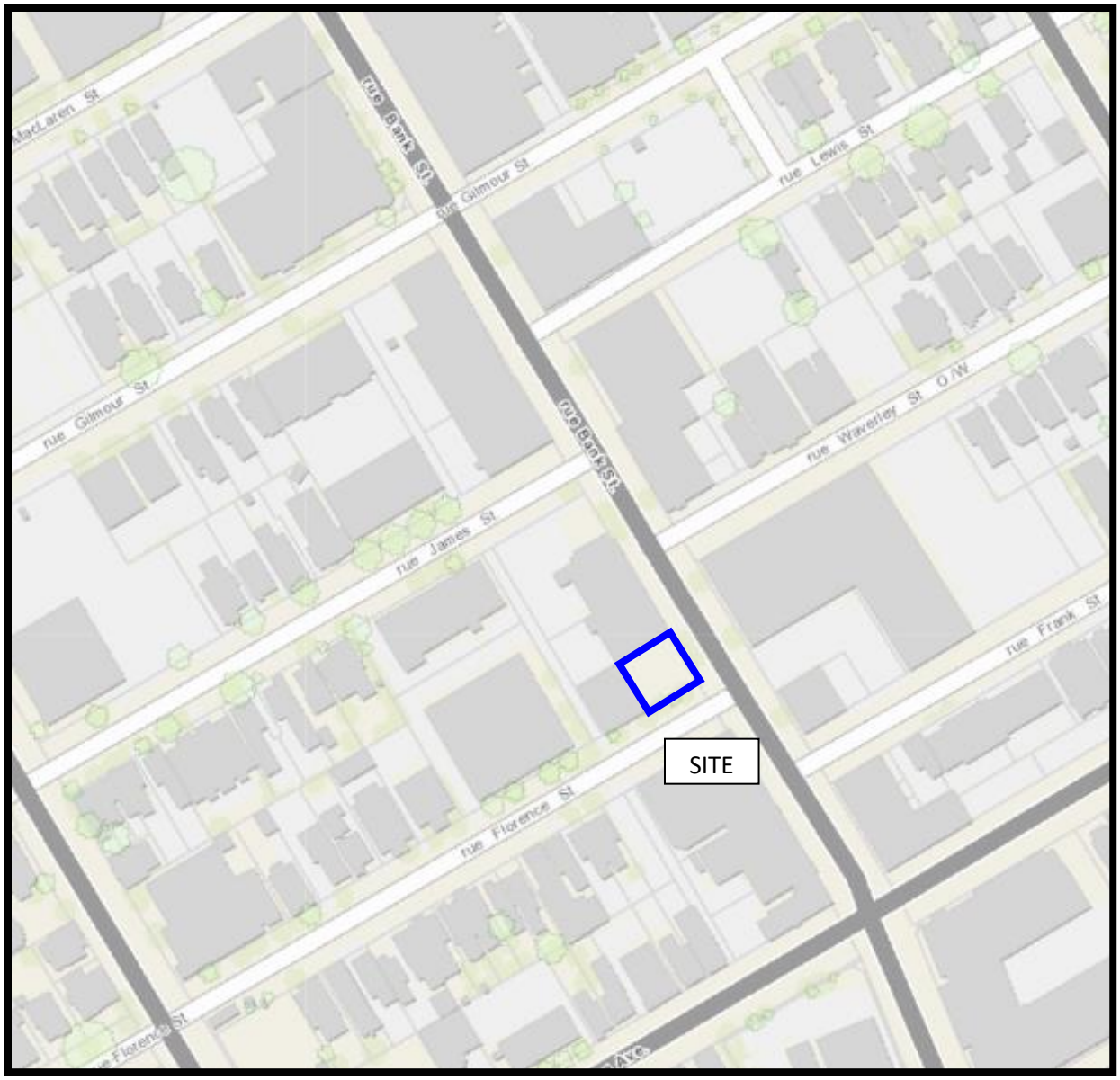

FIGURE 1

KEY PLAN

#394-404 BANK STREET
COMMERCIAL

#19 FLORENCE STREET
COMMERCIAL

A

A'

BHMW 1
71.61
(68.45)

BH 3
71.24

BH 1
71.50
(67.93)

BH 2
71.36
(67.09)

BH 4
71.36

68.2
68.1
68
67.9
67.8
67.7
67.6
67.5
67.4
67.3

(0.007m/m)

FILL / VEGETATION

BANK STREET

FLORENCE STREET

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION BY OTHERS
- 71.50 GROUND SURFACE ELEVATION (m)
- (67.93) GROUNDWATER SURFACE ELEVATION (m)
- 67.7 GROUNDWATER CONTOUR(m)
- (0.007m/m) APPROXIMATE GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

GROUND SURFACE ELEVATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:125

0 0.5 1.0 1.5 2.0 2.5 5.0 7.5m

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NO.	REVISIONS	DATE	INITIAL
0			

12291444 CANADA INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
406 BANK STREET

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:125	Date: 11/2020
Drawn by: MPG	Report No.: PE5088-2
Checked by: MW	Dwg. No.: PE5088-3
Approved by: MSD	Revision No.:

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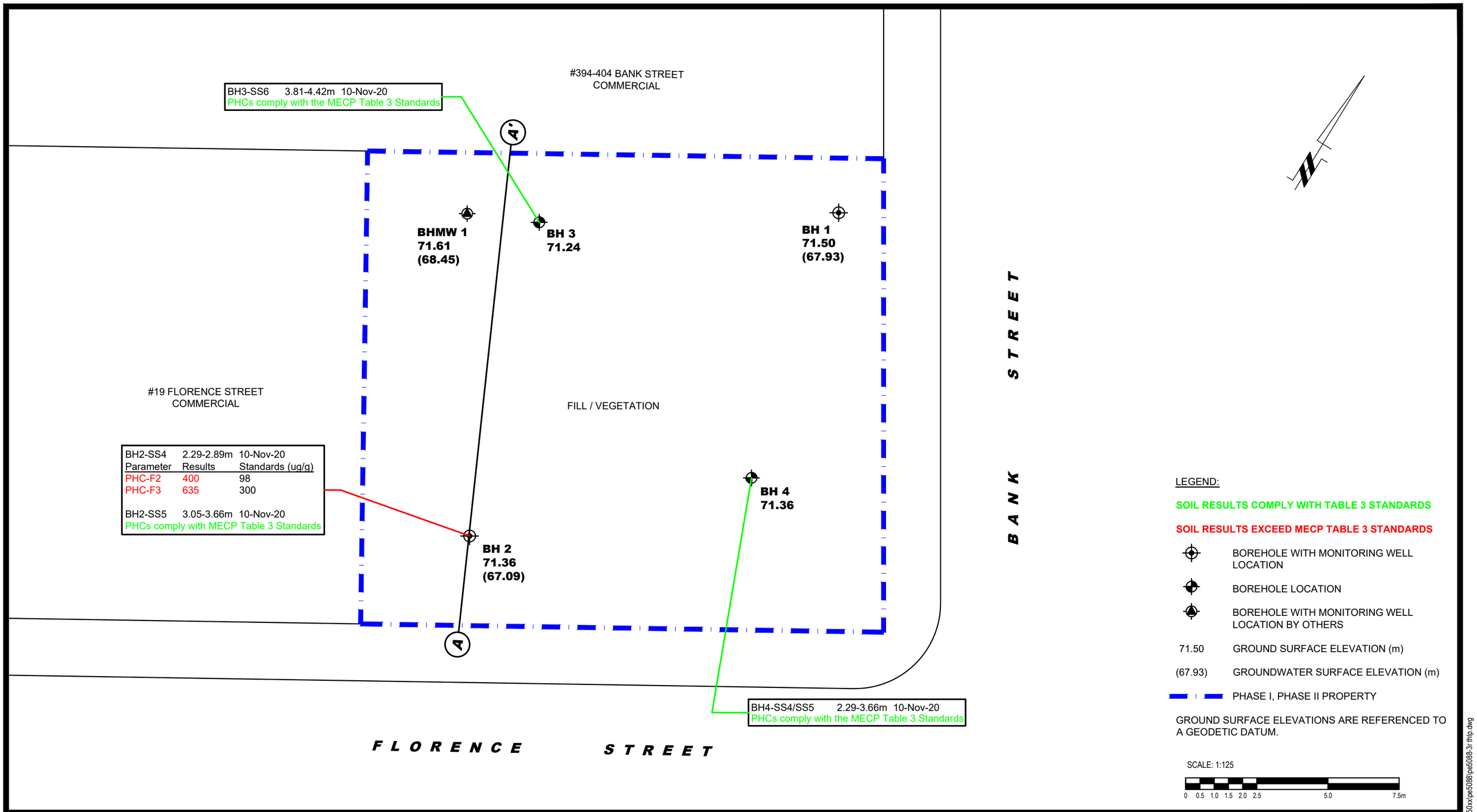

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NO.	REVISIONS	DATE	INITIAL
0			

12291444 CANADA INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
406 BANK STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (PHCs)

Scale: 1:125	Date: 11/2020
Drawn by: MPG	Report No.: PE5088-2
Checked by: MW	Dwg. No.: PE5088-4
Approved by: MSD	Revision No.:

11x17

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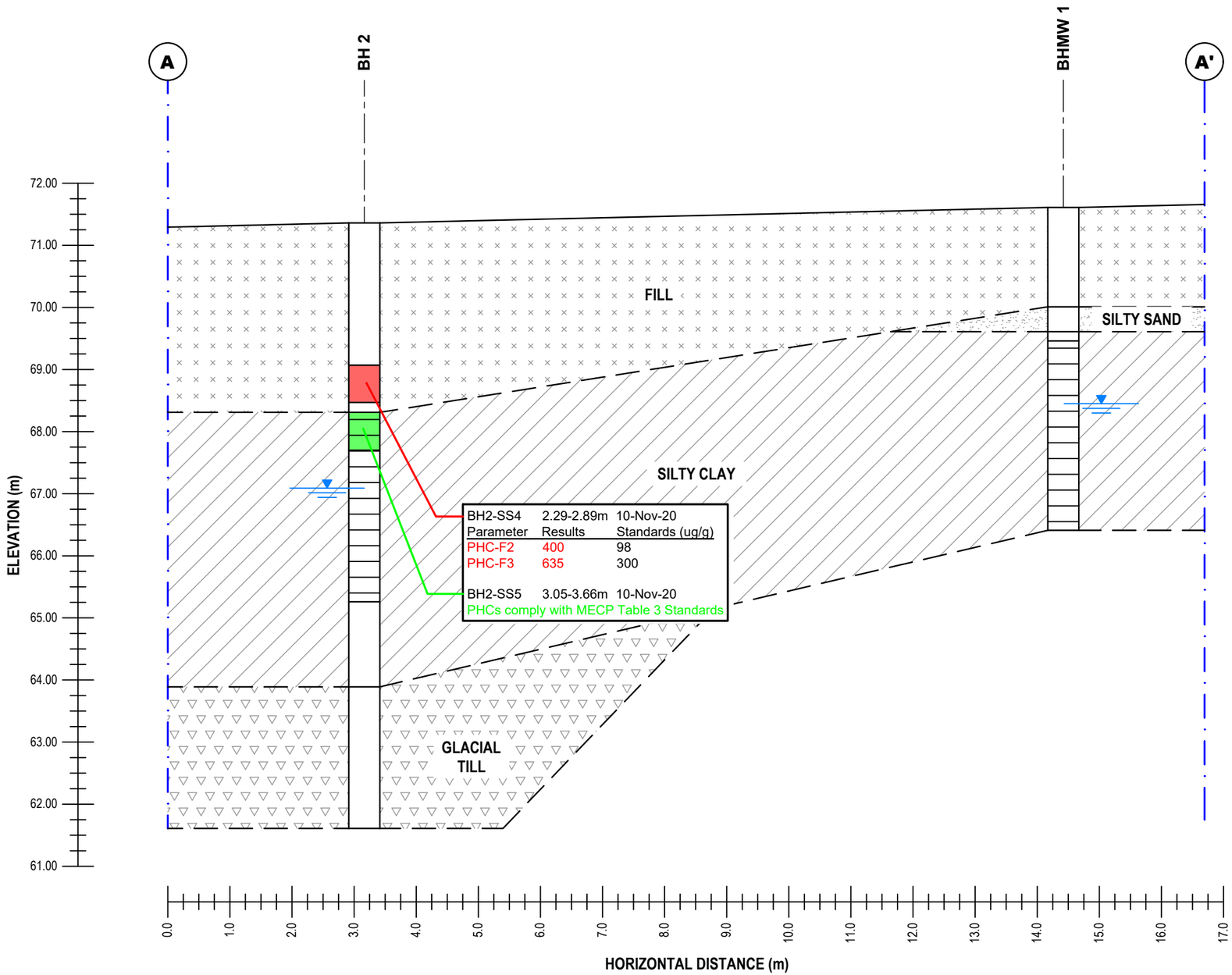

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL
0			

12291444 CANADA INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
406 BANK STREET

OTTAWA, ONTARIO

Title:

CROSS-SECTION B-B' - SOIL (PHCs)

Scale: AS SHOWN	Date: 11/2020
Drawn by: MPG	Report No.: PE5088-2
Checked by: MW	Dwg. No.: PE5088-4A
Approved by: MSD	Revision No.:

11x17

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BH3-SS6 3.81-4.42m 10-Nov-20
VOCs comply with MECP Table 3 Standards

#394-404 BANK STREET
COMMERCIAL

BH1-AU1 0-0.60m 10-Nov-20
PAHs comply with MECP Table 3 Standards

A'

BHMW 1
71.61
(68.45)

BH 3
71.24

BH 1
71.50
(67.93)

#19 FLORENCE STREET
COMMERCIAL

S T R E E T

BH2-AU1 0-0.60m 10-Nov-20
PAHs comply with MECP Table 3 Standards
Metals comply with MECP Table 3 Standards

DUP-SS2-AU1 0-0.60 10-Nov-20
Metals comply with MECP Table 3 Standards

BH2-SS4 2.29-2.89 10-Nov-20
Metals comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH2-SS5 3.05-3.66 10-Nov-20
BTEX comply with MECP Table 3 Standards

FILL / VEGETATION

BH 4
71.36

BH 2
71.36
(67.09)

A

B A N K

F L O R E N C E S T R E E T

LEGEND:

SOIL RESULTS COMPLY WITH TABLE 3 STANDARDS

- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION BY OTHERS
- 71.50 GROUND SURFACE ELEVATION (m)
- (67.93) GROUNDWATER SURFACE ELEVATION (m)
- PHASE I, PHASE II PROPERTY

GROUND SURFACE ELEVATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:125

0 0.5 1.0 1.5 2.0 2.5 5.0 7.5m

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consulting engineers

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Ottawa, Ontario K2E 7J5
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NO.	REVISIONS	DATE	INITIAL
0			

12291444 CANADA INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
406 BANK STREET

OTTAWA, ONTARIO

Title: ANALYTICAL TESTING PLAN - SOIL (BTEX, METALS, PAHs, VOCs)

Scale: 1:125	Date: 11/2020
Drawn by: MPG	Report No.: PE5088-2
Checked by: MW	Dwg. No.: PE5088-5
Approved by: MSD	Revision No.:

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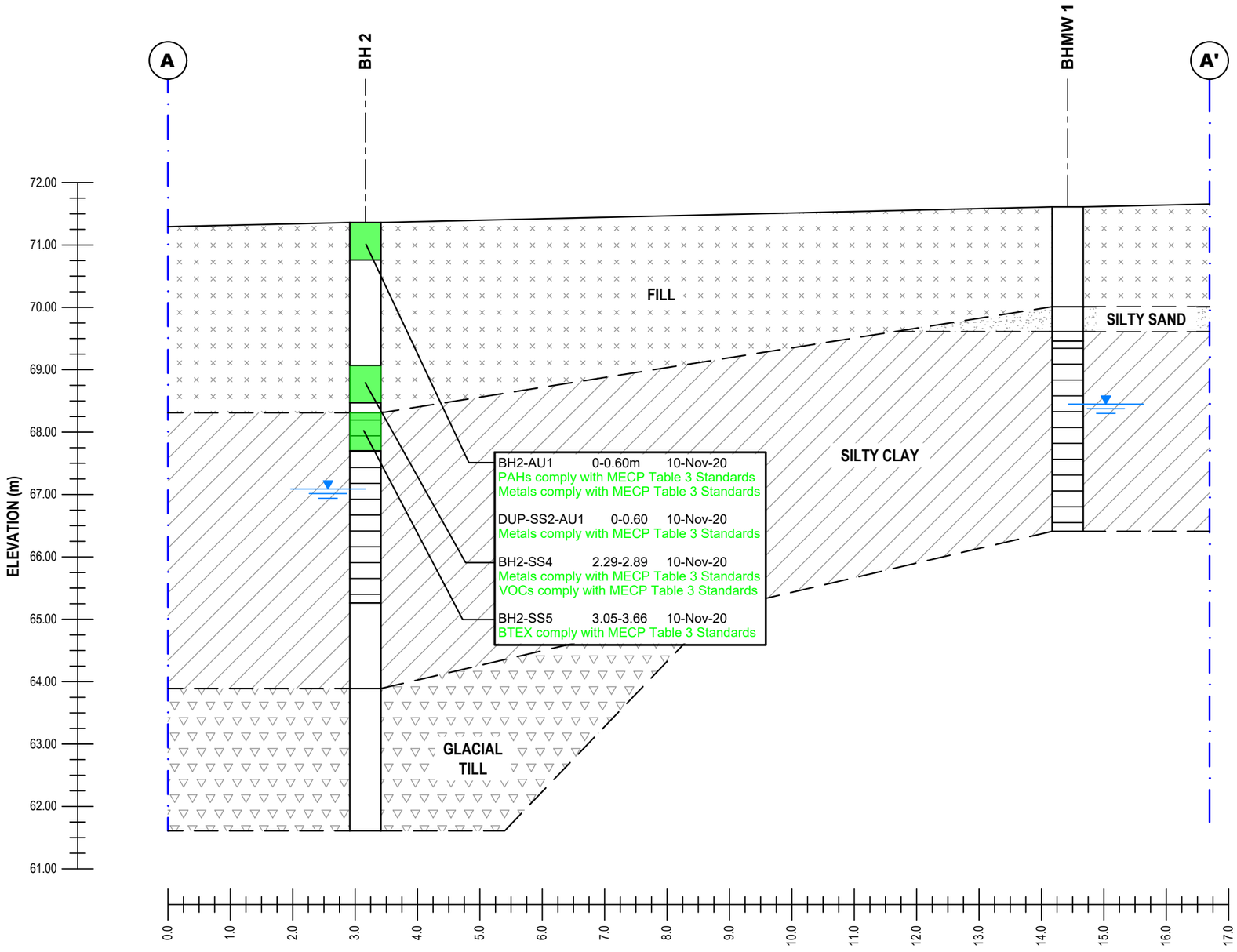

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

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12291444 CANADA INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
406 BANK STREET

OTTAWA, ONTARIO

Title: CROSS-SECTION B-B' - SOIL (BTEX, METALS, PAHs, VOCs)

Scale: AS SHOWN	Date: 11/2020
Drawn by: MPG	Report No.: PE5088-2
Checked by: MW	Dwg. No.: PE5088-5A
Approved by: MSD	Revision No.:

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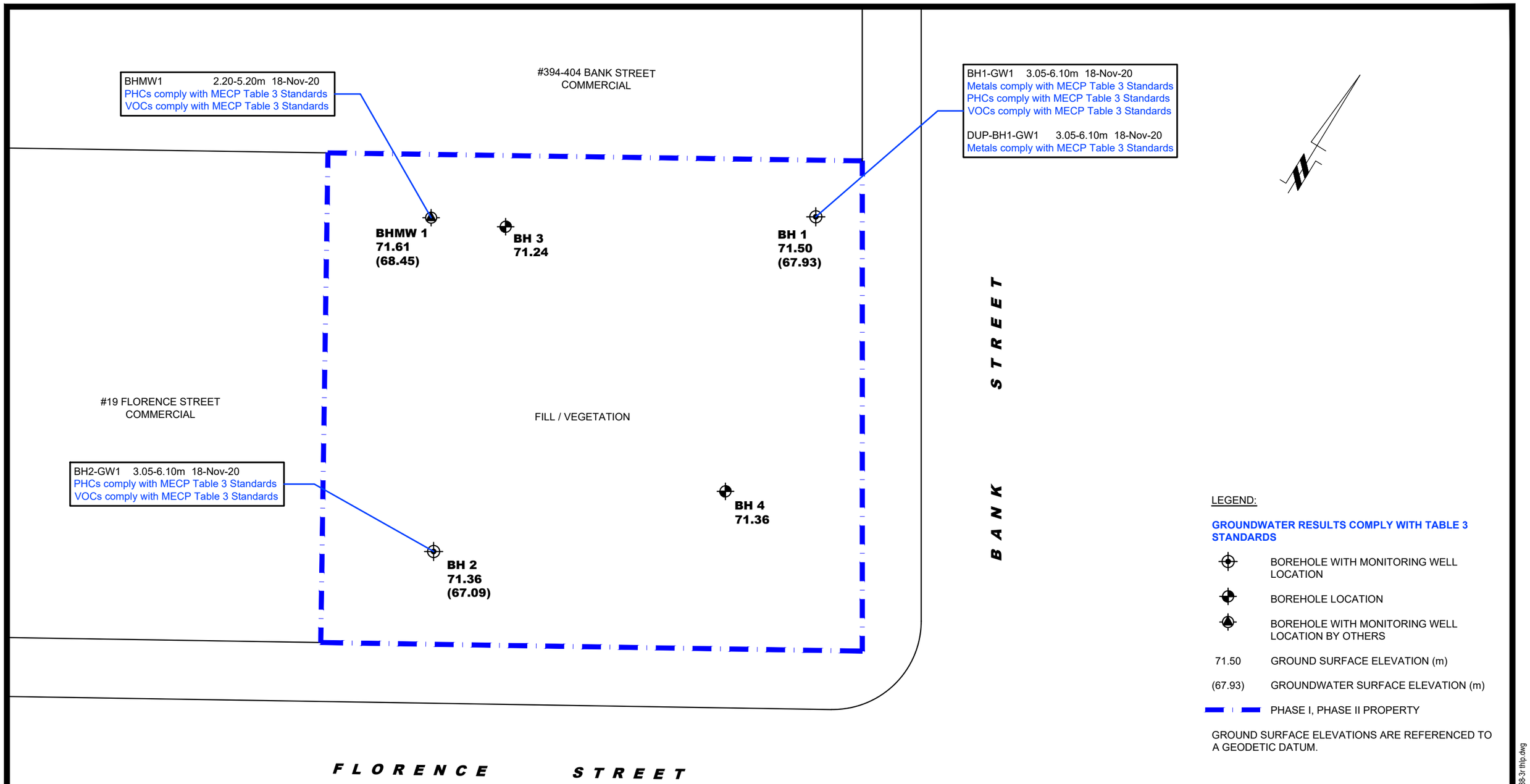

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NO.	REVISIONS	DATE	INITIAL
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12291444 CANADA INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
406 BANK STREET

OTTAWA, ONTARIO

Title: ANALYTICAL TESTING PLAN - GROUNDWATER

Scale: 1:125	Date: 11/2020
Drawn by: MPG	Report No.: PE5088-2
Checked by: MW	Dwg. No.: PE5088-6
Approved by: MSD	Revision No.:

11x17

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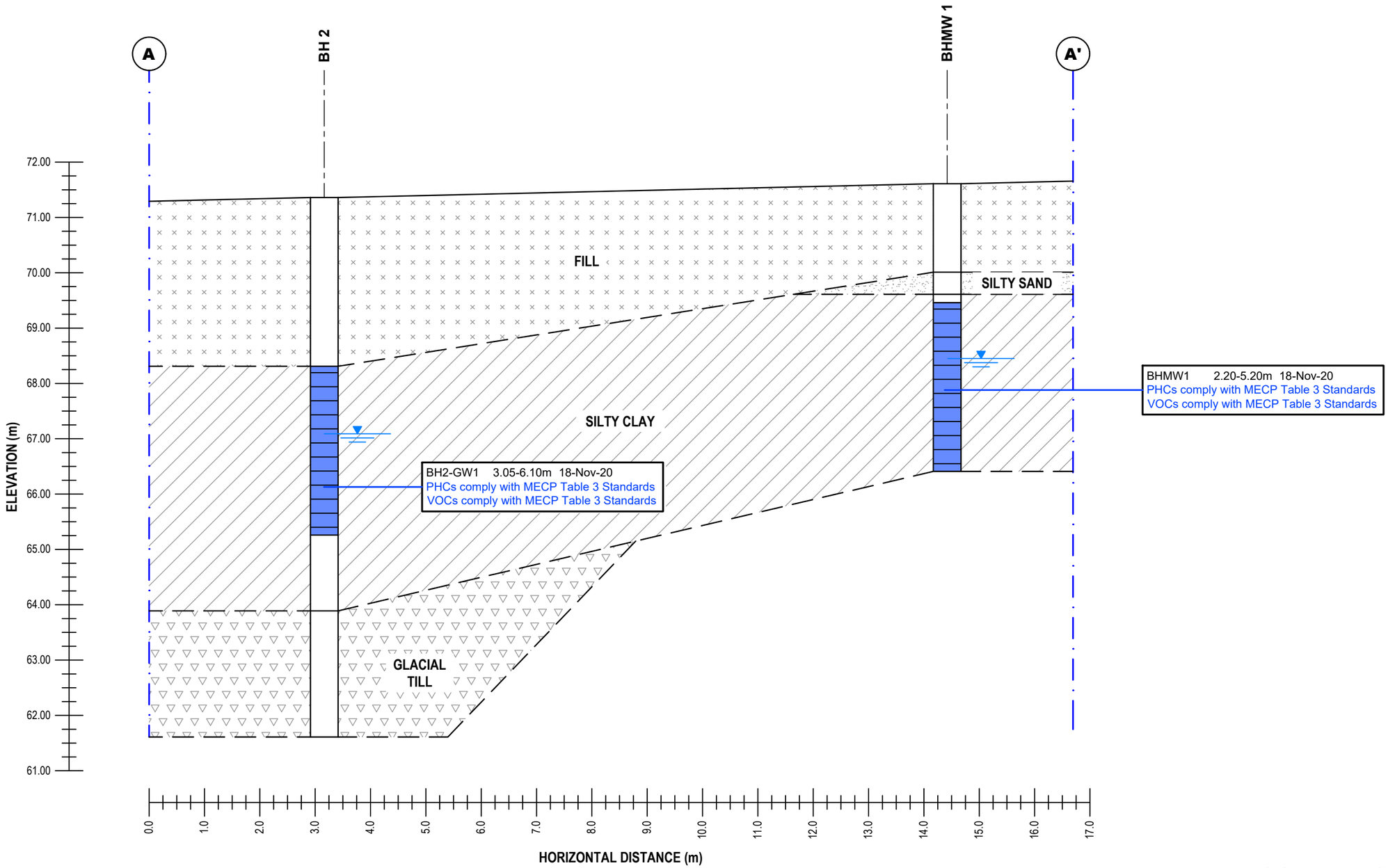

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL
0			

12291444 CANADA INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
406 BANK STREET

OTTAWA, ONTARIO

Title:

CROSS-SECTION A-A - GROUNDWATER

Scale: AS SHOWN	Date: 11/2020
Drawn by: MPG	Report No.: PE5088-2
Checked by: MW	Dwg. No.: PE5088-6A
Approved by: MSD	Revision No.:

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

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Sampling & Analysis Plan

Phase II Environmental Site Assessment
406 Bank Street
Ottawa, Ontario

Prepared For

12291444 Canada Inc.

November 2020

Report: PE5088-SAP

Table of Contents

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Ottawa Carleton Construction Ltd., on behalf of 12291444 Canada Inc. to conduct a Phase II Environmental Site Assessment (ESA) for part of the property addressed 406 Bank Street, in the City of Ottawa, Ontario. A geotechnical investigation was conducted concurrently with the environmental subsurface investigation.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1	Place borehole on the northern portion of the Phase II Property to address APEC 1 and APEC 2	Drill to a depth of approximately 10 mbgs for monitoring well installation to address potential groundwater impacts.
BH2	Place borehole on the southern portion of the Phase II Property to address APEC 1 and APEC 3.	Drill to a depth of approximately 10 mbgs for monitoring well installation to address potential groundwater impacts.
BH3	Place borehole on the northwestern side of the Phase II Property to address APEC 1 and APEC 2.	Drill to a depth of approximately 4 mbgs.
BH4	Place borehole on the eastern side of the Phase II Property to address APEC 1 and APEC 2.	Drill to a depth of approximately 4 mbgs.

At each borehole, split-spoon samples of 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 selected boreholes (as above) for the measurement of water levels and the collection of groundwater samples. Borehole locations are shown on the Test Hole Location Plan appended to the main report.

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 MOECC site condition standards.
- ❒ In boreholes with evidence of contamination as described above, a sample should be submitted from the stratigraphic unit below the 'worst-case' sample to determine whether the contaminant(s) have migrated 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 fire hydrant located on south side of Lisgar Street (300 Lisgar Street), with geodetic elevation of 72.57m above sea level (asl).

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” [1.52 m x 50 mm] threaded sections of Schedule 40 PVC slotted well screen (5’ x 1 ¼” [1.52 m x 32 mm] if installing in cored hole in bedrock)
- ❒ 5’ x 2” [1.52 m x 50 mm] threaded sections of Schedule 40 PVC riser pipe (5’ x 1 ¼” [1.52 m x 32 mm] 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 (0.5 x) the laboratory detection limit.

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS TO SAMPLING & ANALYSIS PLAN

Physical impediments to the Sampling and Analysis plan may include:

- ❒ The location of underground utilities
- ❒ Poor recovery of split-spoon soil samples
- ❒ Insufficient groundwater volume for groundwater samples
- ❒ Breakage of sampling containers following sampling or while in transit to the laboratory
- ❒ Elevated detection limits due to matrix interference (generally related to soil colour or presence of organic material)
- ❒ Elevated detection limits due to high concentrations of certain parameters, necessitating dilution of samples in laboratory
- ❒ Drill rig breakdowns
- ❒ Winter conditions
- ❒ Other site-specific impediments

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

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
406 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5088

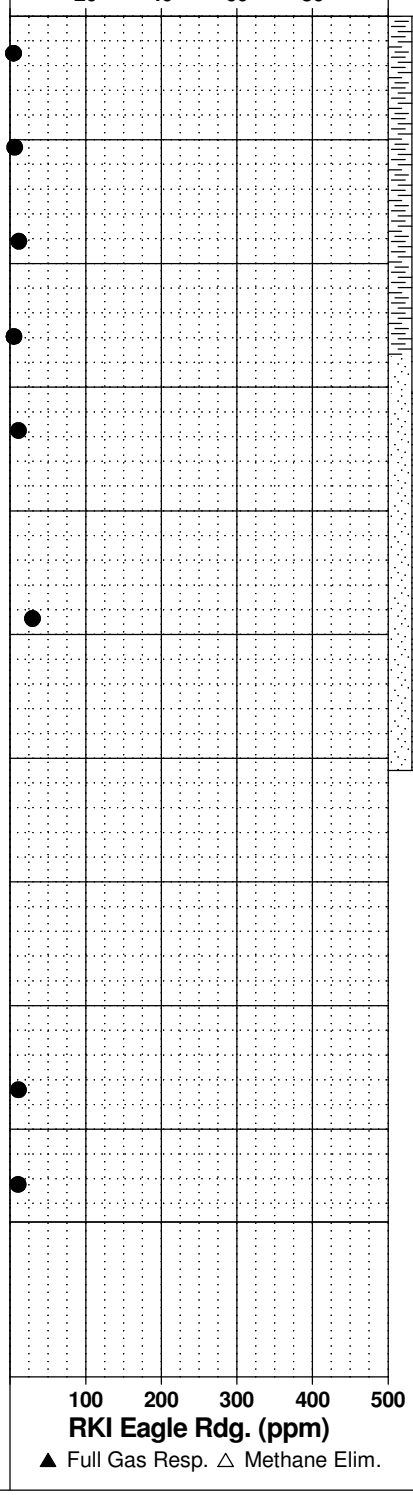
REMARKS

HOLE NO. BH 1

BORINGS BY CME-55 Low Clearance Drill **DATE** November 10, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	71.50
TOPSOIL 0.05							
FILL: Brown silty sand with crushed stone 0.36		AU	1				
FILL: Brown silty sand, trace clay and gravel		SS	2	21	10	1	70.50
1.52		SS	3	12	14	2	69.50
		SS	4	92	4		
Stiff to very stiff, brown **SILTY CLAY**		SS	5	100	P	3	68.50
- grey by 2.3m depth						4	67.50
		SS	6	100	P	5	66.50
						6	65.50
						7	64.50
						8	63.50
8.38							
GLACIAL TILL: Grey silty clay, some gravel, trace sand		SS	7	42	5	9	62.50
		SS	8	58	4		
9.75							
End of Borehole							
(GWL @ 3.57m - Nov. 18, 2020)							

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



Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
406 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5088

REMARKS

HOLE NO. BH 2

BORINGS BY CME-55 Low Clearance Drill **DATE** November 10, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	71.36
FILL: Brown silty sand with crushed stone		AU	1				
0.71							
		SS	2	21	10	1	70.36
FILL: Brown silty sand with gravel		SS	3	42	5	2	69.36
		SS	4	33	36		
3.05						3	68.36
		SS	5	100	2		
						4	67.36
Stiff, grey **SILTY CLAY**		SS	6	50	P	5	66.36
						6	65.36
						7	64.36
7.47							
		SS	7	17	5	8	63.36
GLACIAL TILL: Grey silty clay with sand, trace gravel		SS	8	71	8		
						9	62.36
		SS	9		3		
9.75							
End of Borehole							
(GWL @ 4.27m - Nov. 18, 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
406 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5088

REMARKS

HOLE NO. BH 3

BORINGS BY CME-55 Low Clearance Drill **DATE** November 10, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	71.24
FILL: Brown silty sand, some gravel, trace organics		AU	1				
0.53							
FILL: Brown silty clay, some sand		SS	2	17	6	1	70.24
1.37							
		SS	3	46	11	2	69.24
Stiff, brown **SILTY CLAY**		SS	4	38	5		
- grey by 3.0m depth		SS	5	100	2	3	68.24
		SS	6	100	2	4	67.24
4.42							
End of Borehole							

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

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
406 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5088

REMARKS

HOLE NO. BH 4

BORINGS BY CME-55 Low Clearance Drill **DATE** November 10, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	71.36		
		AU	1						
		SS	2	17	6	1	70.36		
		SS	3	12	5	2	69.36		
FILL: Brown silty sand with crushed stone									
2.74		SS	4	8	6				
Stiff, grey **SILTY CLAY**						3	68.36		
		SS	5	100	2				
3.66									
End of Borehole									

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

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

LOG OF BOREHOLE / MONITORING WELL BHMW1

DST REF. No.: OG05373
CLIENT: Galaxy Camera
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 406 - 408 Bank Street, Ottawa, Ontario
SURFACE ELEV.: --/--

Drilling Data
METHOD: CME 75 Drill Rig
DIAMETER: 100

DATE: December 09 2005

DEPTH (m)	MATERIAL DESCRIPTION	SAMPLE NUMBER	'N' VALUE
0	SAND - compact, frozen, light brown (fill)	SS1	
0	SAND - silty, trace gravel, loose, frozen, dark brown (fill)	SS2	7
1.8	SAND - clayey, loose, moist (possible fill)	SS3	6
2	CLAY - silty, stiff, moist to wet, olive grey	SS4	3
		SS5	2
		SS6	1
		SS7	1
5.2	End of borehole at 5.2 m depth.		

% MOISTURE: W_p 20 40 60 80 W_l (W)

VANE (kPa) × 50 100 150 200
SPT (N) □ Blows/0.3m 10 20 30 40
DCPT ◆

REMARKS:
Monitoring well installed to 5.9 m depth on December 9, 2005.

Groundwater level recorded at 2.9 m below grade on December 9, 2005.

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SAMPLE TYPE LEGEND

- Auger Sample
- Split Spoon Sample
- Thin Wall Tube
- Rock Core
- Side Sampler
- Grab Sample
- Ponar Sample

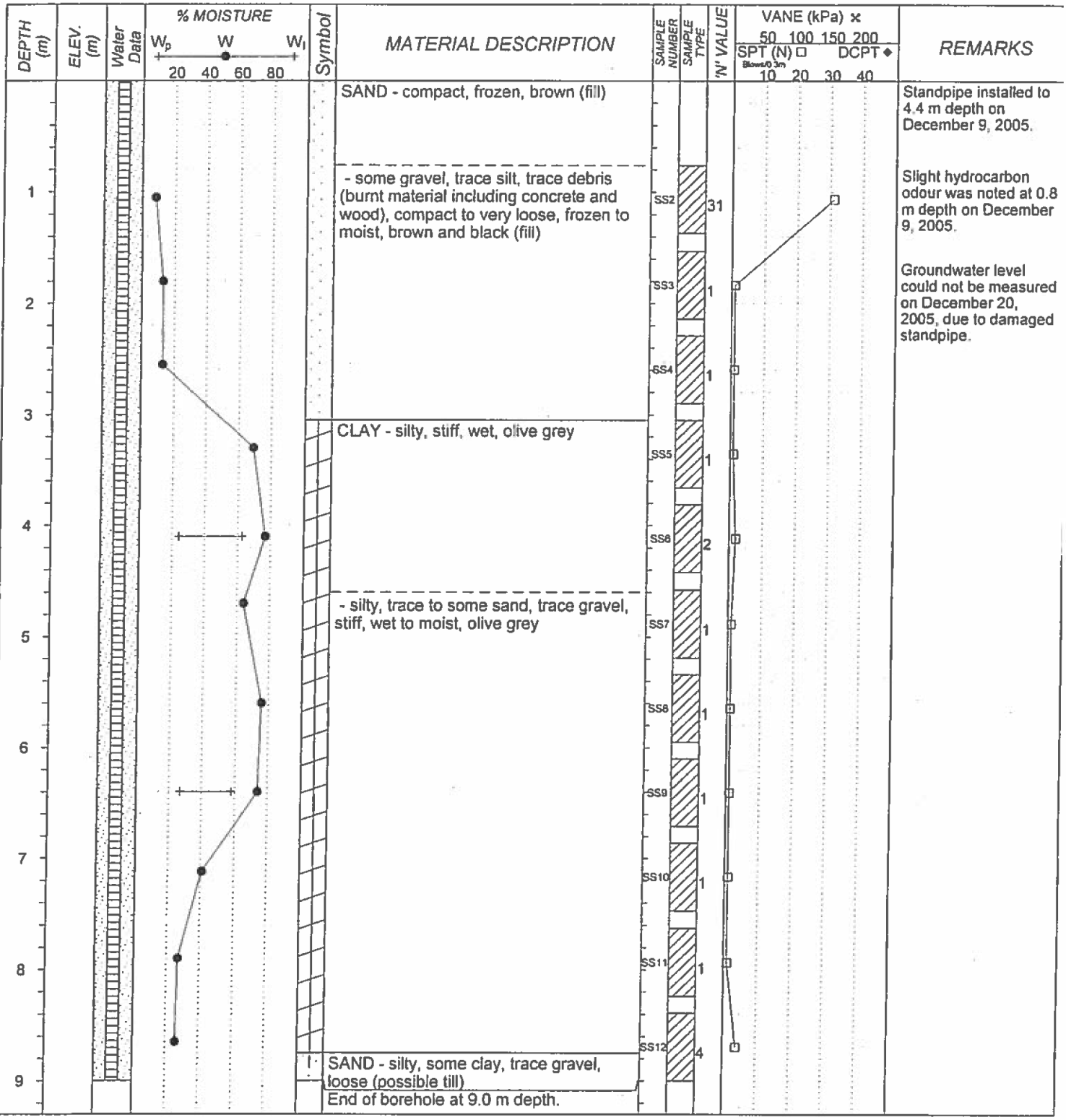
APPENDIX C

LOG OF BOREHOLE BH2

DST REF. No.: OG05373
CLIENT: Galaxy Camera
PROJECT: Preliminary Geotechnical Investigation
LOCATION: 406 - 408 Bank Street, Ottawa, Ontario
SURFACE ELEV.: --/--

Drilling Data
METHOD: CME 75 Drill Rig
DIAMETER: 100

DATE: December 09 2005



BOREHOLE (STANDARD) OG05373.GPJ DST_MIN.GDT 1/24/06

DST CONSULTING ENGINEERS

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SAMPLE TYPE LEGEND

Auger Sample
Split Spoon Sample
Thin Wall Tube
Rock Core
Side Sampler
Grab Sample
Ponar Sample

APPENDIX C

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

The standard terminology to describe the relative strength of cohesionless soils is the compactness condition, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm. An SPT N value of "P" denotes that the split-spoon sampler was pushed 300 mm into the soil without the use of a falling hammer.

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

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory shear vane tests, unconfined compression tests, or occasionally by the Standard Penetration Test (SPT). Note that the typical correlations of undrained shear strength to SPT N value (tabulated below) tend to underestimate the consistency for sensitive silty clays, so Paterson reviews the applicable split spoon samples in the laboratory to provide a more representative consistency value based on tactile examination.

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their "sensitivity". The sensitivity, S_t, is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil. The classes of sensitivity may be defined as follows:

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube, generally recovered using a piston sampler
G	-	"Grab" sample from test pit or surface materials
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size BQ, NQ, HQ, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC%	-	Natural water content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic Limit, % (water content above which soil behaves plastically)
PI	-	Plasticity Index, % (difference between LL and PL)
Dxx	-	Grain size at which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
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

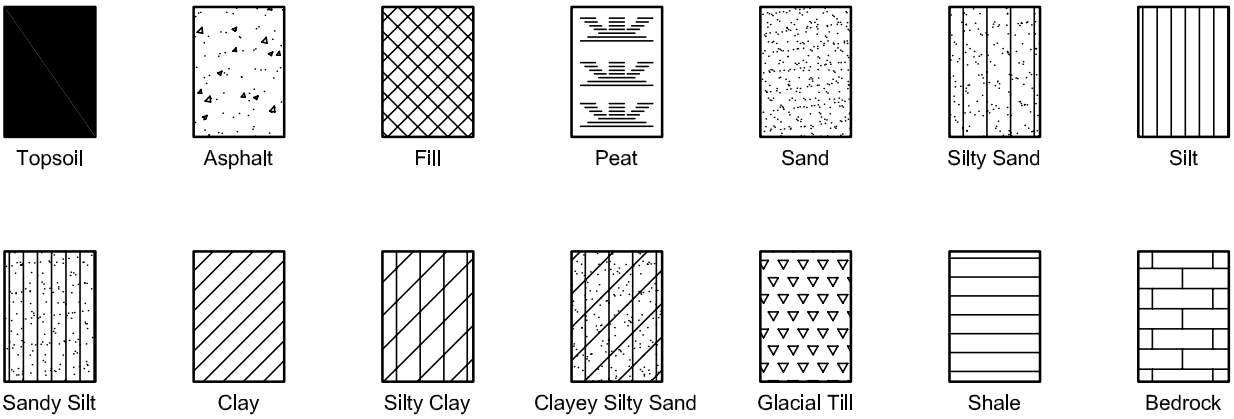
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

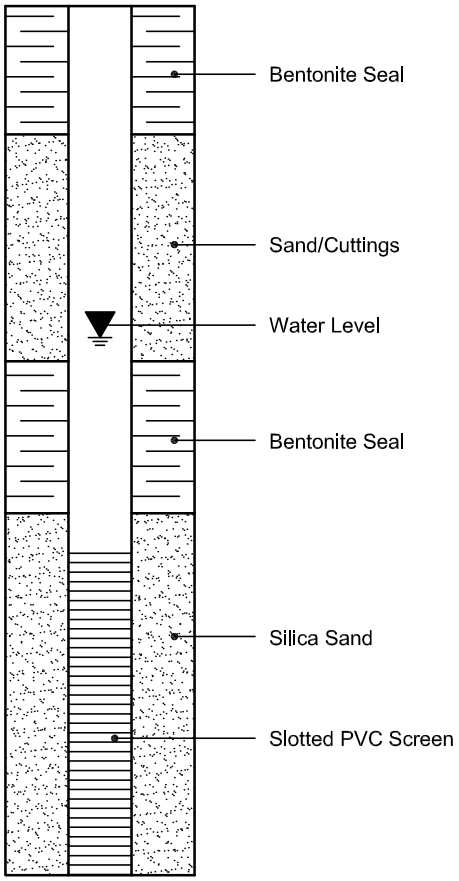
SYMBOLS AND TERMS (continued)

STRATA PLOT

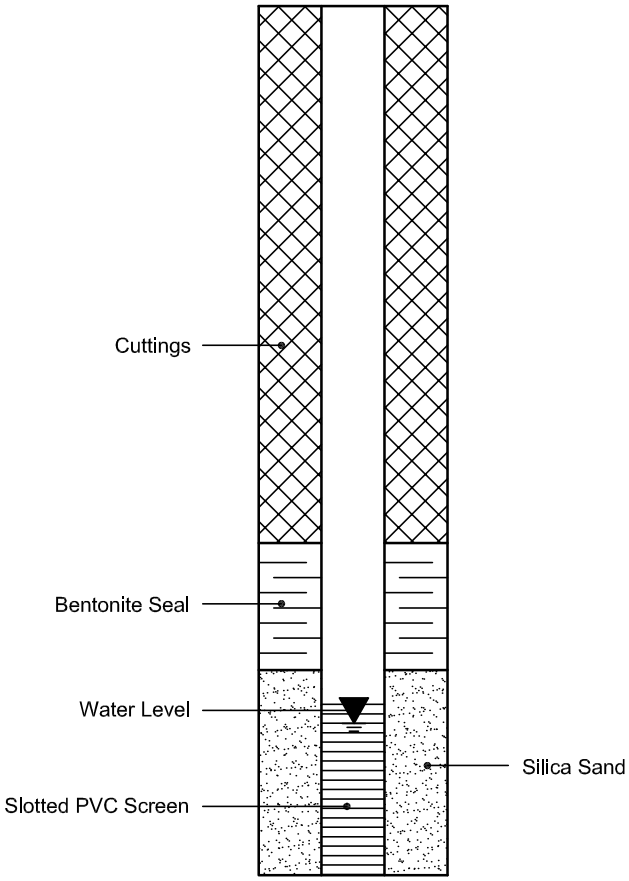


MONITORING WELL AND PIEZOMETER CONSTRUCTION

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: Karyn Munch

Client PO: 31243
Project: PE5088
Custody: 52588

Report Date: 19-Nov-2020
Order Date: 12-Nov-2020

Order #: 2046449

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

Paracel ID	Client ID
2046449-01	BH1-AU1
2046449-02	BH2-AU1
2046449-03	BH2-SS4
2046449-04	BH3-SS6
2046449-05	BH4-SS3/SS2
2046449-06	BH4-SS4/SS5
2046449-07	DUP

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 19-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 12-Nov-2020

Client PO: 31243

Project Description: PE5088

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	13-Nov-20	17-Nov-20
Mercury by CVAA	EPA 7471B - CVAA, digestion	19-Nov-20	19-Nov-20
PHC F1	CWS Tier 1 - P&T GC-FID	13-Nov-20	16-Nov-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	13-Nov-20	15-Nov-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	19-Nov-20	19-Nov-20
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	13-Nov-20	16-Nov-20
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	13-Nov-20	15-Nov-20
Solids, %	Gravimetric, calculation	13-Nov-20	16-Nov-20

Certificate of Analysis

Report Date: 19-Nov-2020

Client: **Paterson Group Consulting Engineers**

Order Date: 12-Nov-2020

Client PO: **31243**

Project Description: **PE5088**

	Client ID:	BH1-AU1	BH2-AU1	BH2-SS4	BH3-SS6
	Sample Date:	10-Nov-20 09:00	10-Nov-20 09:00	10-Nov-20 09:00	10-Nov-20 12:00
	Sample ID:	2046449-01	2046449-02	2046449-03	2046449-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	98.3	95.3	88.5	60.5
Metals					
Antimony	1.0 ug/g dry	-	<1.0	-	-
Arsenic	1.0 ug/g dry	-	2.1	-	-
Barium	1.0 ug/g dry	-	43.3	-	-
Beryllium	0.5 ug/g dry	-	<0.5	-	-
Boron	5.0 ug/g dry	-	<5.0	-	-
Cadmium	0.5 ug/g dry	-	<0.5	-	-
Chromium	5.0 ug/g dry	-	11.9	-	-
Chromium (VI)	0.2 ug/g dry	-	<0.2	-	-
Cobalt	1.0 ug/g dry	-	4.0	-	-
Copper	5.0 ug/g dry	-	11.2	-	-
Lead	1.0 ug/g dry	-	15.0	-	-
Mercury	0.1 ug/g dry	-	<0.1	-	-
Molybdenum	1.0 ug/g dry	-	<1.0	-	-
Nickel	5.0 ug/g dry	-	9.4	-	-
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	-	18.6	-	-
Zinc	20.0 ug/g dry	-	26.6	-	-
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

Certificate of Analysis

Report Date: 19-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 12-Nov-2020

Client PO: 31243

Project Description: PE5088

	Client ID:	BH1-AU1	BH2-AU1	BH2-SS4	BH3-SS6
	Sample Date:	10-Nov-20 09:00	10-Nov-20 09:00	10-Nov-20 09:00	10-Nov-20 12:00
	Sample ID:	2046449-01	2046449-02	2046449-03	2046449-04
	MDL/Units	Soil	Soil	Soil	Soil
1,4-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	<0.05
1,1-Dichloroethane	0.05 ug/g dry	-	-	<0.05	<0.05
1,2-Dichloroethane	0.05 ug/g dry	-	-	<0.05	<0.05
1,1-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	<0.05
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	<0.05
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	<0.05
1,2-Dichloropropane	0.05 ug/g dry	-	-	<0.05	<0.05
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	-	<0.05	<0.05
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	-	<0.05	<0.05
1,3-Dichloropropene, total	0.05 ug/g dry	-	-	<0.05	<0.05
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	<0.05
Ethylene dibromide (dibromoethane, 1,2-)	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	-	-	96.8%	98.7%
Dibromofluoromethane	Surrogate	-	-	107%	105%
Toluene-d8	Surrogate	-	-	123%	123%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	-	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	-	-	400	<4

Certificate of Analysis

Report Date: 19-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 12-Nov-2020

Client PO: 31243

Project Description: PE5088

	Client ID:	BH1-AU1	BH2-AU1	BH2-SS4	BH3-SS6
	Sample Date:	10-Nov-20 09:00	10-Nov-20 09:00	10-Nov-20 09:00	10-Nov-20 12:00
	Sample ID:	2046449-01	2046449-02	2046449-03	2046449-04
	MDL/Units	Soil	Soil	Soil	Soil
F3 PHCs (C16-C34)	8 ug/g dry	-	-	635	<8
F4 PHCs (C34-C50)	6 ug/g dry	-	-	<6	<6
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	<0.02	<0.02	-	-
Acenaphthylene	0.02 ug/g dry	<0.02	<0.02	-	-
Anthracene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [a] anthracene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [a] pyrene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	<0.02	<0.02	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	<0.02	<0.02	-	-
Chrysene	0.02 ug/g dry	<0.02	<0.02	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02	<0.02	-	-
Fluoranthene	0.02 ug/g dry	<0.02	<0.02	-	-
Fluorene	0.02 ug/g dry	<0.02	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	<0.02	<0.02	-	-
1-Methylnaphthalene	0.02 ug/g dry	<0.02	<0.02	-	-
2-Methylnaphthalene	0.02 ug/g dry	<0.02	<0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04	<0.04	-	-
Naphthalene	0.01 ug/g dry	<0.01	<0.01	-	-
Phenanthrene	0.02 ug/g dry	<0.02	<0.02	-	-
Pyrene	0.02 ug/g dry	<0.02	<0.02	-	-
2-Fluorobiphenyl	Surrogate	69.4%	69.3%	-	-
Terphenyl-d14	Surrogate	93.9%	109%	-	-

Certificate of Analysis

Report Date: 19-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 12-Nov-2020

Client PO: 31243

Project Description: PE5088

	Client ID:	BH4-SS3/SS2	BH4-SS4/SS5	DUP	-
	Sample Date:	10-Nov-20 12:00	10-Nov-20 12:00	10-Nov-20 09:00	-
	Sample ID:	2046449-05	2046449-06	2046449-07	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	90.3	58.6	94.8	-
Metals					
Antimony	1.0 ug/g dry	<1.0	-	<1.0	-
Arsenic	1.0 ug/g dry	1.2	-	2.1	-
Barium	1.0 ug/g dry	23.7	-	33.1	-
Beryllium	0.5 ug/g dry	<0.5	-	<0.5	-
Boron	5.0 ug/g dry	<5.0	-	<5.0	-
Cadmium	0.5 ug/g dry	<0.5	-	<0.5	-
Chromium	5.0 ug/g dry	7.2	-	11.4	-
Chromium (VI)	0.2 ug/g dry	<0.2	-	-	-
Cobalt	1.0 ug/g dry	3.9	-	3.9	-
Copper	5.0 ug/g dry	9.5	-	11.9	-
Lead	1.0 ug/g dry	2.9	-	6.3	-
Mercury	0.1 ug/g dry	<0.1	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	<1.0	-
Nickel	5.0 ug/g dry	5.9	-	8.0	-
Selenium	1.0 ug/g dry	<1.0	-	<1.0	-
Silver	0.3 ug/g dry	<0.3	-	<0.3	-
Thallium	1.0 ug/g dry	<1.0	-	<1.0	-
Uranium	1.0 ug/g dry	<1.0	-	<1.0	-
Vanadium	10.0 ug/g dry	16.1	-	20.1	-
Zinc	20.0 ug/g dry	<20.0	-	26.8	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	-	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	-	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	-	<6	-	-

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 (VI)	ND	0.2	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						
Mercury	ND	0.1	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						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	*0.864*		*ug/g*		*64.8*	*50-140*			
Surrogate: Terphenyl-d14	*1.21*		*ug/g*		*90.8*	*50-140*			
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						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*8.39*		*ug/g*		*105*	*50-140*			
Surrogate: Dibromofluoromethane	*8.75*		*ug/g*		*109*	*50-140*			
Surrogate: Toluene-d8	*9.07*		*ug/g*		*113*	*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			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Metals									
Antimony	1.1	1.0	ug/g dry	ND			NC	30	
Arsenic	3.1	1.0	ug/g dry	2.9			8.6	30	
Barium	56.1	1.0	ug/g dry	55.8			0.5	30	
Beryllium	0.5	0.5	ug/g dry	ND			NC	30	
Boron	6.4	5.0	ug/g dry	6.9			8.8	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	16.3	5.0	ug/g dry	16.9			3.9	30	
Cobalt	4.9	1.0	ug/g dry	4.7			3.8	30	
Copper	8.4	5.0	ug/g dry	8.3			1.1	30	
Lead	11.0	1.0	ug/g dry	10.9			1.3	30	
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	8.7	5.0	ug/g dry	8.8			0.8	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	26.6	10.0	ug/g dry	29.4			10.1	30	
Zinc	52.0	20.0	ug/g dry	51.7			0.5	30	
Physical Characteristics									
% Solids	90.8	0.1	% by Wt.	90.9			0.1	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g dry	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g dry	ND			NC	40	
Anthracene	0.022	0.02	ug/g dry	0.020			8.8	40	
Benzo [a] anthracene	0.033	0.02	ug/g dry	0.043			24.6	40	
Benzo [a] pyrene	0.032	0.02	ug/g dry	0.046			33.9	40	
Benzo [b] fluoranthene	0.040	0.02	ug/g dry	0.048			20.0	40	
Benzo [g,h,i] perylene	ND	0.02	ug/g dry	0.028			NC	40	
Benzo [k] fluoranthene	0.023	0.02	ug/g dry	0.032			30.5	40	
Chrysene	0.043	0.02	ug/g dry	0.053			20.6	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g dry	ND			NC	40	
Fluoranthene	0.081	0.02	ug/g dry	0.106			27.3	40	
Fluorene	ND	0.02	ug/g dry	ND			NC	40	
Indeno [1,2,3-cd] pyrene	0.021	0.02	ug/g dry	0.025			20.5	40	
1-Methylnaphthalene	ND	0.02	ug/g dry	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g dry	ND			NC	40	
Naphthalene	ND	0.01	ug/g dry	ND			NC	40	
Phenanthrene	0.050	0.02	ug/g dry	0.068			31.0	40	
Pyrene	0.066	0.02	ug/g dry	0.090			30.9	40	
Surrogate: 2-Fluorobiphenyl	*0.825*		*ug/g dry*		*56.2*	*50-140*			
Surrogate: Terphenyl-d14	*1.33*		*ug/g dry*		*90.7*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g dry	ND			NC	50	
Bromoform	ND	0.05	ug/g dry	ND			NC	50	
Bromomethane	ND	0.05	ug/g dry	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g dry	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chloroform	ND	0.05	ug/g dry	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g dry	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,4-Dichlorobenzene	0.130	0.05	ug/g dry	0.101			25.3	50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g dry	ND			NC	50	
Hexane	ND	0.05	ug/g dry	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g dry	ND			NC	50	
Styrene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	*8.34*		*ug/g dry*		*97.9*	*50-140*			
Surrogate: Dibromofluoromethane	*8.90*		*ug/g dry*		*104*	*50-140*			
Surrogate: Toluene-d8	*10.6*		*ug/g dry*		*124*	*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)	203	7	ug/g	ND	102	80-120			
F2 PHCs (C10-C16)	108	4	ug/g	ND	113	60-140			
F3 PHCs (C16-C34)	276	8	ug/g	ND	117	60-140			
F4 PHCs (C34-C50)	165	6	ug/g	ND	111	60-140			
Metals									
Antimony	46.3	1.0	ug/g	ND	91.8	70-130			
Arsenic	50.3	1.0	ug/g	1.2	98.2	70-130			
Barium	71.3	1.0	ug/g	22.3	97.9	70-130			
Beryllium	51.5	0.5	ug/g	ND	103	70-130			
Boron	47.4	5.0	ug/g	ND	89.2	70-130			
Cadmium	46.9	0.5	ug/g	ND	93.7	70-130			
Chromium (VI)	0.2	0.2	ug/g	ND	85.5	70-130			
Chromium	56.9	5.0	ug/g	6.8	100	70-130			
Cobalt	50.1	1.0	ug/g	1.9	96.4	70-130			
Copper	51.1	5.0	ug/g	ND	95.6	70-130			
Lead	51.3	1.0	ug/g	4.3	93.8	70-130			
Mercury	1.67	0.1	ug/g	ND	111	70-130			
Molybdenum	47.8	1.0	ug/g	ND	95.1	70-130			
Nickel	52.1	5.0	ug/g	ND	97.1	70-130			
Selenium	48.1	1.0	ug/g	ND	95.9	70-130			
Silver	40.5	0.3	ug/g	ND	81.0	70-130			
Thallium	48.8	1.0	ug/g	ND	97.5	70-130			
Uranium	49.6	1.0	ug/g	ND	98.8	70-130			
Vanadium	61.4	10.0	ug/g	11.8	99.2	70-130			
Zinc	67.8	20.0	ug/g	20.7	94.3	70-130			
Semi-Volatiles									
Acenaphthene	0.142	0.02	ug/g	ND	77.5	50-140			
Acenaphthylene	0.111	0.02	ug/g	ND	60.7	50-140			
Anthracene	0.167	0.02	ug/g	0.020	80.0	50-140			
Benzo [a] anthracene	0.167	0.02	ug/g	0.043	67.6	50-140			
Benzo [a] pyrene	0.169	0.02	ug/g	0.046	67.2	50-140			
Benzo [b] fluoranthene	0.211	0.02	ug/g	0.048	88.6	50-140			
Benzo [g,h,i] perylene	0.169	0.02	ug/g	0.028	76.7	50-140			
Benzo [k] fluoranthene	0.222	0.02	ug/g	0.032	104	50-140			
Chrysene	0.189	0.02	ug/g	0.053	74.5	50-140			
Dibenzo [a,h] anthracene	0.150	0.02	ug/g	ND	81.8	50-140			
Fluoranthene	0.245	0.02	ug/g	0.106	75.3	50-140			
Fluorene	0.134	0.02	ug/g	ND	72.9	50-140			
Indeno [1,2,3-cd] pyrene	0.164	0.02	ug/g	0.025	75.5	50-140			
1-Methylnaphthalene	0.138	0.02	ug/g	ND	75.2	50-140			
2-Methylnaphthalene	0.145	0.02	ug/g	ND	79.2	50-140			
Naphthalene	0.155	0.01	ug/g	ND	84.7	50-140			
Phenanthrene	0.190	0.02	ug/g	0.068	66.1	50-140			
Pyrene	0.233	0.02	ug/g	0.090	78.0	50-140			
Surrogate: 2-Fluorobiphenyl	*1.06*		*ug/g*		*72.1*	*50-140*			
Surrogate: Terphenyl-d14	*1.35*		*ug/g*		*92.0*	*50-140*			
Volatiles									
Acetone	11.9	0.50	ug/g	ND	119	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzene	3.27	0.02	ug/g	ND	81.7	60-130			
Bromodichloromethane	2.89	0.05	ug/g	ND	72.4	60-130			
Bromoform	4.85	0.05	ug/g	ND	121	60-130			
Bromomethane	4.34	0.05	ug/g	ND	108	50-140			
Carbon Tetrachloride	4.96	0.05	ug/g	ND	124	60-130			
Chlorobenzene	3.97	0.05	ug/g	ND	99.2	60-130			
Chloroform	3.84	0.05	ug/g	ND	96.0	60-130			
Dibromochloromethane	4.69	0.05	ug/g	ND	117	60-130			
Dichlorodifluoromethane	5.06	0.05	ug/g	ND	127	50-140			
1,2-Dichlorobenzene	3.79	0.05	ug/g	ND	94.8	60-130			
1,3-Dichlorobenzene	3.87	0.05	ug/g	ND	96.7	60-130			
1,4-Dichlorobenzene	3.89	0.05	ug/g	ND	97.3	60-130			
1,1-Dichloroethane	3.46	0.05	ug/g	ND	86.5	60-130			
1,2-Dichloroethane	4.16	0.05	ug/g	ND	104	60-130			
1,1-Dichloroethylene	3.24	0.05	ug/g	ND	80.9	60-130			
cis-1,2-Dichloroethylene	3.33	0.05	ug/g	ND	83.4	60-130			
trans-1,2-Dichloroethylene	3.31	0.05	ug/g	ND	82.9	60-130			
1,2-Dichloropropane	3.27	0.05	ug/g	ND	81.8	60-130			
cis-1,3-Dichloropropylene	3.88	0.05	ug/g	ND	97.0	60-130			
trans-1,3-Dichloropropylene	4.55	0.05	ug/g	ND	114	60-130			
Ethylbenzene	3.84	0.05	ug/g	ND	96.1	60-130			
Ethylene dibromide (dibromoethane, 1,2-	3.82	0.05	ug/g	ND	95.6	60-130			
Hexane	4.08	0.05	ug/g	ND	102	60-130			
Methyl Ethyl Ketone (2-Butanone)	9.59	0.50	ug/g	ND	95.9	50-140			
Methyl Isobutyl Ketone	8.35	0.50	ug/g	ND	83.5	50-140			
Methyl tert-butyl ether	7.30	0.05	ug/g	ND	73.0	50-140			
Methylene Chloride	3.56	0.05	ug/g	ND	88.9	60-130			
Styrene	4.07	0.05	ug/g	ND	102	60-130			
1,1,1,2-Tetrachloroethane	4.62	0.05	ug/g	ND	115	60-130			
1,1,2,2-Tetrachloroethane	3.93	0.05	ug/g	ND	98.4	60-130			
Tetrachloroethylene	4.00	0.05	ug/g	ND	100	60-130			
Toluene	3.83	0.05	ug/g	ND	95.7	60-130			
1,1,1-Trichloroethane	4.15	0.05	ug/g	ND	104	60-130			
1,1,2-Trichloroethane	3.00	0.05	ug/g	ND	75.1	60-130			
Trichloroethylene	3.69	0.05	ug/g	ND	92.2	60-130			
Trichlorofluoromethane	4.64	0.05	ug/g	ND	116	50-140			
Vinyl chloride	5.18	0.02	ug/g	ND	130	50-140			
m,p-Xylenes	7.93	0.05	ug/g	ND	99.2	60-130			
o-Xylene	4.16	0.05	ug/g	ND	104	60-130			
Surrogate: 4-Bromofluorobenzene	*7.75*		*ug/g*		*96.9*	*50-140*			
Surrogate: Dibromofluoromethane	*8.75*		*ug/g*		*109*	*50-140*			
Surrogate: Toluene-d8	*7.34*		*ug/g*		*91.7*	*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.
NC: Not Calculated

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

CCME PHC additional information:

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

PARACEL LABORATORIES LTD.

Paracel ID: 2046449

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2046449	Nº 52588

Client Name: Paterson Group Inc.	Project Ref: PE5088	Page __ of __
Contact Name: Kaylyn Munch	Quote #:	Turnaround Time
Address: 154 Colonnade Rd S.	PO #: 31243	☐ 1 day ☐ 3 day
	E-mail: kmunch@patersongroup.ca	☐ 2 day ☒ Regular
Telephone: 613-226-7381		Date Required:

Regulation 153/04	Other Regulation
☐ Table 1 ☐ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ CCME ☐ MISA
☒ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm
☐ Table ___	Mun: ___
For RSC: ☐ Yes ☐ No	☐ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	Required Analysis: VOC, PHC F1-F4	Metals, Hg, CrVI	PAHs	PHC (F1-F4)	Metals ICP
1	BH1-AU1	S		1	Nov.10/20	am			✓		
2	BH2-AU1	|		1	|	am		✓	✓		
3	BH2-SS4	|		2	|	am	✓				
4	BH3-SS6	|		2	|	pm	✓				
5	BH4-SS3/SS2	|		1	|	pm		✓			
6	BH4-SS4/SS5	|		2	|	pm				✓	
7	DUP	↓		1	↓	am		✓			✓
8											
9											
10											

Comments:

Method of Delivery: Drop Box

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: BCam	Verified By: BCam
Relinquished By (Print):	Date/Time:	Date/Time: Nov 12, 2020 17:45	Date/Time: Nov 12, 2020 18:09
Date/Time:	Temperature: °C	Temperature: 19.9 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Karyn Munch

Client PO: 31282
Project: PE5088
Custody: 52588

Report Date: 25-Nov-2020
Order Date: 23-Nov-2020

Order #: 2048088

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

Paracel ID	Client ID
2048088-01	BH2-SS4

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 31282

Report Date: 25-Nov-2020

Order Date: 23-Nov-2020

Project Description: PE5088

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	24-Nov-20	24-Nov-20
Solids, %	Gravimetric, calculation	24-Nov-20	24-Nov-20

Certificate of Analysis

Report Date: 25-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 23-Nov-2020

Client PO: 31282

Project Description: PE5088

	Client ID:	BH2-SS4	-	-	-
	Sample Date:	10-Nov-20 09:00	-	-	-
	Sample ID:	2048088-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	86.8	-	-	-
Metals					
Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	1.8	-	-	-
Barium	1.0 ug/g dry	32.8	-	-	-
Beryllium	0.5 ug/g dry	<0.5	-	-	-
Boron	5.0 ug/g dry	<5.0	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	5.0 ug/g dry	9.7	-	-	-
Cobalt	1.0 ug/g dry	4.1	-	-	-
Copper	5.0 ug/g dry	9.2	-	-	-
Lead	1.0 ug/g dry	4.8	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	5.0 ug/g dry	7.1	-	-	-
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	19.3	-	-	-
Zinc	20.0 ug/g dry	<20.0	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	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						

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1.0	ug/g dry	ND			NC	30	
Arsenic	4.2	1.0	ug/g dry	3.9			9.1	30	
Barium	75.1	1.0	ug/g dry	69.9			7.2	30	
Beryllium	0.7	0.5	ug/g dry	0.6			9.7	30	
Boron	7.5	5.0	ug/g dry	6.6			12.7	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium	28.8	5.0	ug/g dry	28.0			2.9	30	
Cobalt	6.2	1.0	ug/g dry	6.0			3.4	30	
Copper	12.4	5.0	ug/g dry	11.8			5.1	30	
Lead	10.5	1.0	ug/g dry	9.9			5.9	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	16.9	5.0	ug/g dry	16.2			4.0	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	29.6	10.0	ug/g dry	29.2			1.3	30	
Zinc	49.4	20.0	ug/g dry	45.6			7.9	30	
Physical Characteristics									
% Solids	90.5	0.1	% by Wt.	90.7			0.2	25	

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	47.2	1.0	ug/g	ND	94.3	70-130			
Arsenic	49.8	1.0	ug/g	1.5	96.5	70-130			
Barium	70.7	1.0	ug/g	28.0	85.5	70-130			
Beryllium	49.8	0.5	ug/g	ND	99.1	70-130			
Boron	51.1	5.0	ug/g	ND	97.0	70-130			
Cadmium	46.1	0.5	ug/g	ND	92.0	70-130			
Chromium	59.0	5.0	ug/g	11.2	95.6	70-130			
Cobalt	50.0	1.0	ug/g	2.4	95.3	70-130			
Copper	51.4	5.0	ug/g	ND	93.3	70-130			
Lead	50.2	1.0	ug/g	4.0	92.6	70-130			
Molybdenum	47.3	1.0	ug/g	ND	94.3	70-130			
Nickel	52.9	5.0	ug/g	6.5	92.9	70-130			
Selenium	45.8	1.0	ug/g	ND	91.1	70-130			
Silver	45.1	0.3	ug/g	ND	90.2	70-130			
Thallium	47.3	1.0	ug/g	ND	94.5	70-130			
Uranium	47.8	1.0	ug/g	ND	95.1	70-130			
Vanadium	57.9	10.0	ug/g	11.7	92.4	70-130			
Zinc	60.8	20.0	ug/g	ND	85.0	70-130			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

PARACEL LABORATORIES LTD.

Paracel ID: 2048088

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2348088 ~~2046445~~	Nº 52588

Client Name: Paterson Group Inc.	Project Ref: PE5088	Page __ of __
Contact Name: Kaylyn Munch	Quote #:	Turnaround Time
Address: 154 Colonnade Rd S.	PO #: ~~31243~~ 31282	☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone: 613-226-7381	E-mail: kmunch@patersongroup.ca	Date Required:

Regulation 153/04	Other Regulation
☐ Table 1 ☐ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ CCME ☐ MISA
☒ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm
☐ Table	Mun:
For RSC: ☐ Yes ☐ No	☐ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	Required Analysis: VOC, PHC F1-F4	metals, Hg, CrVI	PAHs	PHC (F1-F4)	metals ICP
1	BH1-AU1	S		1	Nov 10/20	am			✓		
2	BH2-AU1	"		1	"	am		✓	✓		
3	BH2-SS4	"		2	"	am	✓				
4	BH3-SS6	"		2	"	pm	✓				
5	BH4-SS3/SS2	"		1	"	pm		✓			
6	BH4-SS4/SS5	"		2	"	pm				✓	
7	DUP	↓		1	↓	am		✓			✓
8											
9											
10											

Comments:

Method of Delivery: Drop Box

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: 8am	Verified By: BCam
Relinquished By (Print):	Date/Time:	Date/Time: Nov 12, 2020 17:45	Date/Time: Nov 12, 2020 18:09
Date/Time:	Temperature: °C	Temperature: 19.9 °C	pH Verified: ☐ By:

Chain of Custody (Blank).xlsx

Revision 3.0

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Karyn Munch

Client PO: 31282
Project: PE5088
Custody: 52432

Report Date: 26-Nov-2020
Order Date: 20-Nov-2020

Order #: 2047672

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

Paracel ID	Client ID
2047672-01	BH2-SS5

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 26-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 20-Nov-2020

Client PO: 31282

Project Description: PE5088

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	24-Nov-20	25-Nov-20
PHC F1	CWS Tier 1 - P&T GC-FID	24-Nov-20	25-Nov-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	23-Nov-20	24-Nov-20
Solids, %	Gravimetric, calculation	23-Nov-20	24-Nov-20

Certificate of Analysis

Report Date: 26-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 20-Nov-2020

Client PO: 31282

Project Description: PE5088

	Client ID:	BH2-SS5	-	-	-
	Sample Date:	10-Nov-20 09:00	-	-	-
	Sample ID:	2047672-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	58.9	-	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02 [1]	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05 [1]	-	-	-
Toluene	0.05 ug/g dry	<0.05 [1]	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05 [1]	-	-	-
o-Xylene	0.05 ug/g dry	<0.05 [1]	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05 [1]	-	-	-
Toluene-d8	Surrogate	108% [1]	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7 [1]	-	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	-	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	-	-

Certificate of Analysis

Report Date: 26-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 20-Nov-2020

Client PO: 31282

Project Description: PE5088

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*8.43*		*ug/g*		*105*	*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			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Physical Characteristics									
% Solids	68.7	0.1	% by Wt.	68.3			0.5	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*12.9*		*ug/g dry*		*108*	*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)	198	7	ug/g	ND	98.9	80-120			
F2 PHCs (C10-C16)	142	4	ug/g	ND	117	60-140			
F3 PHCs (C16-C34)	387	8	ug/g	ND	130	60-140			
F4 PHCs (C34-C50)	234	6	ug/g	ND	124	60-140			
Volatiles									
Benzene	4.43	0.02	ug/g	ND	111	60-130			
Ethylbenzene	4.32	0.05	ug/g	ND	108	60-130			
Toluene	4.47	0.05	ug/g	ND	112	60-130			
m,p-Xylenes	8.24	0.05	ug/g	ND	103	60-130			
o-Xylene	4.17	0.05	ug/g	ND	104	60-130			
Surrogate: Toluene-d8	*8.30*		*ug/g*		*104*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

1 : This analysis was conducted after the accepted holding time had been exceeded.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

PARACEL LABORATORIES LTD.

Paracel ID: 2047672

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2047671 - water 2047672 - Soil	№ 52432

Client Name: PATERSON	Project Ref: PE5088
Contact Name: KARYN MUNCH	Quote #:
Address: 154 COLONNADE Rd, S, OTTAWA, ONT.	PO #: 31282
Telephone: (613) 226-7381	E-mail: KMUNCH@PATERSONGROUP.CA

Page 1 of 1

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)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	VOCs	PHCs	Metals By ICP	Hg	CrVI	PHCs (F1→F4)	BTEX						
1	BH1-GW1	GW		6	Nov. 18/2020		✓	✓	✓	✓	✓								
2	MW	GW		3	Nov. 18/2020		✓	✓											
3	BH2-GW1	GW		3	Nov 19/2020		✓	✓											
4	Dup	GW		1	Nov. 18/2020				✓										
5	BH2-SS5	S		2	Nov. 10/2020							✓	✓						
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Drop Box

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: BCam	Verified By: BCam
Relinquished By (Print): Dominic Lowery	Date/Time:	Date/Time: Nov 20, 20 18:10	Date/Time: Nov 21, 2020 14:43
Date/Time: Nov. 20/2020	Temperature: °C	Temperature: 15.6 °C	pH Verified: ☐ By: NA

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Karyn Munch

Client PO: 31282
Project: PE5088
Custody: 52432

Report Date: 27-Nov-2020
Order Date: 20-Nov-2020

Order #: 2047671

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

Paracel ID	Client ID
2047671-01	BH1-GW1
2047671-02	MW
2047671-03	BH2-GW1
2047671-04	DUP

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 27-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 20-Nov-2020

Client PO: 31282

Project Description: PE5088

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent - water	MOE E3056 - colourimetric	24-Nov-20	24-Nov-20
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	23-Nov-20	24-Nov-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	23-Nov-20	23-Nov-20
PHC F1	CWS Tier 1 - P&T GC-FID	23-Nov-20	24-Nov-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	26-Nov-20	26-Nov-20
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	23-Nov-20	24-Nov-20

Certificate of Analysis

Report Date: 27-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 20-Nov-2020

Client PO: 31282

Project Description: PE5088

	Client ID:	BH1-GW1	MW	BH2-GW1	DUP
	Sample Date:	18-Nov-20 09:00	18-Nov-20 09:00	19-Nov-20 09:00	18-Nov-20 09:00
	Sample ID:	2047671-01	2047671-02	2047671-03	2047671-04
	MDL/Units	Water	Water	Water	Water
Metals					
Mercury	0.1 ug/L	<0.1	-	-	-
Antimony	0.5 ug/L	<0.5	-	-	<0.5
Arsenic	1 ug/L	1	-	-	2
Barium	1 ug/L	107	-	-	99
Beryllium	0.5 ug/L	<0.5	-	-	<0.5
Boron	10 ug/L	126	-	-	119
Cadmium	0.1 ug/L	<0.1	-	-	<0.1
Chromium	1 ug/L	<1	-	-	<1
Chromium (VI)	10 ug/L	<10	-	-	-
Cobalt	0.5 ug/L	<0.5	-	-	<0.5
Copper	0.5 ug/L	1.3	-	-	3.2
Lead	0.1 ug/L	<0.1	-	-	<0.1
Molybdenum	0.5 ug/L	15.1	-	-	15.3
Nickel	1 ug/L	<1	-	-	<1
Selenium	1 ug/L	6	-	-	6
Silver	0.1 ug/L	<0.1	-	-	<0.1
Sodium	200 ug/L	126000	-	-	121000
Thallium	0.1 ug/L	<0.1	-	-	<0.1
Uranium	0.1 ug/L	3.5	-	-	3.6
Vanadium	0.5 ug/L	2.5	-	-	2.8
Zinc	5 ug/L	<5	-	-	6
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	-
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Chloroform	0.5 ug/L	<0.5	1.8	1.6	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-

Certificate of Analysis

Report Date: 27-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 20-Nov-2020

Client PO: 31282

Project Description: PE5088

	Client ID:	BH1-GW1	MW	BH2-GW1	DUP
	Sample Date:	18-Nov-20 09:00	18-Nov-20 09:00	19-Nov-20 09:00	18-Nov-20 09:00
	Sample ID:	2047671-01	2047671-02	2047671-03	2047671-04
	MDL/Units	Water	Water	Water	Water
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	-
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	-
4-Bromofluorobenzene	Surrogate	95.7%	98.2%	102%	-
Dibromofluoromethane	Surrogate	134%	132%	135%	-
Toluene-d8	Surrogate	128%	131%	134%	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	-

Certificate of Analysis

Report Date: 27-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 20-Nov-2020

Client PO: 31282

Project Description: PE5088

	Client ID:	BH1-GW1	MW	BH2-GW1	DUP
	Sample Date:	18-Nov-20 09:00	18-Nov-20 09:00	19-Nov-20 09:00	18-Nov-20 09:00
	Sample ID:	2047671-01	2047671-02	2047671-03	2047671-04
	MDL/Units	Water	Water	Water	Water
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	-

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						
Metals									
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
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						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*82.6*		*ug/L*		*103*	*50-140*			
Surrogate: Dibromofluoromethane	*102*		*ug/L*		*127*	*50-140*			
Surrogate: Toluene-d8	*99.3*		*ug/L*		*124*	*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	
Metals									
Mercury	ND	0.1	ug/L	ND			NC	20	
Antimony	ND	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	ND	1	ug/L	ND			NC	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	ND	10	ug/L	ND			NC	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium (VI)	ND	10	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	ND	0.5	ug/L	ND			NC	20	
Lead	ND	0.1	ug/L	ND			NC	20	
Molybdenum	ND	0.5	ug/L	ND			NC	20	
Nickel	ND	1	ug/L	ND			NC	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	216	200	ug/L	219			1.8	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	ND	0.1	ug/L	ND			NC	20	
Vanadium	ND	0.5	ug/L	ND			NC	20	
Zinc	ND	5	ug/L	ND			NC	20	
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	

Certificate of Analysis

Report Date: 27-Nov-2020

Client: Paterson Group Consulting Engineers

Order Date: 20-Nov-2020

Client PO: 31282

Project Description: PE5088

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*70.8*		*ug/L*		*88.6*	*50-140*			
Surrogate: Dibromofluoromethane	*103*		*ug/L*		*129*	*50-140*			
Surrogate: Toluene-d8	*103*		*ug/L*		*129*	*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)	1850	25	ug/L	ND	92.3	68-117			
Metals									
Mercury	3.24	0.1	ug/L	ND	108	70-130			
Antimony	45.9	0.5	ug/L	ND	91.3	80-120			
Arsenic	54.2	1	ug/L	ND	108	80-120			
Barium	52.6	1	ug/L	ND	104	80-120			
Beryllium	58.5	0.5	ug/L	ND	117	80-120			
Boron	51	10	ug/L	ND	101	80-120			
Cadmium	52.4	0.1	ug/L	ND	105	80-120			
Chromium (VI)	180	10	ug/L	ND	90.0	70-130			
Chromium	57.2	1	ug/L	ND	114	80-120			
Cobalt	55.1	0.5	ug/L	ND	110	80-120			
Copper	55.0	0.5	ug/L	ND	110	80-120			
Lead	53.4	0.1	ug/L	ND	107	80-120			
Molybdenum	47.0	0.5	ug/L	ND	93.8	80-120			
Nickel	54.5	1	ug/L	ND	109	80-120			
Selenium	52.7	1	ug/L	ND	105	80-120			
Silver	48.2	0.1	ug/L	ND	96.4	80-120			
Sodium	9290	200	ug/L	219	90.7	80-120			
Thallium	52.1	0.1	ug/L	ND	104	80-120			
Uranium	55.2	0.1	ug/L	ND	110	80-120			
Vanadium	54.6	0.5	ug/L	ND	109	80-120			
Zinc	58	5	ug/L	ND	116	80-120			
Volatiles									
Acetone	89.8	5.0	ug/L	ND	89.8	50-140			
Benzene	51.8	0.5	ug/L	ND	130	60-130			
Bromodichloromethane	50.0	0.5	ug/L	ND	125	60-130			
Bromoform	48.1	0.5	ug/L	ND	120	60-130			
Bromomethane	41.5	0.5	ug/L	ND	104	50-140			
Carbon Tetrachloride	51.1	0.2	ug/L	ND	128	60-130			
Chlorobenzene	41.0	0.5	ug/L	ND	103	60-130			
Chloroform	46.0	0.5	ug/L	ND	115	60-130			
Dibromochloromethane	50.5	0.5	ug/L	ND	126	60-130			
Dichlorodifluoromethane	45.7	1.0	ug/L	ND	114	50-140			
1,2-Dichlorobenzene	39.0	0.5	ug/L	ND	97.4	60-130			
1,3-Dichlorobenzene	38.0	0.5	ug/L	ND	94.9	60-130			
1,4-Dichlorobenzene	40.8	0.5	ug/L	ND	102	60-130			
1,1-Dichloroethane	43.7	0.5	ug/L	ND	109	60-130			
1,2-Dichloroethane	35.3	0.5	ug/L	ND	88.2	60-130			
1,1-Dichloroethylene	43.1	0.5	ug/L	ND	108	60-130			
cis-1,2-Dichloroethylene	50.5	0.5	ug/L	ND	126	60-130			
trans-1,2-Dichloroethylene	51.7	0.5	ug/L	ND	129	60-130			
1,2-Dichloropropane	44.1	0.5	ug/L	ND	110	60-130			
cis-1,3-Dichloropropylene	48.2	0.5	ug/L	ND	121	60-130			
trans-1,3-Dichloropropylene	40.8	0.5	ug/L	ND	102	60-130			
Ethylbenzene	38.7	0.5	ug/L	ND	96.6	60-130			
Ethylene dibromide (dibromoethane, 1,2	35.5	0.2	ug/L	ND	88.6	60-130			
Hexane	43.8	1.0	ug/L	ND	109	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl Ethyl Ketone (2-Butanone)	87.7	5.0	ug/L	ND	87.7	50-140			
Methyl Isobutyl Ketone	88.7	5.0	ug/L	ND	88.7	50-140			
Methyl tert-butyl ether	101	2.0	ug/L	ND	101	50-140			
Methylene Chloride	44.8	5.0	ug/L	ND	112	60-130			
Styrene	36.0	0.5	ug/L	ND	89.9	60-130			
1,1,1,2-Tetrachloroethane	46.2	0.5	ug/L	ND	115	60-130			
1,1,2,2-Tetrachloroethane	46.1	0.5	ug/L	ND	115	60-130			
Tetrachloroethylene	33.5	0.5	ug/L	ND	83.8	60-130			
Toluene	44.9	0.5	ug/L	ND	112	60-130			
1,1,1-Trichloroethane	46.3	0.5	ug/L	ND	116	60-130			
1,1,2-Trichloroethane	48.0	0.5	ug/L	ND	120	60-130			
Trichloroethylene	42.9	0.5	ug/L	ND	107	60-130			
Trichlorofluoromethane	41.8	1.0	ug/L	ND	104	60-130			
Vinyl chloride	42.8	0.5	ug/L	ND	107	50-140			
m,p-Xylenes	84.5	0.5	ug/L	ND	106	60-130			
o-Xylene	40.6	0.5	ug/L	ND	102	60-130			
Surrogate: 4-Bromofluorobenzene	*63.4*		*ug/L*		*79.3*	*50-140*			
Surrogate: Dibromofluoromethane	*98.6*		*ug/L*		*123*	*50-140*			
Surrogate: Toluene-d8	*86.5*		*ug/L*		*108*	*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: 2047671

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2047671 - water 2047672 - soil	№ 52432

Client Name: PATERSON	Project Ref: PE 5088	Page 1 of 1
Contact Name: KARYN MUNCH	Quote #:	Turnaround Time
Address: 154 COLONNADE Rd, S, OTTAWA, ONT.	PO #: 31282	☐ 1 day ☐ 3 day ☐ 2 day ☑ Regular
Telephone: (613) 226-7381	E-mail: KMUNCH@PATERSONGROUP.CA	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)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	Required Analysis: VOCs	PHCs	Metals by ICP	Hg	CrVI	PHC's (F1→F4)	BTEX						
1	BH1-GW1	GW	\	6	Nov. 18/2020	\	\	\	\	\	\								
2	MW	GW	\	3	Nov. 18/2020	\	\	\											
3	BH2-GW1	GW	\	3	Nov 19/2020	\	\	\											
4	DUP	GW	\	1	Nov. 18/2020	\			\										
5	BH2-SS5	S	\	2	Nov. 10/2020	\						\	\						
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Drop Box

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab: BS	Verified By: BS
Relinquished By (Print): Dominic Lavoie	Date/Time:	Date/Time: Nov 20, 20 18:10	Date/Time: Nov 21, 2020 14:43
Date/Time: Nov. 20/2020	Temperature: °C	Temperature: 15.6 °C	pH Verified: ☑ By: BS