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Phase II Environmental Site Assessment

1050 and 1060 Bank Street
Ottawa, Ontario

Prepared For

2641723 Ontario Inc.

January 10, 2020

Report: PE4783-2

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the property addressed 1050 and 1060 Bank Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address areas of potential environmental concerns (APECs) on the Phase II Property, resulting from historical on- or off-site potentially contaminating activities (PCAs). An initial Phase II ESA for 1050 Bank Street was carried out in conjunction with a Geotechnical Investigation in 2018. Three boreholes, completed with monitoring well installations, were advanced on the property at this time. The current investigation consisted of the placement of an additional seven (7) boreholes across the entire property, four (4) of which were constructed with groundwater monitoring well installations. The findings of both investigations are presented in this report.

Soil samples obtained from all of the boreholes were screened using visual observations and combustible vapour measurements. Sixteen (16) soil samples were submitted for laboratory analysis of a combination of benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, F1-F4), volatile organic compounds (VOCs), metals (including As, Se, Sb, Hg and CrVI) and/or polycyclic aromatic hydrocarbons (PAHs).

Based on the analytical test results, ethylbenzene, xylenes, PHC F1 and F2 concentrations in compliance with the MECP Table 3 residential standards, were identified in a soil sample recovered from BH1 (2018). Concentrations of PHC F3, F4 and/or F4G were identified in samples recovered from BH2-19, BH5-19 and BH7-19; identified parameters were in compliance with the MECP Table 3 residential standards. No other BTEX or PHC parameters were identified in the samples analysed. Metal parameters identified in each of the samples analysed were also in compliance with the MECP Table 3 residential standards. No PAH or VOC parameters were identified in any of the soil samples analysed. The soil results are in compliance with the MECP Table 3 residential standards.

Groundwater samples from monitoring wells installed in BH1, BH2, BH3, BH1-19, BH2-19, BH3-19 and BH6-19 were recovered and analysed for PHC and VOC parameters. Concentrations of hexane, toluene, xylenes and PHC (F_1) were identified in groundwater Sample BH1-GW1, at concentrations below the MECP Table 3 residential standards. No other parameters were identified above the method detection limits in any of the groundwater samples analysed. The groundwater results are in compliance with the MECP Table 3 residential standards.

Conclusion

Based on the findings of the Phase II ESA, no further investigation is recommended at this time.

If the monitoring wells installed at the Phase II Property are not going to be used in the future, they should be abandoned according to Ontario Regulation 903. The monitoring wells will be registered with the MECP under this regulation. Further information can be provided up request in this regard.

1.0 INTRODUCTION

At the request of 2641723 Ontario Inc., Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the properties addressed 1050 and 1060 Bank Street, in the City of Ottawa, Ontario, herein referred to as the Phase II Property. The purpose of this Phase II ESA was to address areas of potential environmental concern (APECs) identified in the December 2019 Phase I ESA conducted by Paterson.

It should be noted that a Phase II ESA was conducted on the northern portion of the Phase II Property (1050 Bank Street) by Paterson in June of 2018, for due diligence purposes. The findings of the 2018 investigation are presented in this report.

1.1 Site Description

Address:	1050 and 1060 Bank Street, Ottawa, Ontario
Legal Description:	Part of Lots 2, 3, 4, 5, 6 and 7 of Registered Plan RP101126 and Part of Lot A of Registered Plan RP116274, in the City of Ottawa, Ontario
Property Identification Numbers:	04143-0673, 04143-0674, 04143-0324, 04143-0676
Location:	The Phase II Property is located on the west side of Bank Street between Alymer Avenue and Euclid Avenue, in the City of Ottawa, Ontario. Refer to Figure 1 - Key Plan in the Figures section following the text.
Latitude and Longitude:	45° 23' 43.16" N, 75° 41' 3.72" W
Configuration:	Irregular
Site Area:	2,115 m^2 (approximate)

1.2 Property Ownership

The subject property is currently owned by 614762 Ontario Inc. Paterson was retained by Mr. Domenic Santaguida of 614762 Ontario Inc. and 2641723 Ontario Inc., to complete this Phase II ESA. Mr. Santaguida can be contacted by telephone at 613-868-5536.

1.3 Current and Proposed Future Uses

The Phase II Property is currently used for commercial purposes: a restaurant and retail store at 1050 Bank Street and a restaurant at 1060 Bank Street. It is our understanding that the Phase II Property will be redeveloped with a multi-storey mixed-use building consisting of ground-floor commercial and residential units above, with one (1) level 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 the Environment (MECP), April 2011. The MECP Table 3 Residential Standards are based on the following considerations:

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

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is located in an urban area surrounded by various sized commercial, residential and/or institutional structures. The Phase II Property is at a similar grade as the adjacent properties. Site topography is relatively flat, while the regional topography slopes gently down to the east and to the south. The regional topography generally slopes down in a south/southeasterly direction towards the Rideau River. Site drainage consists primarily of sheet flow to catch basins situated on the Phase II Property and Bank Street. The Phase II Property is situated within a municipally serviced area.

2.2 Past Investigations

Paterson reviewed the following reports prior to conducting the Phase II ESA:

- Shallow Soils Investigation, 1050 Bank Street, Ottawa, Ontario, prepared by Franz Environmental Inc., dated October 2013.

Three (3) boreholes were advanced across the Phase I Property to address potential soil impacts associated with the past use of the site as a retail fuel outlet. Boreholes were advanced to a maximum depth of 6.0m below grade. No visual or olfactory evidence of potential petroleum hydrocarbon impacts were identified.

One soil sample from each borehole was submitted to Maxxam Analytics for benzene, ethylbenzene, toluene and xylenes (BTEX) and petroleum hydrocarbons (PHCs, F_1-F_4) analysis. No BTEX or PHC concentrations were identified above the laboratory method detection limits; the results were in compliance with the 2011 MECP Table 3 residential standards.

No further soil investigation was recommended. It should be noted that the 2013 investigation did not include groundwater testing on the subject site.

- Phase I Environmental Site Assessment, 1050 and 1060 Bank Street, Ottawa Ontario, prepared by Paterson Group Inc., dated December 10, 2019.

Based on the findings of the Phase I ESA, several historical on-site and off-site potentially contaminating activities (PCAs) were considered to result in 10 areas of potential environmental concern (APECs) on the Phase I Property, as shown in Table 1 below.

TABLE 1: 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 former on-site USTs at 1050 Bank Street)	Northeastern portion of the Phase I Property	PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	On-site	BTEX PHCs (F_1-F_4)	Soil, Groundwater
APEC 2 (Resulting from former on-site pump island at 1050 Bank Street)	North-central portion of the Phase I Property	PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	On-site	BTEX PHCs (F_1-F_4)	Soil, Groundwater
APEC 3 (Resulting from former on-site automotive service garage)	Central portion of the Phase I Property	PCA 52 – Storage, maintenance, fuelling and repairing of equipment, vehicles, and materials used to maintain transportation systems	On-site	BTEX PHCs (F_1-F_4) VOCs PAHs	Soil, Groundwater
APEC 4 (Resulting from former on-site pump island at 1060 Bank Street)	South-central portion of the Phase I Property	PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	On-site	BTEX PHCs (F_1-F_4)	Soil, Groundwater
APEC 5 (Resulting from former on-site USTs)	South-central portion of the Phase I Property	PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	On-site	BTEX PHCs (F_1-F_4)	Soil, Groundwater
APEC 6 (Resulting from former on-site automotive body shop)	Southwestern portion of the Phase I Property	PCA 10 – Commercial Autobody Shops	On-site	BTEX PHCs (F_1-F_4) VOCs PAHs	Soil, Groundwater
APEC 7 (Resulting from fill material)	Across the majority of the Phase I Property	PCA 30 - Importation of Fill Material of Unknown Quality	On-site	Metals (including As, Sb, Se) Hg, CrVI	Soil

TABLE 1 Continued: 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 8 (Resulting from former retail fuel outlet and existing service garage at 1063 Bank Street)	Eastern 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	BTEX PHCs (F_1-F_4) VOCs PAHs	Groundwater
APEC 9 (Resulting from former off-site dry cleaner at 1069 Bank Street)	Southeastern portion of the Phase I Property	PCA 37 – Operation of Dry-Cleaning Equipment (where chemicals are used)	Off-site	VOCs	Groundwater
APEC 10 (Resulting from former off-site dry cleaner at 1072 Bank Street)	Southeastern portion of the Phase I Property	PCA 37 – Operation of Dry-Cleaning Equipment (where chemicals are used)	Off-site	VOCs	Groundwater

A Phase II ESA was recommended to address the aforementioned APECs. The APECs are outlined in red on Drawing PE4783-1 – Site Plan, appended to the Phase I ESA report.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The initial subsurface investigation conducted for the northern portion of the Phase II Property (1050 Bank Street) was carried out in conjunction with a Geotechnical Investigation during the interim of May 1 through May 4, 2018. The more recent subsurface investigation was carried out during the interim of December 2 through December 4, 2019. The field programs consisted of drilling a total of ten (10) boreholes across the Phase II Property. The boreholes were completed to depths ranging from approximately 4.4 to 15.2m below ground surface (mbgs). Seven (7) boreholes were completed with monitoring well installations in order to access the groundwater table.

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 (CPCs) identified in the Phase I ESA.

As noted in Table 1 in Section 2.2, CPCs for soil and groundwater include benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, fractions F_1-F_4), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) and/or metals (including arsenic, antimony, selenium, mercury and hexavalent chromium).

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

Based on the 2017 subsurface program, site soils generally consisted of a pavement structure over fill material, underlain by native sand. Bedrock was not encountered during the subsurface program; according to the Geological Survey of Canada website, the bedrock in the area of the Phase I Property is reported to consist of interbedded limestone and shale of the Verulam Formation and is present at depths ranging from approximately 1 to 5 mbgs. During the previous subsurface investigation, boreholes were drilled to depths of 13.72 and 14.63m below grade, and were terminated in overburden; bedrock was not encountered.

During the previous subsurface investigation, groundwater was encountered within the overburden at approximately 11.7m bgs. Based on groundwater contour mapping completed at the time, the groundwater flow beneath the Phase I Property was in a northwesterly direction. Regional groundwater flow is inferred to be to the north, towards the Ottawa River.

Water Bodies and Areas of Natural Significance

No natural water bodies or areas of natural significance are known to exist on or within 30m of the Phase I Property. Browns Inlet, located approximately 180m northwest of the Phase I Property, is identified as a provincially significant wetland.

Potable Water Well Records

No potable well records were identified for the Phase I Property. However, the MECP online interactive well record mapping system identified one domestic well record, dated 1950 on a property to the west of the subject land, at 20 Euclid Avenue. It is expected that this well has not been used since the area was provided with municipally services.

Monitoring Well Records

According to the MECP online interactive well record mapping system, there were no monitoring wells identified on the Phase I Property. However, during the site visit, three (3) monitoring wells drilled during the subsurface investigation in 2017 were identified on the northern portion of the Phase I Property (1050 Bank Street).

Existing Buildings and Structures

1050 Bank Street

The original portion of the one-storey building addressed 1050 Bank Street, was constructed circa 1928, with a concrete foundation and is currently occupied by Siam Kitchen restaurant. A basement level is present beneath this portion of the building. Two (2) one-storey slab-on-grade additions were made to the southern portion of the original building circa 1965 and 1980. The additions are currently occupied by Boomerang Kids consignment store. The building is of concrete construction with stone and wood decorative finishes on the eastern façade, and flat tar-and-gravel style roof.

1060 Bank Street

The building addressed 1060 Bank Street was constructed circa 1947 with a poured concrete foundation and is finished on the exterior with red brick and a flat, tar-and-gravel style roof.

The one-storey building has a basement level and is occupied by the Barley Mow restaurant. A wood patio structure is present adjacent to the east face of the building.

Both subject buildings are heated with natural gas-fired equipment. No other buildings or structures are present on the Phase I Property.

Subsurface Structures and Utilities

The Phase I Property is situated in a municipally serviced area. Underground utility services on the subject land include natural gas, electricity, municipal water and sewer services. The services enter the Phase I Property from Bank Street and Aylmer Avenue. Other than service utilities, no subsurface structures were observed on the Phase I Property at the time of the site visit.

Based on standard practice for subsurface utility installation, service trenches are expected to be present approximately 1 to 2 m below existing grade. In general, trench backfill may provide a preferential pathway for contaminant transport if the water table is at or above the base of the trenches. Based on the findings of the 2018 Phase II ESA, the water table was identified at depths of approximately 11.4 to 11.75m below grade. As the water table was identified at a significant depth below standard service trenches, underground services are not considered to have the potential to create preferential pathways for contaminant migration.

Fill Material

No evidence of fill material was noted at the time of the site visit. Some sand and gravel fill material was noted during the previous Phase II ESA at 1050 Bank Street, within the former tank nest. The fill material was analysed and determined to be in compliance with the MECP Table 3 Residential Standards applicable to the site. Fill material was also identified at 1060 Bank Street, during the concurrent subsurface investigation. The fill material consisted of silty sand and gravel and was considered to be associated with the pavement structure or the backfill of former tank nest and pump island excavations. No deleterious materials or evidence of contamination were noted with respect to the fill material.

Neighbouring Land Use

Neighbouring land use within the Phase I Study Area consists primarily of residential and commercial (along Bank Street) with occasional institutional and community land use, as well as parkland along the Rideau Canal and Brown's Inlet.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As presented in Table 1 in Section 2.2 of this report, a variety of on and off-site PCAs are considered to have resulted in ten (10) APECs on the Phase I Property.

Contaminants of Potential Concern

As noted in Table 1, the contaminants of potential concern (CPCs) in soil and/or groundwater, and associated with the APECs identified in this Phase I ESA include:

- Benzene, ethylbenzene, toluene and xylenes (BTEX);
- Petroleum hydrocarbons (PHCs, Fractions F_1-F_4);
- Volatile Organic Compounds (VOCs);
- Polycyclic aromatic hydrocarbons (PAHs);
- Metals;
- Hydride-forming compounds (As, Sb, Se);
- Mercury (Hg); and
- Hexavalent Chromium (CrVI).

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of the Phase I-ESA was considered to be sufficient to conclude that there are historical on-site and off-site PCAs that have resulted in APECs on the Phase I Property. While several additional historical off-site PCAs were identified, they were not considered to represent APECs on the Phase I Property, based on their separation distances and/or orientations relative to the subject land.

A variety of independent sources were consulted as part of the Phase I ESA, 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. The field measurement of water quality parameters was not conducted at the time of the groundwater sampling events due to instrument failure in the field. There were no other deviations from the Sampling and Analysis Plan.

3.5 Impediments

It was not possible to retrieve soil samples from depths greater than approximately 12m below grade due to running sand encountered at the depth of each borehole location. No other physical impediments were encountered during the field portion of the Phase II ESA.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigations were conducted during the interim of May 1 through May 4, 2018 and December 2 through December 4, 2019 and consisted of drilling a total of ten (10) boreholes across the Phase II Property, seven (7) of which were completed with monitoring well installations.

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 truck mounted CME 55 power auger drill rig. The truck mounted drill rig was provided by George Downing Estate Drilling of Hawkesbury, Ontario. Borehole locations are shown on Drawing PE4783-3 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

A total of 156 soil samples were obtained from the boreholes by means of direct sampling from auger flights and split spoon sampling. The depths at which auger and split spoon samples were obtained from the boreholes are shown as "**AU**" and "**SS**" on the Soil Profile and Test Data Sheets, appended to this report.

Site soils consist of a pavement structure over fill material underlain by native sand or silty sand. The fill material present beneath the pavement structure generally consisted of silty sand with gravel and extended to depths ranging from approximately 0.76 to 2.4m below grade. No deleterious materials or signs of potential contamination were identified in the fill material, which is primarily associated with the pavement structure and the decommissioning and removal of the former underground storage tanks and pump islands. The boreholes were terminated in the native sand or silty sand at depths ranging from approximately 4.4 to 15m below grade.

4.3 Field Screening Measurements

A gastech, calibrated to Hexane was used to measure the combustible vapour concentrations in the headspace of all soil samples obtained from the boreholes. The soil vapours were measured by inserting the analyzer probe into the nominal headspace above the soil sample. Samples were then agitated, and the peak readings recorded.

The combustible vapour readings were generally less than 40ppm in the soil samples obtained and were not considered to be indicative of potential hydrocarbon impacts. Elevated readings between 260 and 800ppm were identified in soil samples obtained from BH1 (2018), at approximate depths of 9 and 12.5m below grade. These readings were considered to be potentially indicative of petroleum hydrocarbon impacts. No obvious staining or odours were noted in the soil samples.

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

4.4 Groundwater Monitoring Well Installation

Groundwater monitoring wells were installed in seven (7) boreholes placed on the Phase II Property. 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	14.63	11.63-14.63	11-14.63	0.30-11	Flushmount
BH2	71.55	14.50	11.50-14.50	11-14.50	0.30-11	Flushmount
BH3	71.50	13.72	10.72-13.72	10.4-13.72	0.30-10.4	Flushmount
BH1-19	71.57	14.63	11.63-14.63	11-14.63	0.3-11	Flushmount
BH2-19	71.48	14.63	11.63-14.63	11-14.63	0.3-11	Flushmount
BH3-19	71.46	14.93	11.93-14.93	11.3-14.93	0.3-11.3	Flushmount
BH6-19	71.62	15.24	12.24-15.24	11.6-15.24	0.3-11.6	Flushmount

4.5 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.

4.6 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan in Appendix 1, the soil and groundwater samples submitted for analytical testing are presented in Tables 3 and 4.

Table 3: Soil Samples Submitted						
Sample ID	**Sample Depth and Stratigraphic Unit**	**Parameters Analyzed**				**Rationale**
		BTEX + PHC (F_1 – F_4)	**VOCs**	**PAHs**	**Metals[1]**	
May 1, 2018						
BH1-SS13	9.1-9.7m Native Sand	X				Sample selected for analysis based on vapour reading of 800ppm.
BH1-SS17	12.2-12.8m Native Sand	X				Sample selected for analysis based on vapour reading of 260ppm and location just below the water table.

Table 3 Continued: Soil Samples Submitted

Sample ID	Sample Depth and Stratigraphic Unit	Parameters Analyzed				Rationale
		BTEX + PHC ($F_1 - F_4$)	VOCs	PAHs	Metals[1]	
May 2, 2018						
BH2-SS12	8.2-8.8m Native Sand	X				Low vapour readings; sample selected based on location near water table (sample wet).
May 3, 2018						
BH3-SS2	0.76-1.37m Fill				X	No deleterious fill material; sample selected from area of former tank nest to confirm quality of imported fill material.
BH3-SS14	12.2-12.8m Native Sand	X				Low vapour readings; sample selected based on location near water table (sample wet).
December 2, 2019						
BH1-SS5*	3.05-4.57m Native Sand	X				Sample selected for analysis based on vapour screening.
BH1-SS17	12.19-12.8m Sandy Silt	X				Sample selected based on location near water table (sample wet).
December 2, 2019						
BH2-SS4	2.29-2.89m Sandy Silt	X	X	X		Sample selected for analysis based on vapour screening.
BH2-SS17	12.19-12.80m Native Sand	X				Sample selected based on location near water table (sample wet).
December 3, 2019						
BH3-SS2	0.76-1.40m Fill				X	Sample selected from area of former building to confirm quality of imported fill material.
BH3-SS6	3.84-4.42m Silt	X	X			Sample selected for analysis based on vapour screening.
BH3-SS16	11.43-12.04m Native Sand	X				Sample selected based on location near water table (sample wet).
BH5-SS2	0.79-1.40m Fill	X	X	X		Sample selected to confirm quality of fill material.

Table 3 Continued: Soil Samples Submitted						
Sample ID	Sample Depth and Stratigraphic Unit	Parameters Analyzed				Rationale
		BTEX + PHC (F_1 – F_4)	VOCs	PAHs	Metals[1]	
December 4, 2019						
BH6-SS18	12.95-13.56m Sandy Silt	X				Sample selected based on location near water table (sample wet).
BH7-SS2	0.76-1.40m Fill				X	Sample selected from area of former pump island to confirm quality of imported fill material.
BH7-SS18	12.95-13.56m Clayey Silt	X				Sample selected based on location near water table (sample wet).

Notes:
1 – Includes mercury (Hg) and hexavalent chromium (CrVI), As, Sb, Se
***** – pH testing
VOC group of parameters includes BTEX parameters

Table 4: Groundwater Samples Submitted						
Sample ID	Screened Interval and Stratigraphic Unit	Parameters Analyzed				Rationale
		BTEX	PHCs (F_1-F_4)	PAHs	VOCs	
May 15, 2018						
BH1-GW1	11.63-14.63m; Native Sand		X		X	Assessment of potential impacts from off-site retail fuel outlet on adjacent property to the south.
BH2-GW1	11.50-14.50m; Native Sand		X		X	Assessment of potential impacts from former on-site retail fuel outlet (former pump island).
BH3-GW1	10.72-13.72m; Native Sand		X		X	Assessment of potential impacts from former on-site retail fuel outlet (former tank nest).
December 10, 2019						
BH2-19-GW1	11.63-14.63m Native Sand		X		X	Assessment of potential impacts from former on-site automotive body shop.
BH6-19-GW1	12.24-15.24m Sandy Silt		X	X	X	Assessment of potential impacts from former on-site retail fuel outlet (former pump island).

Table 4 Continued: Groundwater Samples Submitted

Sample ID	Screened Interval and Stratigraphic Unit	Parameters Analyzed				Rationale
		BTEX	PHCs (F_1-F_4)	PAHs	VOCs	
December 11, 2019						
BH1-19-GW1	11.63-14.63m Sandy Silt		X		X	Assessment of potential impacts from former on-site retail fuel outlet (former underground storage tanks) and former off-site drycleaner.
BH3-19-GW1	11.93-14.93m Native Sand		X		X	Assessment of potential impacts from former on-site automotive repair garage.

Note:
VOC group of parameters includes BTEX parameters

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.

4.7 Residue Management

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

4.8 Elevation Surveying

An elevation survey of all borehole locations was completed by Paterson at the time of the subsurface investigation. All borehole elevations are referenced to the top of spindle of a fire hydrant, located on the northwestern portion of the Phase II Property, with a geodetic elevation of 73.22 m.

4.9 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 consist of a pavement structure over fill material, underlain by native sand or silty sand. Bedrock was not encountered during the subsurface program.

Groundwater was encountered within the native sand at depths ranging from approximately 11.4 to 12.3m below existing grade.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during groundwater sampling events on May 15, 2018 and December 11, 2019 using an electronic water level meter. Groundwater levels are summarized below in Table 5.

All measurements are relative to the top spindle of the fire hydrant, with geodetic elevation of 73.22, on the northwestern portion of the Phase II Property.

Table 5: Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1	71.50	11.39	60.11	May 15, 2018
BH2	71.55	11.75	59.80	May 15, 2018
BH3	71.50	11.73	59.77	May 15, 2018
BH1-19	71.57	12.26	59.31	December 11, 2019
BH2-19	71.48	12.27	59.21	December 11, 2019
BH3-19	71.46	12.30	59.16	December 11, 2019
BH6-19	71.62	12.32	59.30	December 11, 2019

Groundwater contour mapping was completed for groundwater levels measured during both the May 2018 and December 2019 sampling events, as it was not possible to obtain groundwater levels for the 2018 boreholes during the current investigation. Both the 2018 and 2019 groundwater contours are shown on Drawing PE4783-4 - Groundwater Contour Plan. Based on the contour mapping, groundwater flow beneath the Phase II Property appears to flow towards the northwest. An average horizontal hydraulic gradient of approximately 0.055m/m was calculated.

5.3 Fine-Coarse Soil Texture

Based on field soil observations, fine-grained soil standards are not applicable to the Phase II Property.

5.4 Soil: Field Screening

The combustible vapour readings were generally less than 40ppm in the soil samples obtained and were not considered to be indicative of potential hydrocarbon impacts. Elevated readings between 260ppm and 800ppm were identified in soil samples obtained from BH1 (2018), at approximate depths of 9 and 12.5m below grade and were considered to be potentially indicative of petroleum hydrocarbon impacts. No obvious staining or odours were noted in the soil samples.

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

Based on the findings of the field screening, in combination with sample depth and location, a total of 11 soil samples were submitted for analysis of a combination of BTEX, PHC (F1-F4), VOCs, PAHs and metals. The results of the analytical testing, and the selected soil standards, are presented in Tables 6 through 11. The laboratory certificates of analysis are provided in Appendix 1.

Table 6: Analytical Test Results – Soil (2018)
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (ug/g)	Soil Samples (µg/g)				MECP Table 3 Residential Standards (µg/g)
		May 1, 2018		May 2, 2018	May 3, 2018	
		BH1-SS13 9.1-9.7m	BH1-SS17 12.2-12.8m	BH2-SS12 8.2-8.8m	BH3-SS14 12.2-12.8m	
Benzene	0.02	nd	nd	nd	nd	0.2
Ethylbenzene	0.05	0.08	nd	nd	nd	2
Toluene	0.05	nd	nd	nd	nd	2.3
Xylenes	0.05	0.21	nd	nd	nd	3.1
PHC F1	7	25	nd	nd	nd	55
PHC F2	4	47	nd	nd	nd	98
PHC F3	8	nd	nd	nd	nd	300
PHC F4	6	nd	nd	nd	nd	2,800

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

BTEX and PHC concentrations were detected in 2018 at location BH3 (2018), however, no exceedances were identifed.

Table 7: Analytical Test Results – Soil (2019)
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (ug/g)	Soil Samples (µg/g) December 2, 2019				MECP Table 3 Residential Standards (µg/g)
		BH1-SS5 3.1-4.6m	BH1-SS17 12.2-12.8m	BH2-SS4[1] 2.3-2.9m	BH2-SS17 12.2-12.8m	
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
Xylenes	0.05	nd	nd	nd	nd	3.1
PHC F1	7	nd	nd	nd	nd	55
PHC F2	4	nd	nd	nd	nd	98
PHC F3	8	nd	nd	11	16	300
PHC F4	6	nd	nd	nd	15	2,800

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- 1 – BTEX analyzed with VOC group parameters

Table 7 Continued: Analytical Test Results – Soil (2019)
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (ug/g)	Soil Samples ((µg/g) December 3, 2019			MECP Table 3 Residential Standards (µg/g)
		BH3-SS6[1] 3.8-4.4m	BH3-SS16 11.4-12.0m	BH5-SS2[1] 0.8-1.4m	
Benzene	0.02	nd	nd	nd	0.21
Ethylbenzene	0.05	nd	nd	nd	2
Toluene	0.05	nd	nd	nd	2.3
Xylenes	0.05	nd	nd	nd	3.1
PHC F1	7	nd	nd	nd	55
PHC F2	4	nd	nd	nd	98
PHC F3	8	nd	nd	94	300
PHC F4	6	nd	nd	174	2,800
PHC F4	50	NA	NA	719	2,800

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – Parameter not analyzed
- 1 – BTEX analyzed with VOC group parameters

Table 7 Continued: Analytical Test Results – Soil (2019)
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (ug/g)	Soil Samples (µg/g) December 4, 2019		MECP Table 3 Residential Standards (µg/g)
		BH6-SS18 12.9-13.6m	BH7-SS18 12.9-13.6m	
Benzene	0.02	nd	nd	0.21
Ethylbenzene	0.05	nd	nd	2
Toluene	0.05	nd	nd	2.3
Xylenes	0.05	nd	nd	3.1
PHC F1	7	nd	nd	55
PHC F2	4	nd	nd	98
PHC F3	8	nd	24	300
PHC F4	6	nd	27	2,800

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

No BTEX parameter concentrations were detected in the soil samples analyzed. Concentrations of PHC fractions, F3 and F4 were identifed in BH2, BH5 and BH7. All soil samples are in compliance with the selected MECP Table 3 residential standards.

Table 8: Analytical Test Results – Soil (2019)
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 3 Residential Standards (µg/g)
		December 2, 2019	December 3, 2019		
		BH2-SS4 2.3-2.9m	BH3-SS6 3.8-4.4m	BH5-SS2 0.8-1.4m	
Acetone	0.5	nd	nd	nd	16
Benzene	0.02	nd	nd	nd	0.21
Bromodichloromethane	0.05	nd	nd	nd	13
Bromoform	0.05	nd	nd	nd	0.27
Bromomethane	0.05	nd	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	nd	0.05
Chlorobenzene	0.05	nd	nd	nd	0.05
Chloroform	0.05	nd	nd	nd	9.4
Dichlorodifluoromethane	0.05	nd	nd	nd	16
1,2-Dichlorobenzene	0.05	nd	nd	nd	3.4
1,3-Dichlorobenzene	0.05	nd	nd	nd	4.8
1,4-Dichlorobenzene	0.05	nd	nd	nd	0.083
1,1-Dichloroethane	0.05	nd	nd	nd	3.5
1,2-Dichloroethane	0.05	nd	nd	nd	0.05
1,1-Dichloroethylene	0.05	nd	nd	nd	0.05
cis-1,2-Dichloroethylene	0.05	nd	nd	nd	3.4
trans-1,2-Dichloroethylene	0.05	nd	nd	nd	0.84
1,2-Dichloropropane	0.05	nd	nd	nd	0.05
1,3-Dichloropropene, total	0.05	nd	nd	nd	0.05
Ethylbenzene	0.05	nd	nd	nd	2
Hexane	0.05	nd	nd	nd	0.05
Methyl Ethyl Ketone (2-Butanone)	0.50	nd	nd	nd	2.8
Methyl Isobutyl Ketone	0.50	nd	nd	nd	16
Methyl tert-butyl ether	0.05	nd	nd	nd	1.7
Methylene Chloride	0.05	nd	nd	nd	0.75
Styrene	0.05	nd	nd	nd	0.1
1,1,1,2-Tetrachloroethane	0.05	nd	nd	nd	0.7
1,1,2,2-Tetrachloroethane	0.05	nd	nd	nd	0.058
Tetrachloroethylene	0.05	nd	nd	nd	0.05
Toluene	0.05	nd	nd	nd	2.3
1,1,1-Trichloroethane	0.05	nd	nd	nd	0.38
1,1,2-Trichloroethane	0.05	nd	nd	nd	0.05
Trichloroethylene	0.05	nd	nd	nd	0.061
Trichlorofluoromethane	0.05	nd	nd	nd	4
Vinyl Chloride	0.02	nd	nd	nd	0.02
Xylenes, total	0.05	nd	nd	nd	3.1

Notes:
- ❒ MDL – Method Detection Limit
- ❒ nd – not detected above the MDL
- ❒ BTEX is included in the VOC group parameters

No VOC parameter concentrations were detected in the soil samples analyzed. All soil samples tested for VOCs comply with the selected MECP Table 3 residential standards.

Table 9: Analytical Test Results – Soil (2019)
Polycyclic Aromatic Hydrocarbons (PAHs)

Parameter	MDL (µg/g)	Soil Samples (µg/g)		MECP Table 3 Residential Standards (µg/g)
		December 2, 2019	December 3, 2019	
		BH2-SS4 2.3-2.9m	BH5-SS2 0.8-1.4m	
Acenaphthene	0.02	nd	nd	21
Acenaphthylene	0.02	nd	0.02	0.15
Anthracene	0.02	nd	nd	0.67
Benzo[a]anthracene	0.02	nd	0.02	0.96
Benzo[a]pyrene	0.02	nd	0.02	0.3
Benzo[b]fluoranthene	0.02	nd	0.04	0.96
Benzo[g,h,i]perylene	0.02	nd	0.04	9.6
Benzo[k]fluoranthene	0.02	nd	0.02	0.96
Chrysene	0.02	nd	0.03	9.6
Dibenzo[a,h]anthracene	0.02	nd	nd	0.1
Fluoranthene	0.02	nd	0.03	9.6
Fluorene	0.02	nd	nd	62
Indeno[1,2,3-cd]pyrene	0.02	nd	0.02	0.76
1-Methylnaphthalene	0.02	nd	nd	30
2-Methylnaphthalene	0.02	nd	nd	30
Methylnaphthalene (1&2)	0.02	nd	nd	60
Naphthalene	0.01	nd	nd	9.6
Phenathrene	0.02	nd	nd	12
Pyrene	0.02	nd	0.03	9.6

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (i.e <MDL)

PAH parameter concentrations were detected in one of the soil sample analyzed; however, no exceedances were identifed and thus, comply with the selected MECP Table 3 residential standards.

Table 10: Analytical Test Results – Soil (2018)
Metals

Parameter	MDL (µg/g)	Soil Sample (µg/g) May 3, 2018 BH3-SS2 0.8-1.4m	MECP Table 3 Residential Standards (µg/g)
Antimony	1.0	nd	7.5
Arsenic	1.0	nd	18
Barium	1.0	52	390
Beryllium	1.0	nd	4
Boron	1.0	8.4	120
Cadmium	0.5	nd	1.2
Chromium	1.0	14	160
Chromium VI	0.2	NA	8
Cobalt	1.0	4	22
Copper	1.0	7	140
Lead	1.0	12	120
Mercury	0.1	NA	0.27
Molybdenum	1.0	nd	6.9
Nickel	1.0	8	100
Selenium	1.0	nd	2.4
Silver	0.5	nd	20
Thallium	1.0	nd	1
Uranium	1.0	nd	23
Vanadium	1.0	26	86
Zinc	1.0	22	340

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

Metal concentrations detected in Sample BH3-SS2 (2018), were in compliance with the MECP Table 3 residential standards.

Table 11: Analytical Test Results – Soil (2019)
Metals

Parameter	MDL (µg/g)	Soil Sample (µg/g)		MECP Table 3 Residential Standards (µg/g)
		December 3, 2019	December 4, 2019	
		BH3-SS2 0.8-1.4m	BH7-SS2 0.8-1.4m	
Antimony	1.0	1.1	nd	7.5
Arsenic	1.0	3.0	2.3	18
Barium	1.0	47.4	34.8	390
Beryllium	1.0	nd	nd	4
Boron	1.0	5.0	nd	120
Cadmium	0.5	nd	nd	1.2
Chromium	1.0	12.6	10.3	160
Chromium VI	0.2	nd	nd	8
Cobalt	1.0	3.7	3.6	22
Copper	1.0	9.2	11.1	140
Lead	1.0	21.3	30.9	120
Mercury	0.1	nd	nd	0.27
Molybdenum	1.0	nd	nd	6.9
Nickel	1.0	6.5	6.0	100
Selenium	1.0	nd	nd	2.4
Silver	0.5	nd	nd	20
Thallium	1.0	nd	nd	1
Uranium	1.0	nd	nd	23
Vanadium	1.0	22.5	21.2	86
Zinc	1.0	156	68.7	340

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

Metal concentrations, identified in the 2019 soil samples analyzed comply with the MECP Table 3 residential standards.

The maximum concentrations of analyzed parameters in the soil at the Phase II Property are summarized below in Table 12.

Table 12: Maximum Concentrations – Soil			
Parameter	**Maximum Concentration (µg/g)**	**Borehole**	**Depth Interval (m BGS)**
Ethylbenzene	0.08	BH1 (2018)	9.1-9.7
Xylenes	0.21		
PHC F1	25		
PHC F2	47	BH7 (2019)	3.05-4.57
PHC F3	94	BH5 (2019)	
PHC F4	174		
Barium	52	BH3 (2018)	0.8-1.4
4Boron	8.4		
Chromium	14		
Cobalt	4	BH3 (2018)	0.8-1.4
Copper	11.1	BH7 (2019)	0.8-1.4
Lead	30.9		
Nickel	8	BH3 (2018)	0.8-1.4
Vanadium	26		
Zinc	22	BH3 (2019)	0.8-1.4
Acenaphthylene	0.2	BH5 (2019)	0.81.4
Benzo[a]anthracene	0.02		
Benzo[a]pyrene	0.02		
Benzo[b]fluoranthene	0.04		
Benzo[g,h,i]perylene	0.04		
Benzo[k]fluoranthene	0.02		
Chrysene	0.03		
Fluoranthene	0.3		
Indeno[1,2,3-cd]pyrene	0.2		
Pyrene	0.3		

All other parameter concentrations were below laboratory method detection limits.

5.6 Groundwater Quality

Groundwater samples from all of the monitoring wells installed across the Phase II Property were submitted for laboratory analysis of a combination of PHCs, BTEX, VOCs, and/or PAHs. The groundwater samples were obtained from the screened intervals noted on Table 2. Monitoring wells, BH1 through BH3 were installed and sampled in May 2018. Monitoring wells BH1-19, BH2-19, BH3-19 and BH6-19 were installed and sampled in December 2019.

The results of the analytical testing are presented below in Tables 13 through 17. The laboratory certificates of analysis are provided in Appendix 1.

Table 13: Analytical Test Results – Groundwater (2018)
PHCs (Fractions 1 to 4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 3 Standards (µg/L)
		May 15, 2018			
		BH1-GW1	BH2-GW1	BH3-GW1	
PHC F1	25	386	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

A concentration of PHC F1 was identified in groundwater Sample BH1-GW1 at a concentration below the MECP Table 3 residential standard. No other PHC parameters were identified in the samples analysed.

Table 14: Analytical Test Results – Groundwater (2019)
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)				MECP Table 3 Standards (µg/L)
		December 10, 2019		December 11, 2019		
		BH2-19-GW1	BH6-19-GW1	BH1-19-GW1	BH3-19-GW1	
Benzene	0.5	nd	nd	nd	nd	44
Ethylbenzene	0.5	nd	nd	nd	nd	2,300
Toluene	0.5	nd	nd	nd	nd	18,000
Xylenes	0.5	nd	nd	nd	nd	4,200
PHC F1	25	nd	nd	nd	nd	750
PHC F2	100	nd	nd	nd	nd	150
PHC F3	100	nd	nd	nd	nd	500
PHC F4	100	nd	nd	nd	nd	500

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

No BTEX or PHC concentrations were identified in the groundwater samples analyzed. The analytical test results are compliance with MECP Table 3 residential standards.

Table 15: Analytical Test Results – Groundwater (2018)
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) May 15, 2018			MECP Table 3 Standards (µg/L)
		BH1-GW1	BH2-GW1	BH3-GW1	
Acetone	5.0	nd	nd	nd	130,000
Benzene	0.5	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	85,000
Bromoform	0.5	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	630
Chloroform	0.5	nd	nd	nd	2.4
Dibromochloromethane	0.5	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	4,400
1,2-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	18.8	nd	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	140,000
Methyl tert-butyl Ether	2.0	nd	nd	nd	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	1.2	nd	nd	18,000
1,1,1-Trichloroethane	0.5	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	2,500
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes	0.5	2.2	nd	nd	4,200

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- BTEX is included in the VOC group parameters

Hexane, toluene and xylene parameters were identified in groundwater Sample BH1-GW1, at concentrations below the MECP Table 3 residential standards. No other VOC parameter concentrations were detected in the 2018 groundwater samples analysed.

Table 16: Analytical Test Results – Groundwater (2019)
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)				MECP Table 3 Standards (µg/L)
		December 10 2019		December 11, 2019		
		BH1-19-GW1	BH6-19-GW1	BH1-19-GW1	BH3-19-GW1	
Acetone	5.0	nd	nd	nd	nd	130,000
Benzene	0.5	nd	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	nd	85,000
Bromoform	0.5	nd	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	nd	630
Chloroform	0.5	nd	nd	nd	nd	2.4
Dibromochloromethane	0.5	nd	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	nd	4,400
1,2-Dibromoethane	0.2	nd	nd	nd	nd	0.25
1,2-Dichlorobenzene	0.5	nd	nd	nd	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	nd	16
1,3-Dichloropropene	0.5	nd	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	nd	2,300
Hexane	1.0	nd	nd	nd	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	nd	140,000
Methyl tert-butyl Ether	2.0	nd	nd	nd	nd	1900
Methylene Chloride	5.0	nd	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	nd	3.4
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	nd	1.6
Toluene	0.5	nd	nd	nd	nd	18,000
1,1,1-Trichloroethane	0.5	nd	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	nd	2,500
Vinyl Chloride	0.5	nd	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	nd	nd	4,200

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- BTEX is included in the VOC group parameters

No VOC parameter concentrations were identified in any of the 2019 groundwater samples analysed. The test results are in compliance with the MECP Table 3 residential standards.

Table 17: Analytical Test Results – Groundwater (2019)
Polycyclic Aromatic Hydrocarbons (PAHs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)	MECP Table 3 Standards (µg/L)
		December 10, 2019	
		BH6-19-GW1	
Acenaphthene	0.05	nd	600
Acenaphthylene	0.05	nd	1.8
Anthracene	0.01	nd	2.4
Benzo[a]anthracene	0.01	nd	4.7
Benzo[a]pyrene	0.01	nd	0.81
Benzo[b]fluoranthene	0.05	nd	0.75
Benzo[g,h,i]perylene	0.05	nd	0.2
Benzo[k]fluoranthene	0.05	nd	0.4
Chrysene	0.05	nd	1
Dibenzo[a,h]anthracene	0.05	nd	0.52
Fluoranthene	0.01	nd	130
Fluorene	0.05	nd	400
Indeno[1,2,3-cd]pyrene	0.05	nd	0.2
1-Methylnaphthalene	0.05	nd	1800
2-Methylnaphthalene	0.05	nd	1800
Methylnaphthalene (1&2)	0.1	nd	3600
Naphthalene	0.05	nd	1400
Phenathrene	0.05	nd	580
Pyrene	0.01	nd	68

Notes:
- MDL - Method Detection Limit
- nd - Not Detected (i.e <MDL)

No detectable PAH parameter concentrations were identified in the groundwater sample recovered from BH6. The test results are in compliance with the MECP Table 3 residential standards.

The maximum concentrations of analyzed parameters in the groundwater at the Phase II Property are summarized below in Table 18.

Table 18: Maximum Concentrations – Groundwater			
Parameter	**Maximum Concentration (µg/g)**	**Monitoring Well**	**Depth Interval (m BGS)**
PHC F1	386	BH1 (2018)	11.63-14.63
Hexane	18.8		
Toluene	1.2		
Xylenes	2.2		

All other parameter concentrations were below laboratory method detection limits.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of the May 2018 and December 2019 sampling events were handled in accordance with the Analytical Protocol with respect to preservation method, storage requirement, and container type.

As per the sampling and analysis plan, duplicate soil samples (DUP1 and DUP2) from BH3-SS6 and BH6-SS18 were obtained and analyzed for BTEX and PHC parameters. No parameter concentrations were detected above the laboratory method detection limits in either the original or duplicate samples.

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

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 153/04, as amended under the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

As per Table 1 in section 2.2, the following PCAs are considered to have resulted in 10 APECs on the Phase II Property:

- ❒ PCA 10 – Commercial Autobody Shops: this PCA is associated with a former autobody shop at 1060 Bank Street (APEC 6);

- PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks: this PCA is associated with former USTs and pump islands at 1050 and 1060 Bank Street, as well as a former retail fuel outlet at 1063 Bank Street (APEC 1, APEC 2, APEC 4, APEC 5 and APEC 8);
- PCA 30 – Importation of Fill Material of Unknown Quality: this PCA is associated with fill material identified during the subsurface investigations (APEC 7);
- PCA 37 – Operation of Dry-Cleaning Equipment (where chemicals are used): this PCA is associated with historical dry cleaners at 1069 and 1072 Bank Street (APEC 9 and APEC 10); and
- PCA 52 – Storage, maintenance, fuelling and repairing of equipment, vehicles, and materials used to maintain transportation systems: this PCA is associated with former on-site garage at 1050 Bank Street and a former off-site garage at 1063 Bank Street (APEC 3 and APEC 8).

Contaminants of Potential Concern

Contaminants of potential environmental concern associated with the aforementioned APECs on the Phase II Property include the following:

- Benzene, ethylbenzene, toluene and xylenes (BTEX);
- Petroleum hydrocarbons (PHCs, Fractions F_1-F_4);
- Volatile Organic Compounds (VOCs);
- Polycyclic aromatic hydrocarbons (PAHs);
- Metals (including hydride-forming compounds (As, Sb, Se));
- Mercury (Hg); and
- Hexavalent Chromium (CrVI).

Subsurface Structures and Utilities

The Phase II Property is situated in a municipally serviced area. Underground utility services on the subject land include natural gas, electricity, municipal water and sewer services. The services enter the Phase II Property from Bank Street and Aylmer Avenue. Other than service utilities, no subsurface structures were observed on the Phase II Property at the time of the site visit.

Based on standard practice for subsurface utility installation, service trenches are expected to be present approximately 1 to 2 m below existing grade. In general, trench backfill may provide a preferential pathway for contaminant transport if the water table is at or above the base of the trenches. Based on the findings of the Phase II ESA, the water table was identified at depths of approximately 11.4 to 11.75m below grade. As the water table was identified at a significant depth below standard service trenches, underground services are not considered to have the potential to create preferential pathways for contaminant migration.

Physical Setting

Site Stratigraphy

The site stratigraphy consists of the following:

- Pavement structure consisting of approximately asphaltic concrete over crushed stone with silt and sand, extending to depths ranging from approximately 0.05 to 0.60m below grade.
- Fill material generally consisting of brown silty sand with some gravel was identified at each borehole location and extended to depths of approximately 0.40 to 2.4m below grade.
- Native sand was identified beneath the fill material, with a layer of silty sand to sandy silt with trace clay and gravel from approximately 7.8 to 9.8m to a depth of 10.7m at each borehole location.
- Boreholes were terminated in the native sand layer at depths ranging from 13.7 to 14.9m below grade. Groundwater was identified in this stratigraphic unit.
- Bedrock was not encountered during the Phase II ESA.

Hydrogeological Characteristics

Groundwater at the Phase II Property was encountered within the native sand layer. This unit is interpreted to function as a local aquifer at the subject site.

Water levels were measured at the Phase II Property in May of 2018 and in December of 2019. Groundwater levels ranging in depths from approximately 11.4 to 12.3m below grade. Groundwater contour mapping was conducted for groundwater elevations identified during of the 2018 and 2019 sampling events.

Groundwater flow at the subject site was in a northwesterly direction, with an average hydraulic gradient of approximately 0.055 m/m.

Approximate Depth to Bedrock

Bedrock was not encountered during the Phase II ESA field program.

Approximate Depth to Water Table

Depth to water table at the subject site varies between approximately 11.4 and 12.3m 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, and the pH of the subsurface soil is between 5 and 9, while the pH of the subsurface soil is between 5 and 11.

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

Fill material was identified across the Phase II Property beneath the pavement structure and extending to depths of approximately 1.4 to 2.4m below grade. The fill material generally consists of silty sand, gravel with some crushed stone and is considered to be associated with the pavement structure. Fill material is also considered to be associated with the decommissioning of the former retail fuel outlets.

No visual or olfactory evidence of deleterious materials or contamination were identified in the fill material.

Proposed Buildings and Other Structures

It is our understanding that the Phase II Property will be redeveloped with a multi-storey mixed-use building consisting of commercial on the ground floor and residential units above, with one (1) level of underground parking.

Existing Buildings and Structures

1050 Bank Street

The original portion of the one-storey building addressed 1050 Bank Street, was constructed circa 1928, with a concrete foundation and is currently occupied by Siam Kitchen restaurant. A basement level is present beneath this portion of the building. Two (2) one-storey slab-on-grade additions were made to the southern portion of the original building circa 1965 and 1980. The additions are currently occupied by Boomerang Kids consignment store. The building is of concrete construction with stone and wood decorative finishes on the eastern façade, and flat tar-and-gravel style roof.

1060 Bank Street

The building addressed 1060 Bank Street was constructed circa 1947 with a poured concrete foundation and is finished on the exterior with red brick and a flat, tar-and-gravel style roof.

The one-storey building has a basement level and is occupied by the Barley Mow restaurant. A wood patio structure is present adjacent to the east face of the building.

Both subject buildings are heated with natural gas-fired equipment. No other buildings or structures are present on the Phase II Property.

Water Bodies and Areas of Natural Significance

There are no natural water bodies or areas of natural on or within 30m of the Phase II Property. Browns Inlet, located approximately 180m northwest of the Phase II Property, is a provincially significant wetland.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of the Phase II ESA, soil and groundwater beneath the Phase II Property is in compliance with MECP Table 3 residential standards, as shown on Drawings PE4783-5 – Analytical Testing Plan (Soil) and PE4783-6 – Analytical Testing Plan (Groundwater). There are no contaminants on the Phase II Property.

Types of Contaminants

Based on the findings of the Phase II ESA, soil and groundwater is in compliance with MECP Table 3 residential standards. There are no contaminants of concern on the Phase II Property.

Contaminated Media

Soil and groundwater analyses conducted as part of the Phase II ESA were in compliance with MECP Table 3 residential standards. No contaminated media is present on the Phase II Property.

What Is Known About Areas Where Contaminants Are Present

Contaminants are not present in the soil or in the groundwater beneath the Phase II Property.

Distribution and Migration of Contaminants

Based on the findings of the Phase II ESA, there has been no distribution or migration of contaminants on the Phase II Property.

Discharge of Contaminants

Based on the findings of the Phase II ESA, contaminants have not been discharged to the Phase II Property.

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.

Soil and groundwater beneath the Phase II Property are in compliance with MECP Table 3 Residential Standards. Therefore, climatic and meteorological conditions are not considered to have affected contaminant distribution at the Phase II Property.

Potential for Vapour Intrusion

The potential for vapour intrusion does not exist at the Phase II Property.

6.0 CONCLUSIONS

A Phase II ESA was conducted for the property addressed 1050 and 1060 Bank Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address areas of potential environmental concerns (APECs) on the Phase II Property, resulting from historical on- or off-site potentially contaminating activities (PCAs). An initial Phase II ESA for 1050 Bank Street was carried out in conjunction with a Geotechnical Investigation in 2018. Three boreholes, completed with monitoring well installations, were advanced on the property at this time. The current investigation consisted of the placement of an additional seven (7) boreholes across the entire property, four (4) of which were constructed with groundwater monitoring well installations. The findings of both investigations are presented in this report.

Soil samples obtained from all of the boreholes were screened using visual observations and combustible vapour measurements. Sixteen (16) soil samples were submitted for laboratory analysis of a combination of benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, F1-F4), volatile organic compounds (VOCs), metals (including As, Se, Sb, Hg and CrVI) and/or polycyclic aromatic hydrocarbons (PAHs).

Based on the analytical test results, ethylbenzene, xylenes, PHC F1 and F2 concentrations in compliance with the MECP Table 3 residential standards, were identified in a soil sample recovered from BH1 (2018). Concentrations of PHC F3, F4 and/or F4G were identified in samples recovered from BH2-19, BH5-19 and BH7-19; identified parameters were in compliance with the MECP Table 3 residential standards. No other BTEX or PHC parameters were identified in the samples analysed. Metal parameters identified in each of the samples analysed were also in compliance with the MECP Table 3 residential standards. No PAH or VOC parameters were identified in any of the soil samples analysed. The soil results are in compliance with the MECP Table 3 residential standards.

Groundwater samples from monitoring wells installed in BH1, BH2, BH3, BH1-19, BH2-19, BH3-19 and BH6-19 were recovered and analysed for PHC and VOC parameters. Concentrations of hexane, toluene, xylenes and PHC (F_1) were identified in groundwater Sample BH1-GW1, at concentrations below the MECP Table 3 residential standards. No other parameters were identified above the method detection limits in any of the groundwater samples analysed. The groundwater results are in compliance with the MECP Table 3 residential standards.

Conclusion

Based on the findings of the Phase II ESA, no further investigation is recommended at this time.

If the monitoring wells installed at the Phase II Property are not going to be used in the future, they should be abandoned according to Ontario Regulation 903. The monitoring wells will be registered with the MECP under this regulation. Further information can be provided up request in this regard

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared in general accordance with O.Reg. 153/04 as amended by the Environmental Protection Act 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 2641723 Ontario Inc. Notification from 2641723 Ontario 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:

- 2641723 Ontario Inc.
- Paterson Group

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE4783-3 – TEST HOLE LOCATION PLAN

DRAWING PE4783-4 – GROUNDWATER CONTOUR PLAN

DRAWING PE4783-5A – ANALYTICAL TESTING PLAN – SOIL

DRAWING PE4783-5B – ANALYTICAL TESTING PLAN – GROUNDWATER

DRAWING PE4783-6A – CROSS-SECTION A-A' – SOIL

DRAWING PE4783-6B – CROSS-SECTION A-A' – GROUNDWATER

DRAWING PE4783-7A – CROSS-SECTION B-B' – SOIL

DRAWING PE4783-7B – CROSS-SECTION B-B' - GROUNDWATER

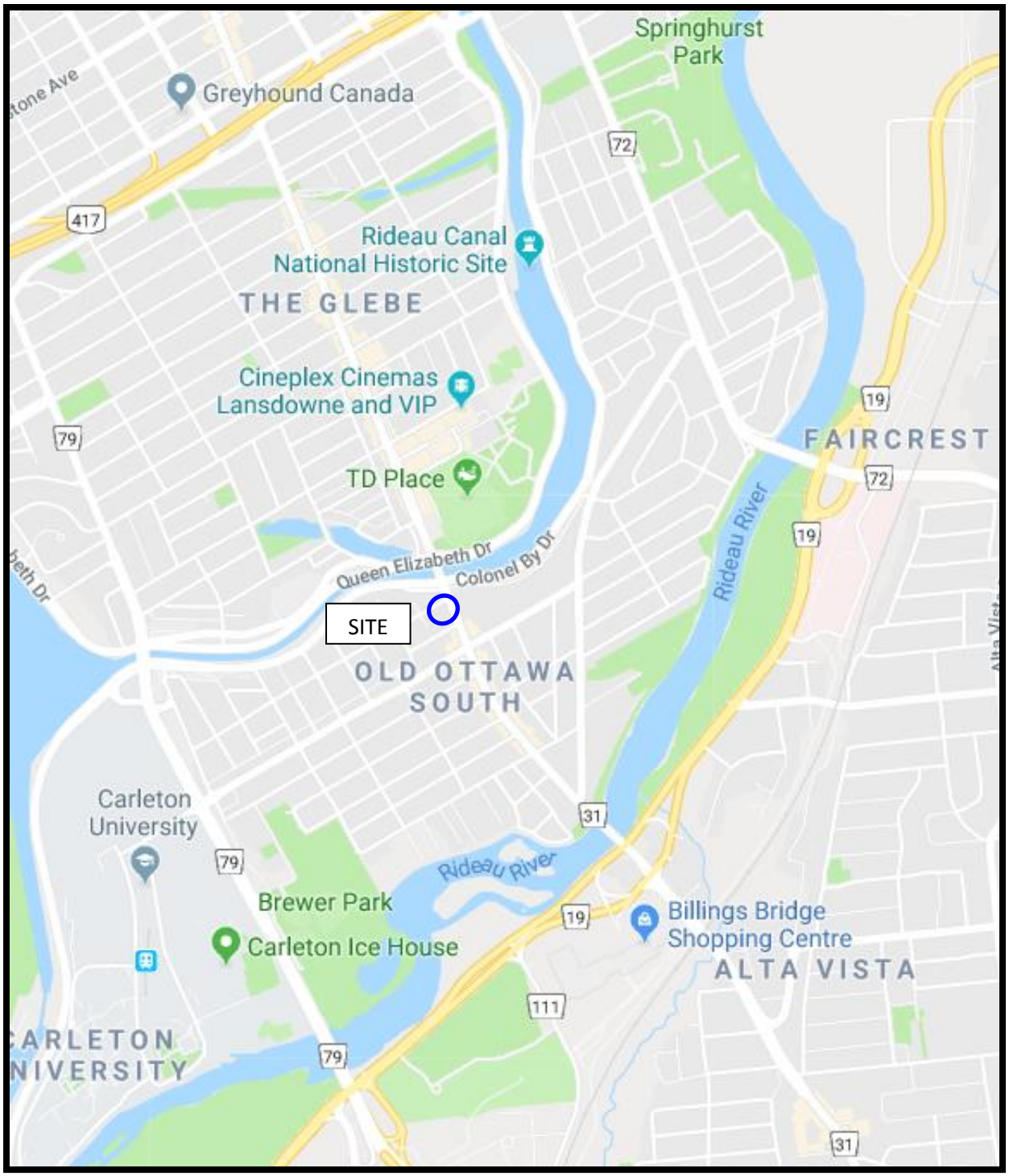
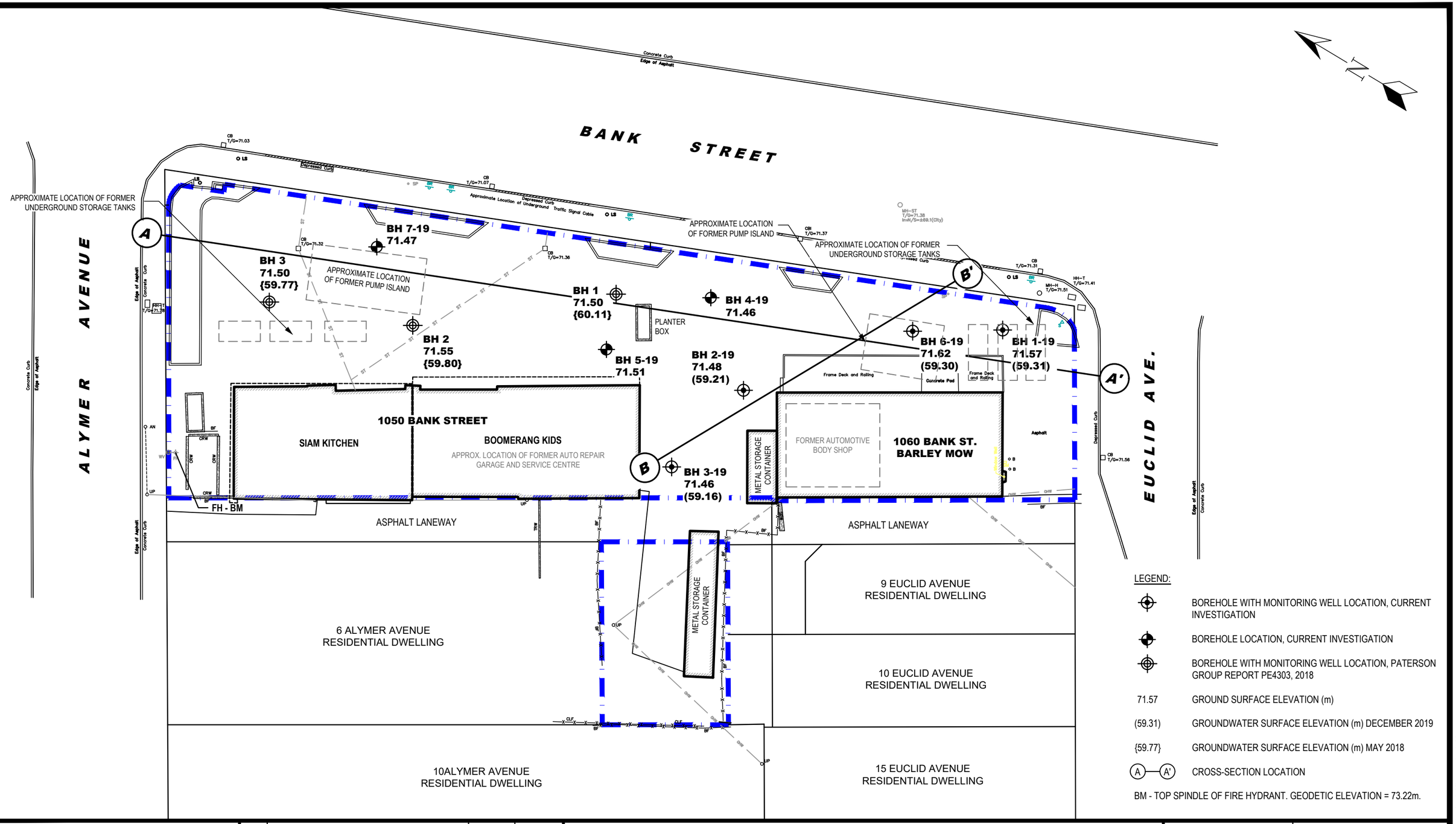


FIGURE 1

KEY PLAN



LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION, CURRENT INVESTIGATION
- BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE4303, 2018
- 71.57 — GROUND SURFACE ELEVATION (m)
- (59.31) — GROUNDWATER SURFACE ELEVATION (m) DECEMBER 2019
- {59.77} — GROUNDWATER SURFACE ELEVATION (m) MAY 2018
- (A — A') — CROSS-SECTION LOCATION

BM - TOP SPINDLE OF FIRE HYDRANT. GEODETIC ELEVATION = 73.22m.

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NO.	REVISIONS	DATE	INITIAL
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2641723 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1050 AND 1060 BANK STREET

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:300	Date: 12/2019
Drawn by: MPG	Report No.: PE4783-2
Checked by: MW	PE4783-3
Approved by: MSD	Revision No.:

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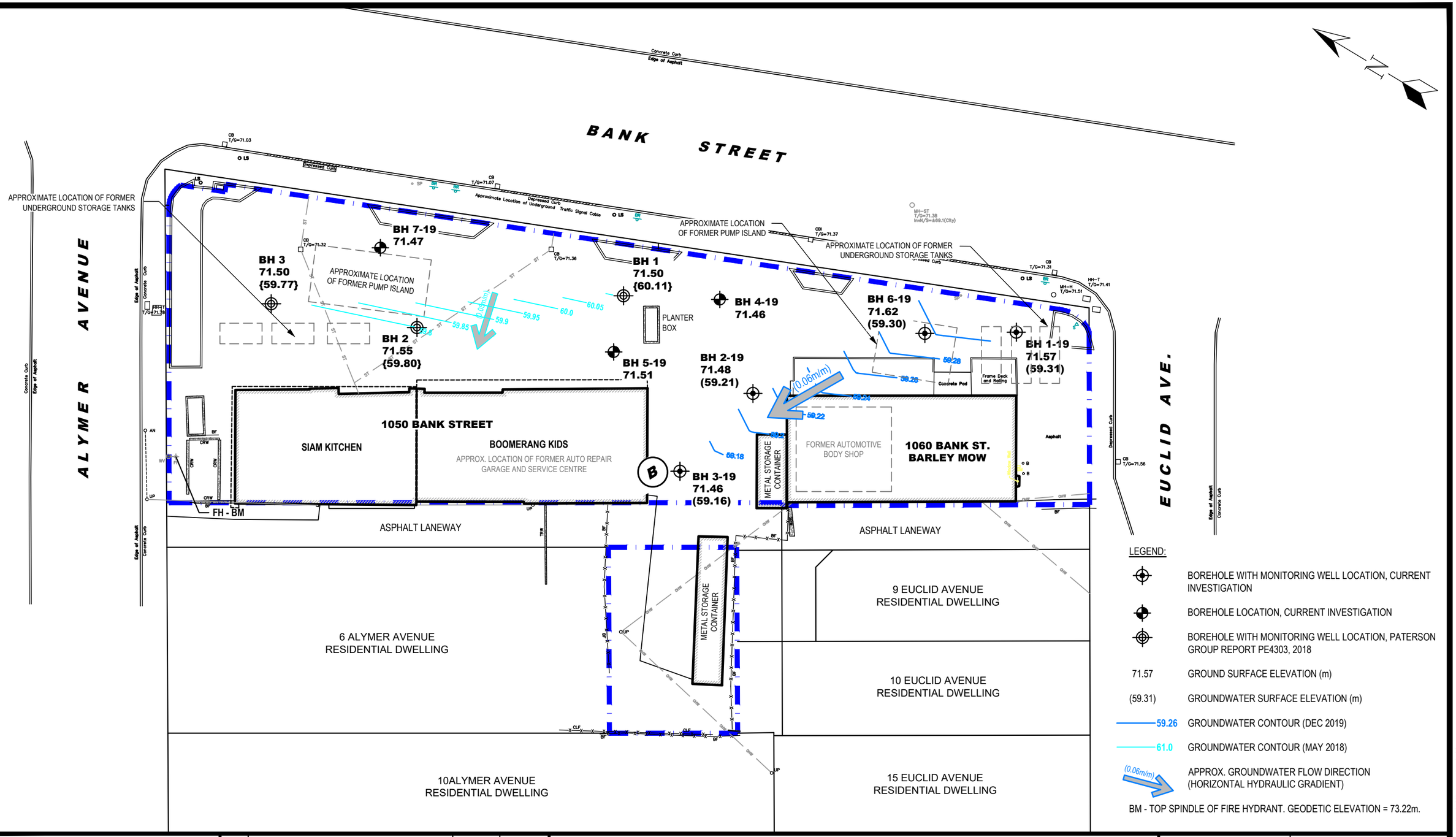

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION, CURRENT INVESTIGATION
- BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE4303, 2018
- 71.57 — GROUND SURFACE ELEVATION (m)
- (59.31) — GROUNDWATER SURFACE ELEVATION (m)
- 59.26 — GROUNDWATER CONTOUR (DEC 2019)
- 61.0 — GROUNDWATER CONTOUR (MAY 2018)
- (0.06m/m) — APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

BM - TOP SPINDLE OF FIRE HYDRANT. GEODETIC ELEVATION = 73.22m.

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2641723 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1050 AND 1060 BANK STREET

OTTAWA, ONTARIO

Title:

GROUNDWATER CONTOUR PLAN

Scale: 1:300	Date: 12/2019
Drawn by: MPG	Report No.: PE4783-2
Checked by: MW	PE4783-4
Approved by: MSD	Revision No.:

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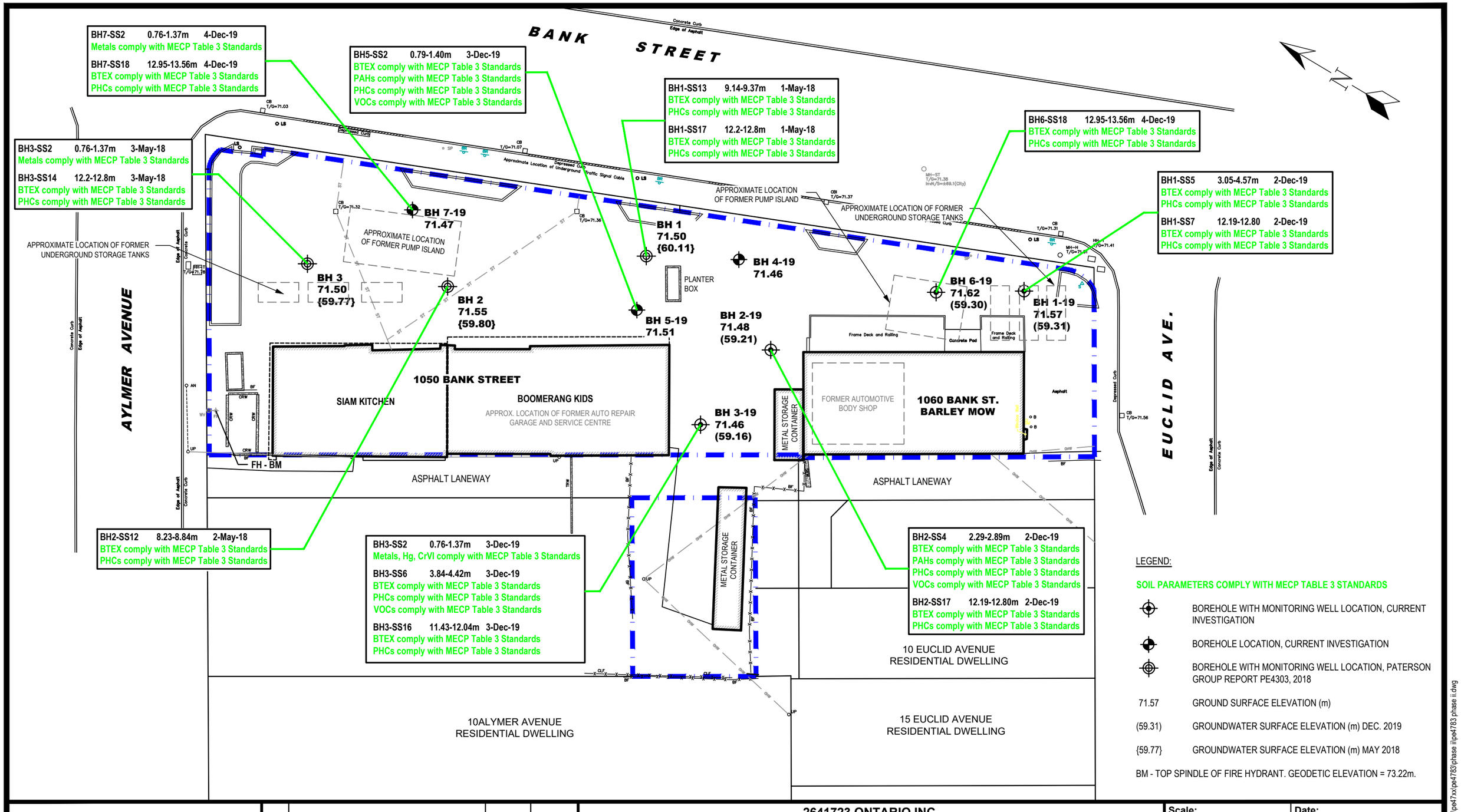

LEGEND:

SOIL PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION, CURRENT INVESTIGATION
- BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE4303, 2018
- 71.57 GROUND SURFACE ELEVATION (m)
- (59.31) GROUNDWATER SURFACE ELEVATION (m) DEC. 2019
- {59.77} GROUNDWATER SURFACE ELEVATION (m) MAY 2018

BM - TOP SPINDLE OF FIRE HYDRANT. GEODETIC ELEVATION = 73.22m.

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2641723 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1050 AND 1060 BANK STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL

Scale: 1:300	Date: 12/2019
Drawn by: MPG	Report No.: PE4783-2
Checked by: MW	PE4783-5A
Approved by: MSD	Revision No.:

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BH3-GW1 10.7-13.7m 15-May-18
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH1-GW1 11.6-14.6m 15-May-18
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH2-19-GW1 11.6-14.6m 10-Dec-19
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH6-19-GW1 12.2-15.2m 10-Dec-19
BTEX comply with MECP Table 3 Standards
PAHs comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH1-19-GW1 11.6-14.6m 11-Dec-19
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH2-GW1 11.5-14.5m 15-May-18
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH3-19-GW1 11.9-14.9m 11-Dec-19
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BANK STREET

ALYMER AVENUE

EUCLID AVE.

APPROXIMATE LOCATION OF FORMER UNDERGROUND STORAGE TANKS

APPROXIMATE LOCATION OF FORMER PUMP ISLAND

BH 7-19 71.47

BH 3 71.50 {59.77}

BH 2 71.55 {59.80}

BH 1 71.50 {60.11}

BH 4-19 71.46

BH 5-19 71.51

BH 2-19 71.48 (59.21)

BH 6-19 71.62 (59.30)

BH 1-19 71.57 (59.31)

BH 3-19 71.46 (59.16)

PLANTER BOX

1050 BANK STREET

SIAM KITCHEN

BOOMERANG KIDS

APPROX. LOCATION OF FORMER AUTO REPAIR GARAGE AND SERVICE CENTRE

1060 BANK ST. BARLEY MOW

FORMER AUTOMOTIVE BODY SHOP

METAL STORAGE CONTAINER

Frame Deck and Railing

Concrete Pad

Frame Deck and Railing

FH - BM

ASPHALT LANEWAY

ASPHALT LANEWAY

9 EUCLID AVENUE RESIDENTIAL DWELLING

10 EUCLID AVENUE RESIDENTIAL DWELLING

15 EUCLID AVENUE RESIDENTIAL DWELLING

10ALYMER AVENUE RESIDENTIAL DWELLING

LEGEND:

GROUNDWATER PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION, CURRENT INVESTIGATION
- BOREHOLE WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE4303, 2018
- 71.57 GROUND SURFACE ELEVATION (m)
- (59.31) GROUNDWATER SURFACE ELEVATION (m) DEC. 2019
- {59.77} GROUNDWATER SURFACE ELEVATION (m) MAY 2018

BM - TOP SPINDLE OF FIRE HYDRANT. GEODETIC ELEVATION = 73.22m.

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1050 AND 1060 BANK STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - GROUNDWATER

Scale: 1:300	Date: 12/2019
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Checked by: MW	PE4783-5B
Approved by: MSD	Revision No.:

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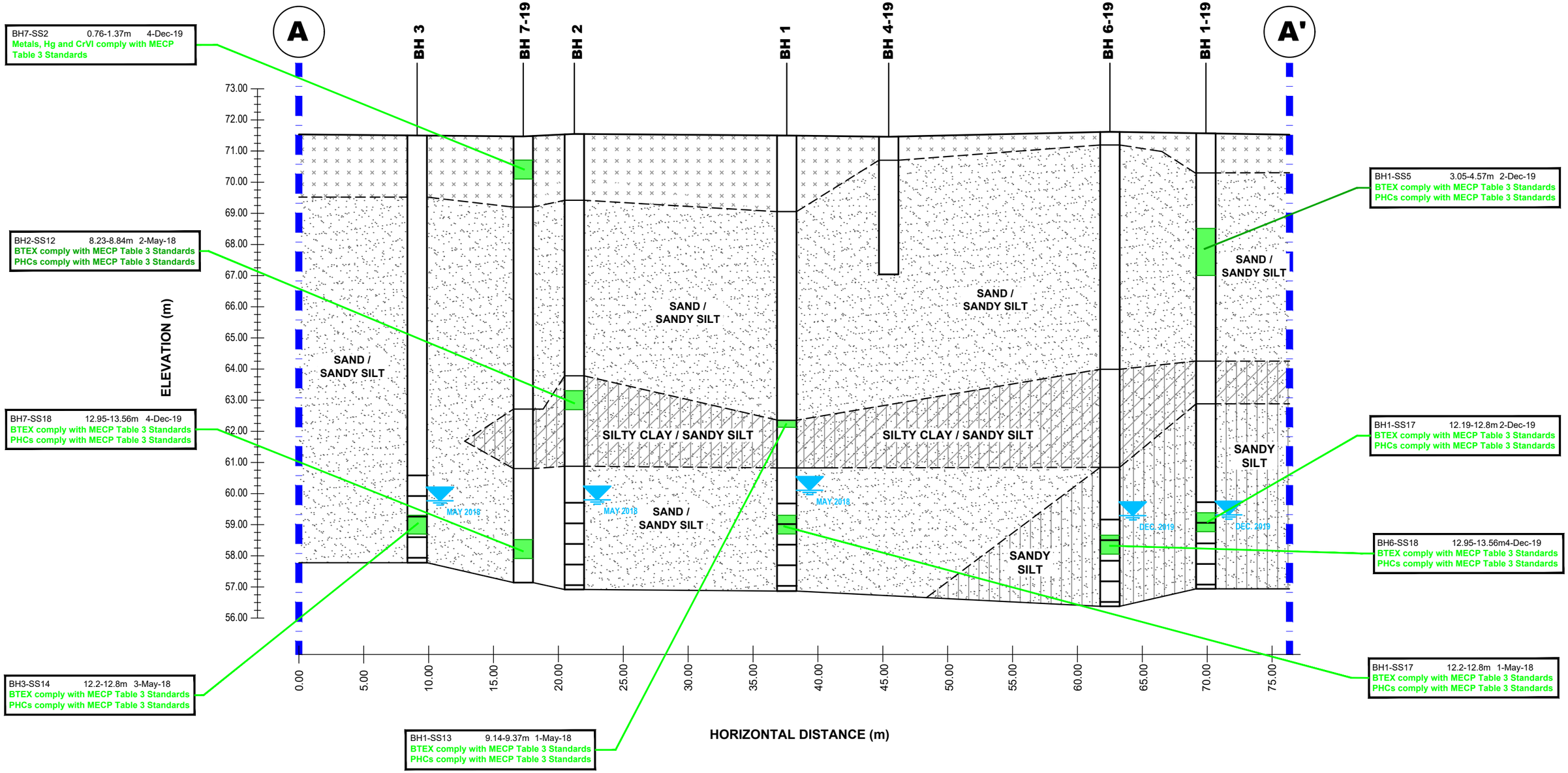

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1050 AND 1060 BANK STREET

OTTAWA, ONTARIO

Title:

CROSS-SECTION A-A'- SOIL

Scale: AS SHOWN	Date: 01/2020
Drawn by: MPG	Report No.: PE4783-2
Checked by: KM	Dwg. No.: PE4783-6A
Approved by: MSD	Revision No.:

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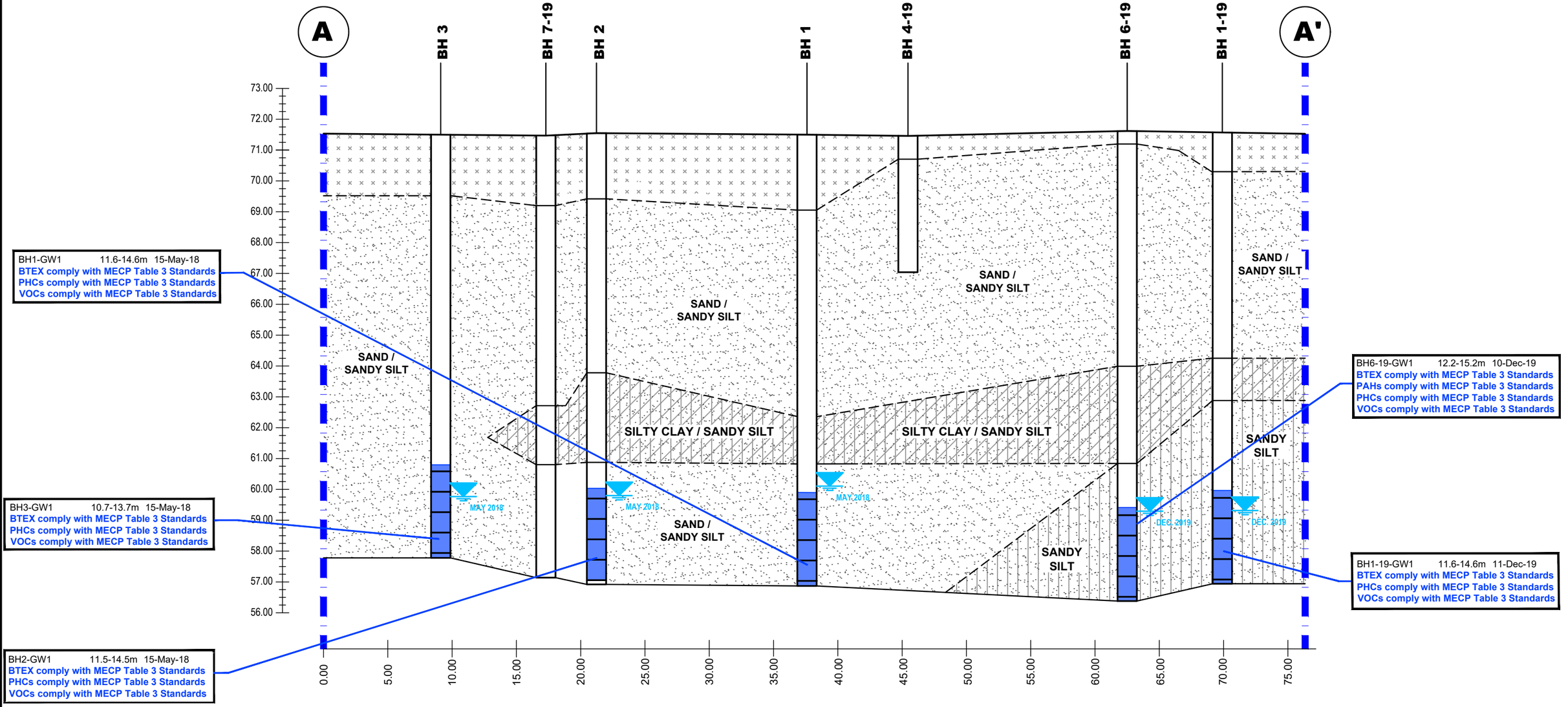

BH1-GW1 11.6-14.6m 15-May-18
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH3-GW1 10.7-13.7m 15-May-18
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH2-GW1 11.5-14.5m 15-May-18
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH6-19-GW1 12.2-15.2m 10-Dec-19
BTEX comply with MECP Table 3 Standards
PAHs comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH1-19-GW1 11.6-14.6m 11-Dec-19
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1050 AND 1060 BANK STREET

OTTAWA, ONTARIO

Title:

CROSS-SECTION A-A'- GROUNDWATER

Scale: AS SHOWN	Date: 01/2020
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Checked by: KM	Dwg. No.: PE4783-6B
Approved by: MSD	Revision No.:

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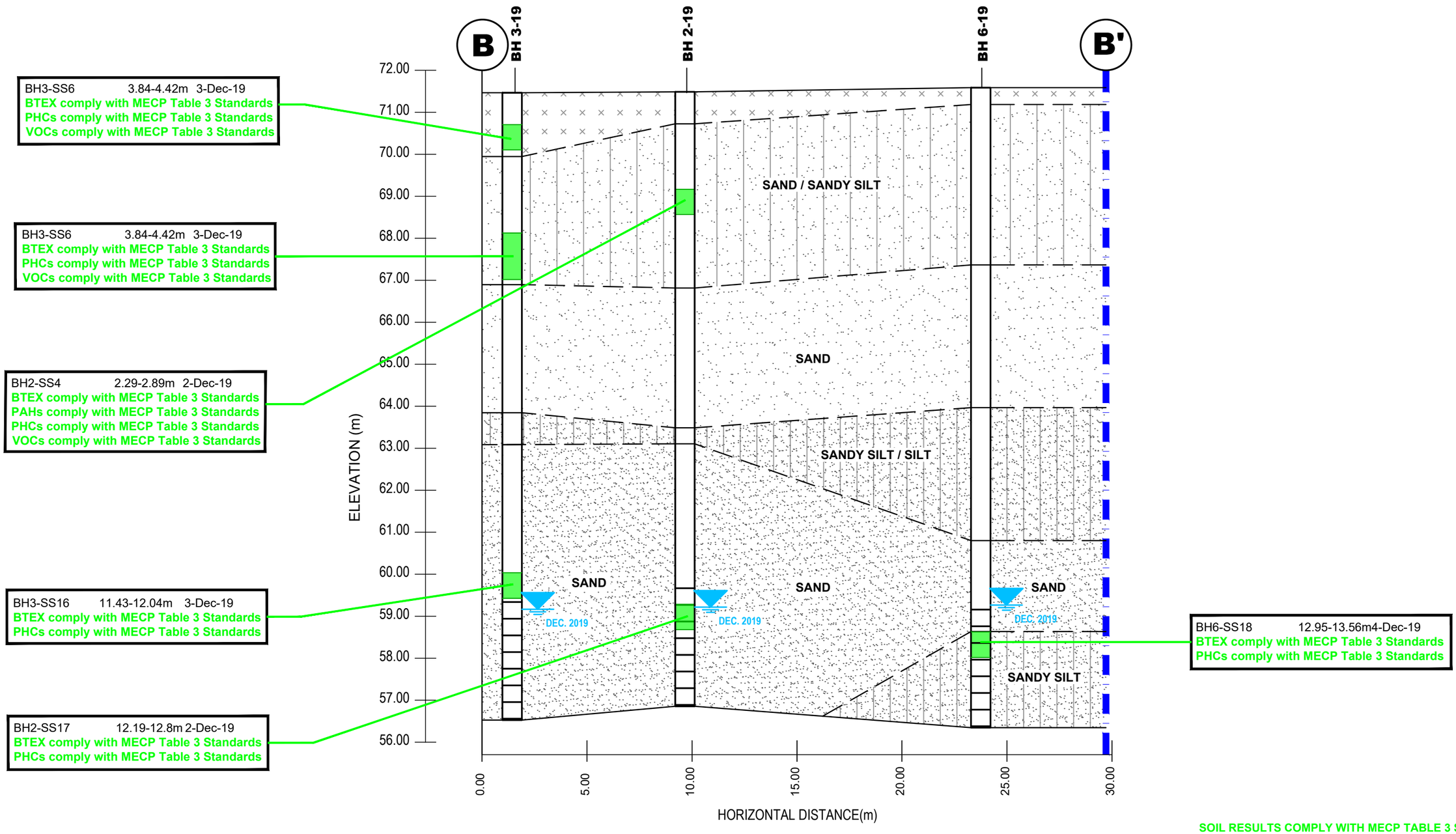

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

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2641723 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1050 AND 1060 BANK STREET

OTTAWA, ONTARIO

Title:

CROSS-SECTION B-B' -SOIL

Scale: AS SHOWN	Date: 12/2019
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Checked by: KM	Dwg. No.: PE4783-7A
Approved by: MSD	Revision No.:

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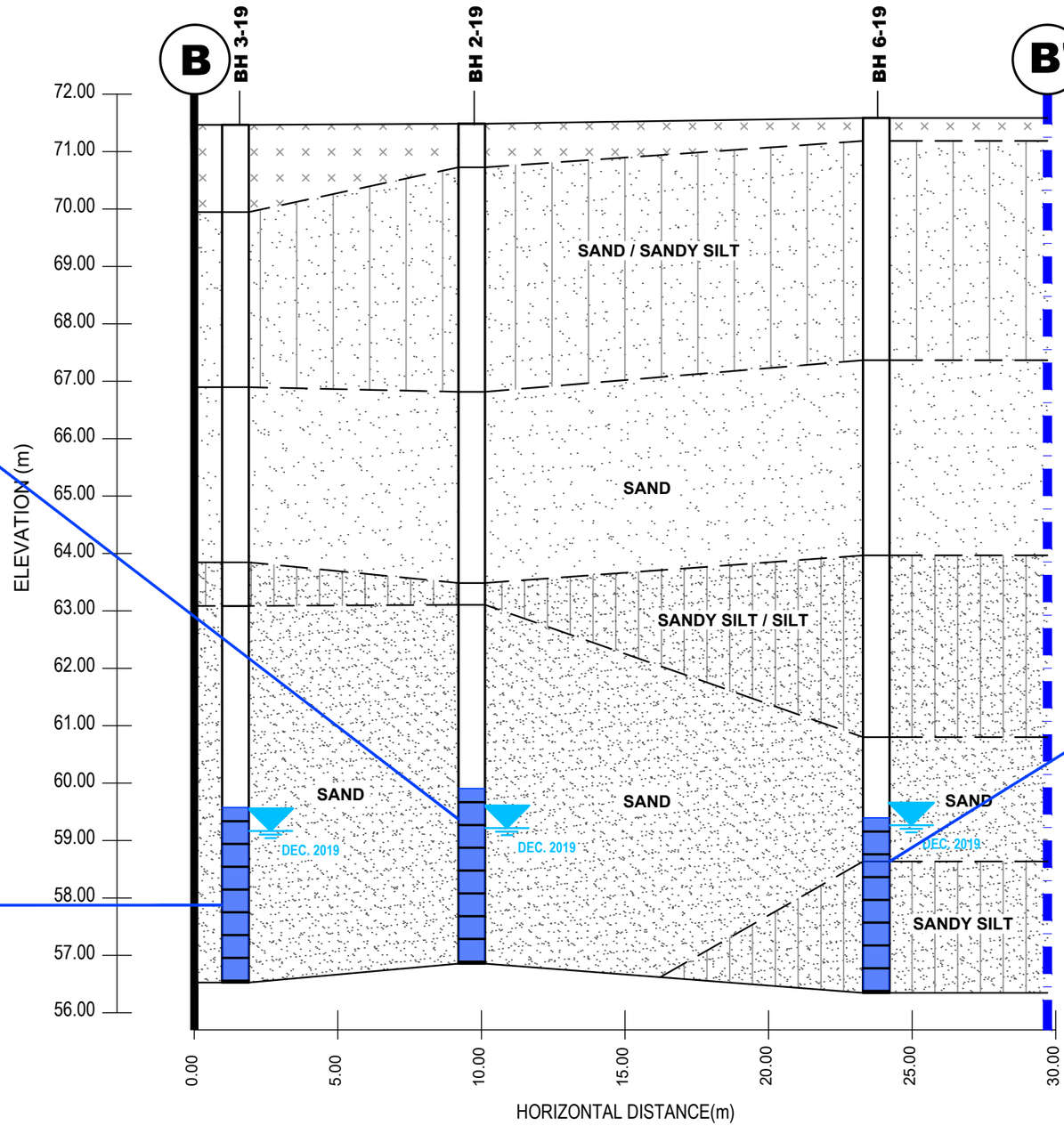

BH2-19-GW1 11.6-14.6m 10-Dec-19
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH3-19-GW1 11.9-4.9m 11-Dec-19
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH6-19-GW1 12.2-15.2m 10-Dec-19
BTEX comply with MECP Table 3 Standards
PAHs comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

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2641723 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1050 AND 1060 BANK STREET

OTTAWA, ONTARIO

Title:
CROSS-SECTION B-B' - GROUNDWATER

Scale: AS SHOWN	Date: 12/2019
Drawn by: MPG	Report No.: PE4783-2
Checked by: KM	Dwg. No.: PE4783-7B
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
1050 and 1060 Bank Street
Ottawa, Ontario

Prepared For

2641723 Ontario Inc.

November 2019

Report: PE4783-SAP

TABLE OF CONTENTS

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by 2641723 Ontario Inc. to conduct a Phase II Environmental Site Assessment (ESA) for the properties addressed 1050 and 1060 Bank Street, in the City of Ottawa, Ontario. Based on the Phase I ESA conducted by Paterson, a subsurface investigation program, consisting of borehole drilling, was developed. An initial Phase II ESA was conducted for 1050 Bank Street in 2018, followed by a Phase II ESA that incorporates an additional property addressed 1060 Bank Street.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1 (2018)	Place borehole central east to address historical retail fuel outlet on the adjacent property (APEC 8).	Drill to a depth of at least 14m to access deep groundwater table for monitoring well installation.
BH2 (2018)	Place borehole at approximate location of former pump island on the northern portion of the Phase II Property to address APEC 2.	Drill to a depth of at least 14m to access deep groundwater table for monitoring well installation.
BH3 (2019)	Place borehole at approximate location of former underground storage tank nest on the northern portion of the Phase II Property to address APEC 1.	Drill to a depth of at least 14m to access deep groundwater table for monitoring well installation.
BH1-19	Place borehole at approximate location of former underground storage tank nest on the southern portion of the Phase II Property (APEC 7) and to address APEC 8, APEC 9 and APEC 10.	Drill to a depth of at least 14m to access deep groundwater table for monitoring well installation.
BH2-19	Place borehole at approximate location of former automotive body shop (1060 Bank Street) on the Phase II Property to address APEC 6.	Drill to a depth of at least 14m to access deep groundwater table for monitoring well installation.
BH3-19	Place borehole at approximate location of former automotive repair garage (1050 Bank Street) on the Phase II Property to address APEC 3.	Drill to a depth of at least 14m to access deep groundwater table for monitoring well installation.
BH4-19	Place borehole for general coverage.	Drill to a depth of at least 4m to access fill material and for geotechnical purposes.
BH5-19	Place borehole at approximate location of former automotive repair garage (1050 Bank Street) on the Phase II Property to address APEC 3.	Drill to a depth of at least 4m to access fill material and for geotechnical purposes.
BH6-19	Place borehole at approximate location of former pump island on the southern portion of the Phase II Property to address APEC 4 and APEC 8.	Drill to a depth of at least 14m to access deep groundwater table for monitoring well installation.
BH7-19	Place borehole at approximate location of former pump island on the northern portion of the Phase II Property to address APEC 2.	Drill to a depth of at least 14m.

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 Alymer Avenue. 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.

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1050 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located in front of 1063 Bank Street. Geodetic elevation = 73.22m.

FILE NO. PE4303

REMARKS

HOLE NO. BH 1

BORINGS BY CME 55 Power Auger **DATE** 2018 May 1

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	71.50		
50mm Asphaltic concrete over crushed stone with silt and sand 0.60		AU	1						
FILL: Brown sand, some silt, trace gravel and asphalt		SS	2	33	8	1	70.50		
		SS	3	50	4	2	69.50		
2.44		SS	4	50	14				
		SS	5	92	12	3	68.50		
		SS	6	92	22	4	67.50		
		SS	7	92	54	5	66.50		
Compact to dense, brown **SAND,** trace silt		SS	8	92	45	6	65.50		
		SS	9	83	45	7	64.50		
		SS	10	75	41				
		SS	11	83	29	8	63.50		
8.38									
Dense, brown **SILTY FINE SAND,** trace clay and gravel 9.14		SS	12	100	40	9	62.50	800	
		SS	13	89	50+				
Very dense, brown **SANDY SILT,** some clay, gravel and cobbles		SS	14	75	50+	10	61.50		
10.67									
		SS	15	75	61	11	60.50		
		SS	16	82	50+				
Very dense, brown **SAND,** some gravel		SS	17	100	50+	12	59.50		
						13	58.50		
						14	57.50		
14.63									
End of Borehole									
(GWL @ 11.39m-May 15, 2018)									

Photo Ionization Detector: ● Volatile Organic Rdg. (ppm)
○ Lower Explosive Limit %
20 40 60 80
100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1050 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located in front of 1063 Bank Street. Geodetic elevation = 73.22m.

FILE NO. PE4303

REMARKS

HOLE NO. BH 2

BORINGS BY CME 55 Power Auger **DATE** 2018 May 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	71.55
50mm Asphaltic concrete over crushed stone with silt and sand 0.46		AU	1				
FILL: Brown sand, trace gravel, asphalt, silt 1.37		SS	2	92	4	1	70.55
FILL: Brown fine sand, trace silt and gravel 2.13		SS	3	67	3	2	69.55
		SS	4	100	10		
		SS	5	92	21	3	68.55
Compact to dense, brown **SAND**		SS	6	75	29	4	67.55
		SS	7	75	27	5	66.55
- some gravel and cobbles, trace clay by 6.1m depth		SS	8	83	25		
		SS	9	75	40	6	65.55
		SS	10	58	38	7	64.55
7.77							
		SS	11	83	27	8	63.55
Compact to very dense, brown **SILTY SAND,** some gravel, trace clay, cobbles and boulders		SS	12	67	19		
		SS	13	88	50+	9	62.55
		SS	14	50	50+	10	61.55
10.67							
		SS	15	83	36	11	60.55
		SS	16	80	50+		
Dense to very dense, brown **SAND,** some gravel		SS	17	67	50+	12	59.55
						13	58.55
						14	57.55
14.63							
End of Borehole							
(GWL @ 11.75m-May 15, 2018)							

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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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1050 Bank Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located in front of 1063 Bank Street. Geodetic elevation = 73.22m.

FILE NO. PE4303

REMARKS

HOLE NO. BH 3

BORINGS BY CME 55 Power Auger **DATE** 2018 May 4

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	71.50		
50mm Asphaltic concrete over crushed stone with silt and sand 0.46		AU	1						
FILL: Brown silty sand, trace gravel and organics		SS	2	54	9	1	70.50		
1.98		SS	3	75	5	2	69.50		
		SS	4	58	23				
		SS	5	75	34	3	68.50		
		SS	6	58	47	4	67.50		
		SS	7	58	40	5	66.50		
Compact to very dense, brown **SAND,** trace silt		SS	8	58	41	6	65.50		
		SS	9	83	54				
		SS	10	75	56	7	64.50		
						8	63.50		
9.75		SS	11	58	75	9	62.50		
Very dense, brown **SAND,** some silt, clay and gravel 10.67		SS	12	67	53	10	61.50		
		SS	13	75	43	11	60.50		
Dense, brown **SAND**		SS	14	83	47	12	59.50		
13.72						13	58.50		
End of Borehole									
(GWL @ 11.73m-May 15, 2018)									

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

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1050 and 1060 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4783

REMARKS

HOLE NO. BH 1-19

BORINGS BY CME 55 Power Auger **DATE** 2019 December 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	71.57
Asphaltic concrete 0.08		AU	1				
FILL: Brown sand, trace gravel 0.76		SS	2	71	7	1	70.57
FILL: Brown sandy silt 1.52		SS	3	83	14	2	69.57
		SS	4	83	14		
		SS	5	92	18	3	68.57
Compact, brown **SAND**		SS	6	75	16	4	67.57
- trace silt from 2.3 to 3.8m depth		SS	7	58	17	5	66.57
		SS	8	75	25		
		SS	9	79	30	6	65.57
7.32		SS	10	75	24	7	64.57
Compact, brown **SANDY SILT,** some gravel, trace clay, cobbles and boulders		SS	11	79	21	8	63.57
8.69		SS	12	92	76		
Compact, brown **SAND,** some gravel, trace cobbles, boulders		SS	13	71	22	9	62.57
10.26		SS	14	67	62	10	61.57
Very dense, brown **SANDY SILT** 10.67		SS	15	67	50+		
		SS	16	100	50+	11	60.57
Very dense, brown **SILTY SAND,** some gravel, trace cobbles and boulders		SS	17	81	50+	12	59.57
		SS	18	0	50+	13	58.57
		AU	19			14	57.57
14.63							
End of Borehole							
(GWL @ 12.26m - Dec. 11, 2019)							

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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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1050 and 1060 Bank Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

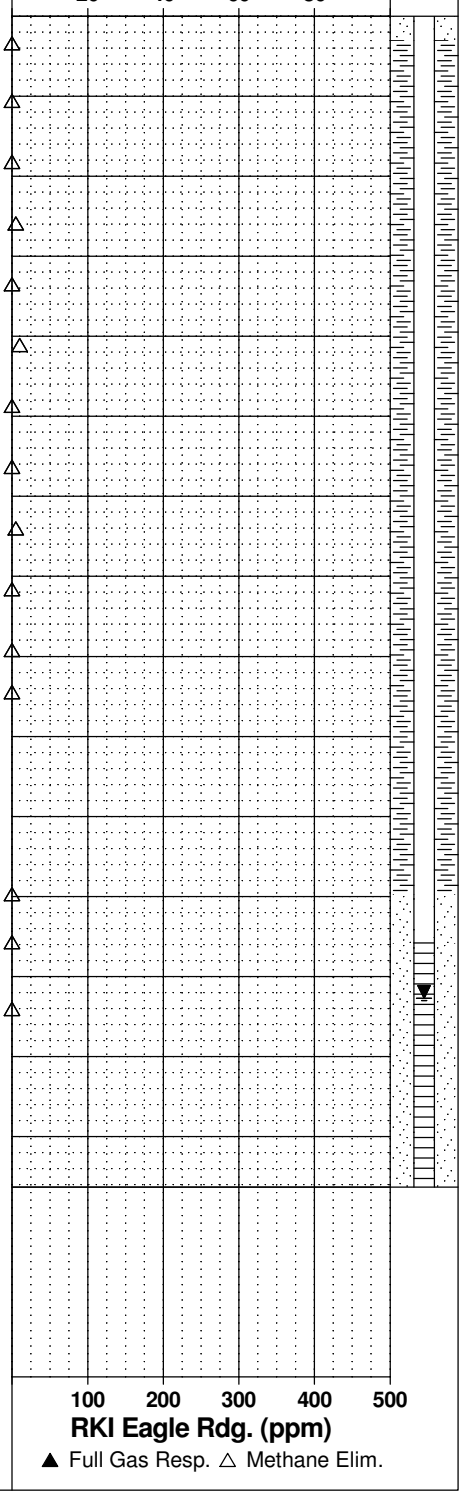
BORINGS BY CME 55 Power Auger **DATE** 2019 December 2

FILE NO. PE4783

HOLE NO. BH 2-19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	71.48
Asphaltic concrete 0.08		AU	1				
FILL: Brown sand 0.76		SS	2	92	16	1	70.48
Compact, brown **SAND** 1.52		SS	3	75	16	2	69.48
Compact, brown **SANDY SILT** 2.29		SS	4	83	9		
Loose to compact, brown **SILTY SAND**		SS	5	71	19	3	68.48
3.81		SS	6	75	16	4	67.48
Compact, brown **SANDY SILT** 4.67		SS	7	79	13	5	66.48
Compact, brown **SAND**		SS	8	83	23		
		SS	9	75	23	6	65.48
- some gravel by 5.8m depth		SS	10	67	25	7	64.48
7.98		SS	11	75	19	8	63.48
Compact, brown **SANDY SILT,** trace gravel 8.38		SS	12	100	50+		
		SS	13	0	50+	9	62.48
		SS	14	67	50+	10	61.48
Very dense, brown **SAND,** some gravel		SS	15	100	58	11	60.48
		SS	16	9	50+		
		SS	17	71	50+	12	59.48
						13	58.48
						14	57.48
14.63		AU	18				
End of Borehole							
(GWL @ 12.27m - Dec. 11, 2019)							

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



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
1050 and 1060 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4783

REMARKS

HOLE NO. BH 3-19

BORINGS BY CME 55 Power Auger **DATE** 2019 December 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.06		AU	1			0	71.46
FILL: Brown sand, some gravel 0.76							
FILL: Brown sand, some silt, trace gravel 1.52		SS	2	50	3	1	70.46
Compact, brown **SAND,** some silt 2.29		SS	3	42	13	2	69.46
Compact, brown **SILT** with sand 3.05		SS	4	54	29	3	68.46
Compact, brown **SAND,** some silt 3.81		SS	5	71	19		
Compact, brown **SILT,** some sand 4.57		SS	6	79	19	4	67.46
		SS	7	71	20	5	66.46
Compact, brown **SAND**		SS	8	79	22		
		SS	9	62	21	6	65.46
- some gravel by 6.9m depth		SS	10	71	26	7	64.46
7.62		SS	11	70	50+		
Very dense, brown **SILT** with clay, some sand and gravel 8.38		SS	12	80	50+	8	63.46
Very dense, brown **SAND,** some gravel		SS	13	50	50+	9	62.46
		SS	14	62	35	10	61.46
- trace cobbles and boulders by 9.1m depth		SS	15	83	53	11	60.46
		SS	16	73	50+		
		SS	17	76	50+	12	59.46
12.95		SS	18	53	50+	13	58.46
Very dense **GRAVEL** with sand		SS	19	46	55	14	57.46
14.94							
End of Borehole							
(GWL @ 12.30m - Dec. 11, 2019)							

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
1050 and 1060 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4783

REMARKS

HOLE NO. BH 4-19

BORINGS BY CME 55 Power Auger **DATE** 2019 December 3

SOIL DESCRIPTION		STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE										
Asphaltic concrete	0.05		AU	1			0	71.46		
FILL: Brown sand			SS	2	54	7	1	70.46		
	1.52									
Loose, brown **SANDY SILT**	2.29		SS	3	71	9	2	69.46		
Compact, brown **SAND**			SS	4	67	10				
- with silt by 3.0m depth			SS	5	58	13	3	68.46		
	3.81									
Compact, brown **SANDY SILT**	4.27		SS	6	67	16	4	67.46		
Compact, brown **SAND**	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.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1050 and 1060 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4783

REMARKS

HOLE NO. BH 5-19

BORINGS BY CME 55 Power Auger **DATE** 2019 December 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector / Monitoring Well Construction
GROUND SURFACE								
Asphaltic concrete 0.06		AU	1			0	71.51	
FILL: Brown sand, trace gravel		SS	2	50	9	1	70.51	
		SS	3	4	6	2	69.51	
2.64		SS	4	50	3			
Very loose to compact, brown **SAND,** trace silt		SS	5	62	3	3	68.51	
4.42		SS	6	79	12	4	67.51	
End of Borehole								

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)
○ Lower Explosive Limit %
20 40 60 80
100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1050 and 1060 Bank Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger **DATE** 2019 December 4

FILE NO. PE4783

HOLE NO. BH 6-19

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	71.62
Asphaltic concrete 0.08		AU	1				
FILL: Brown sand, some gravel 0.41		SS	2	71	10	1	70.62
Compact, brown **SAND**		SS	3	75	16	2	69.62
		SS	4	83	14		
3.15		SS	5	71	15	3	68.62
Compact, brown **SAND** with silt 4.06		SS	6	83	14	4	67.62
Compact, brown **SILT** with sand 4.22		SS	7	79	19	5	66.62
Compact, brown **SAND,** trace gravel		SS	8	75	18	6	65.62
		SS	9	70	79		
7.62		SS	10	71	14	7	64.62
Compact to very dense, brown **SILT** with clay, some sand and gravel		SS	11	62	21	8	63.62
		SS	12	83	34		
- trace cobbles and boulders by 9.9md epth		SS	13	100	50+	9	62.62
		SS	14	50	50+	10	61.62
10.77		SS	15	88	51	11	60.62
Very dense, brown **SAND** 11.43		SS	16	62	49		
Very dense, brown **SAND,** some gravel, trace cobbles and boulders		SS	17	89	50+	12	59.62
- gravel increasing with depth 12.95		SS	18	67	68	13	58.62
Very dense, brown **SILTY SAND** with gravel, trace cobbles and boulders		SS	19	90	50+	14	57.62
		SS	20	0	50+		
15.24		AU	21			15	56.62
End of Borehole							
(GWL @ 12.32m - Dec. 11, 2019)							

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
1050 and 1060 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4783

REMARKS

HOLE NO. BH 7-19

BORINGS BY CME 55 Power Auger **DATE** 2019 December 4

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.09		AU	1			0	71.47
FILL: Brown sand with gravel		SS	2	58	3	1	70.47
- trace gravel by 0.3m depth 1.52		SS	3	67	3	2	69.47
FILL: Brown sand 2.29		SS	4	92	12		
Compact, brown **SAND,** some silt		SS	5	88	18	3	68.47
3.81		SS	6	88	20	4	67.47
		SS	7	58	21	5	66.47
Compact, brown **SAND**		SS	8	75	17		
		SS	9	71	18	6	65.47
		SS	10	79	24	7	64.47
- trace gravel, cobbles and boulders by 7.6m depth		SS	11	46	30	8	63.47
8.76		SS	12	50	11		
Dark brown **SILTY CLAY** with sand and gravel		SS	13	42	23	9	62.47
- trace cobbles and boulders by 9.9m depth		SS	14	100	50+	10	61.47
10.67							
Very dense, brown **SAND,** trace gravel, cobbles, boulders 11.43		SS	15	67	46	11	60.47
Compact to very dense, brown **SAND** with gravel		SS	16	33	29		
		SS	17	89	50+	12	59.47
13.00						13	58.47
Very dense, brown **GRAVEL** with sand		SS	18	54	50		
14.33		SS	19	83	93	14	57.47
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

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

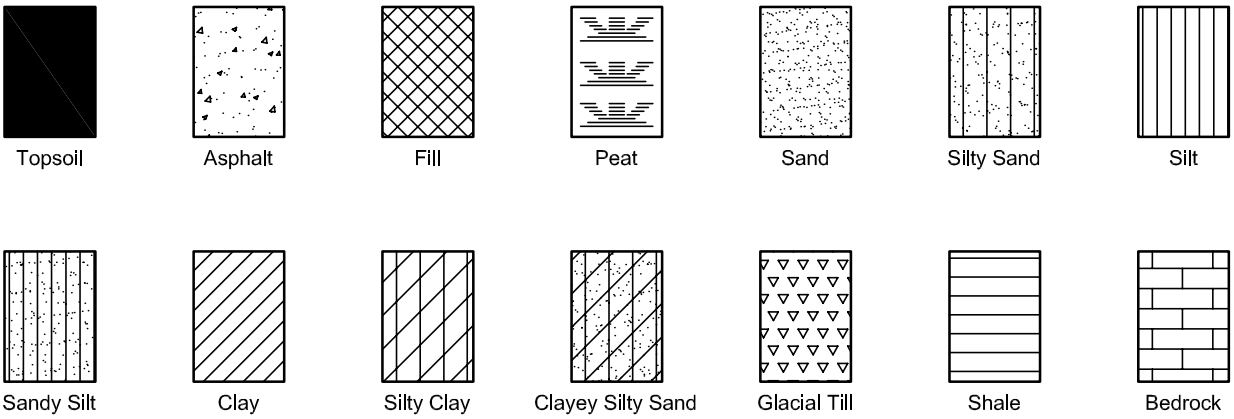
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

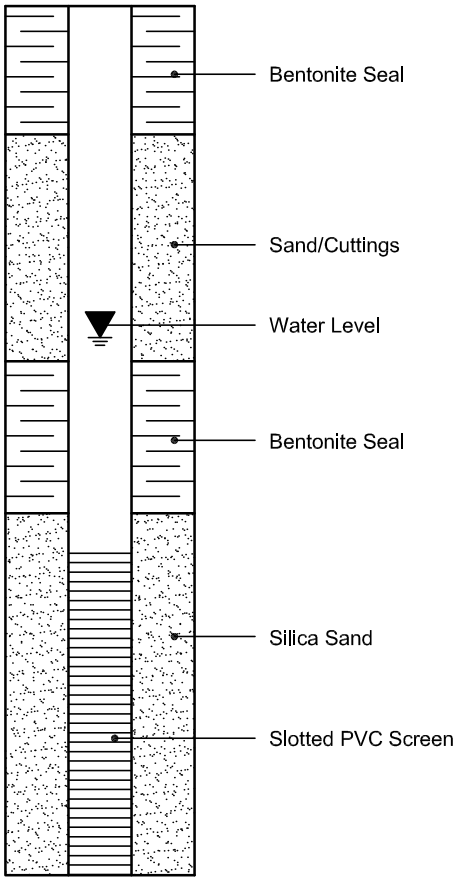
SYMBOLS AND TERMS (continued)

STRATA PLOT

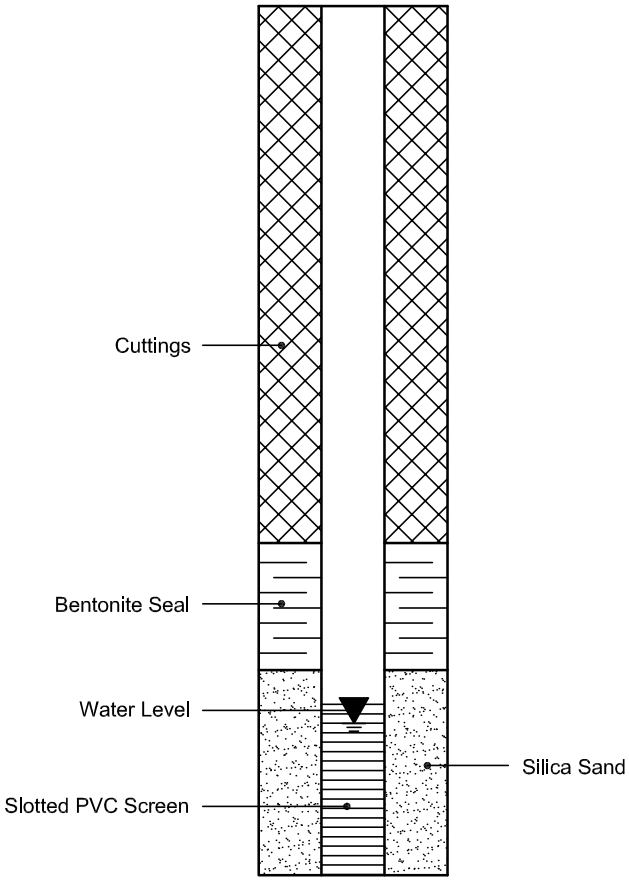


MONITORING WELL AND PIEZOMETER CONSTRUCTION

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: 29273
Project: PE4783
Custody: 51750

Report Date: 19-Dec-2019
Order Date: 6-Dec-2019

Revised Report

Order #: 1949563

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

Paracel ID	Client ID
1949563-01	BH1-SS5
1949563-02	BH1-SS17
1949563-03	BH2-SS4
1949563-04	BH2-SS17
1949563-05	BH3-SS2
1949563-06	BH3-SS6
1949563-07	BH3-SS16
1949563-08	BH5-SS2
1949563-09	BH6-SS18
1949563-10	BH7-SS2
1949563-11	BH7-SS18
1949563-12	Dup1
1949563-13	Dup2

Approved By:

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 29273

Report Date: 19-Dec-2019
Order Date: 6-Dec-2019
Project Description: PE4783

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	11-Dec-19	12-Dec-19
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	9-Dec-19	10-Dec-19
Mercury by CVAA	EPA 7471B - CVAA, digestion	11-Dec-19	11-Dec-19
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	11-Dec-19	11-Dec-19
PHC F1	CWS Tier 1 - P&T GC-FID	11-Dec-19	12-Dec-19
PHC F4G (gravimetric)	CWS Tier 1 - Extraction Gravimetric	11-Dec-19	12-Dec-19
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	9-Dec-19	10-Dec-19
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	11-Dec-19	11-Dec-19
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	13-Dec-19	17-Dec-19
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	11-Dec-19	12-Dec-19
Solids, %	Gravimetric, calculation	9-Dec-19	9-Dec-19

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 29273

Report Date: 19-Dec-2019

Order Date: 6-Dec-2019

Project Description: PE4783

	Client ID:	BH1-SS5	BH1-SS17	BH2-SS4	BH2-SS17
	Sample Date:	02-Dec-19 09:00	02-Dec-19 09:00	02-Dec-19 09:00	02-Dec-19 09:00
	Sample ID:	1949563-01	1949563-02	1949563-03	1949563-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	97.3	95.0	90.7	91.0
General Inorganics					
pH	0.05 pH Units	8.38	-	-	-
Volatiles					
Acetone	0.50 ug/g dry	-	-	<0.50	-
Benzene	0.02 ug/g dry	-	-	<0.02	-
Bromodichloromethane	0.05 ug/g dry	-	-	<0.05	-
Bromoform	0.05 ug/g dry	-	-	<0.05	-
Bromomethane	0.05 ug/g dry	-	-	<0.05	-
Carbon Tetrachloride	0.05 ug/g dry	-	-	<0.05	-
Chlorobenzene	0.05 ug/g dry	-	-	<0.05	-
Chloroform	0.05 ug/g dry	-	-	<0.05	-
Dibromochloromethane	0.05 ug/g dry	-	-	<0.05	-
Dichlorodifluoromethane	0.05 ug/g dry	-	-	<0.05	-
1,2-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	-
1,3-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	-
1,4-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	-
1,1-Dichloroethane	0.05 ug/g dry	-	-	<0.05	-
1,2-Dichloroethane	0.05 ug/g dry	-	-	<0.05	-
1,1-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	-
1,2-Dichloropropane	0.05 ug/g dry	-	-	<0.05	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	-	<0.05	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	-	<0.05	-
1,3-Dichloropropene, total	0.05 ug/g dry	-	-	<0.05	-
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	-
Ethylene dibromide (dibromoethan	0.05 ug/g dry	-	-	<0.05	-
Hexane	0.05 ug/g dry	-	-	<0.05	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	-	<0.50	-
Methyl Isobutyl Ketone	0.50 ug/g dry	-	-	<0.50	-
Methyl tert-butyl ether	0.05 ug/g dry	-	-	<0.05	-
Methylene Chloride	0.05 ug/g dry	-	-	<0.05	-
Styrene	0.05 ug/g dry	-	-	<0.05	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	-	<0.05	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 29273

Report Date: 19-Dec-2019
Order Date: 6-Dec-2019
Project Description: PE4783

	Client ID:	BH1-SS5	BH1-SS17	BH2-SS4	BH2-SS17
	Sample Date:	02-Dec-19 09:00	02-Dec-19 09:00	02-Dec-19 09:00	02-Dec-19 09:00
	Sample ID:	1949563-01	1949563-02	1949563-03	1949563-04
	MDL/Units	Soil	Soil	Soil	Soil
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	-	<0.05	-
Tetrachloroethylene	0.05 ug/g dry	-	-	<0.05	-
Toluene	0.05 ug/g dry	-	-	<0.05	-
1,1,1-Trichloroethane	0.05 ug/g dry	-	-	<0.05	-
1,1,2-Trichloroethane	0.05 ug/g dry	-	-	<0.05	-
Trichloroethylene	0.05 ug/g dry	-	-	<0.05	-
Trichlorofluoromethane	0.05 ug/g dry	-	-	<0.05	-
Vinyl chloride	0.02 ug/g dry	-	-	<0.02	-
m,p-Xylenes	0.05 ug/g dry	-	-	<0.05	-
o-Xylene	0.05 ug/g dry	-	-	<0.05	-
Xylenes, total	0.05 ug/g dry	-	-	<0.05	-
4-Bromofluorobenzene	Surrogate	-	-	111%	-
Dibromofluoromethane	Surrogate	-	-	104%	-
Toluene-d8	Surrogate	-	-	102%	-
Benzene	0.02 ug/g dry	<0.02	<0.02	-	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Toluene-d8	Surrogate	102%	101%	-	101%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	11	16
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	<6	15
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	-	<0.02	-
Acenaphthylene	0.02 ug/g dry	-	-	<0.02	-
Anthracene	0.02 ug/g dry	-	-	<0.02	-
Benzo [a] anthracene	0.02 ug/g dry	-	-	<0.02	-
Benzo [a] pyrene	0.02 ug/g dry	-	-	<0.02	-
Benzo [b] fluoranthene	0.02 ug/g dry	-	-	<0.02	-
Benzo [g,h,i] perylene	0.02 ug/g dry	-	-	<0.02	-
Benzo [k] fluoranthene	0.02 ug/g dry	-	-	<0.02	-
Chrysene	0.02 ug/g dry	-	-	<0.02	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 29273

Report Date: 19-Dec-2019

Order Date: 6-Dec-2019

Project Description: PE4783

	Client ID:	BH1-SS5	BH1-SS17	BH2-SS4	BH2-SS17
	Sample Date:	02-Dec-19 09:00	02-Dec-19 09:00	02-Dec-19 09:00	02-Dec-19 09:00
	Sample ID:	1949563-01	1949563-02	1949563-03	1949563-04
	MDL/Units	Soil	Soil	Soil	Soil
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	-	<0.02	-
Fluoranthene	0.02 ug/g dry	-	-	<0.02	-
Fluorene	0.02 ug/g dry	-	-	<0.02	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	-	<0.02	-
1-Methylnaphthalene	0.02 ug/g dry	-	-	<0.02	-
2-Methylnaphthalene	0.02 ug/g dry	-	-	<0.02	-
Methylnaphthalene (1&2)	0.04 ug/g dry	-	-	<0.04	-
Naphthalene	0.01 ug/g dry	-	-	<0.01	-
Phenanthrene	0.02 ug/g dry	-	-	<0.02	-
Pyrene	0.02 ug/g dry	-	-	<0.02	-
2-Fluorobiphenyl	Surrogate	-	-	73.6%	-
Terphenyl-d14	Surrogate	-	-	66.8%	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 29273

Report Date: 19-Dec-2019

Order Date: 6-Dec-2019

Project Description: PE4783

	Client ID:	BH3-SS2	BH3-SS6	BH3-SS16	BH5-SS2
	Sample Date:	03-Dec-19 09:00	03-Dec-19 09:00	03-Dec-19 09:00	03-Dec-19 09:00
	Sample ID:	1949563-05	1949563-06	1949563-07	1949563-08
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	88.9	84.9	96.7	93.8
Metals					
Antimony	1.0 ug/g dry	1.1	-	-	-
Arsenic	1.0 ug/g dry	3.0	-	-	-
Barium	1.0 ug/g dry	47.4	-	-	-
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	12.6	-	-	-
Chromium (VI)	0.2 ug/g dry	<0.2	-	-	-
Cobalt	1.0 ug/g dry	3.7	-	-	-
Copper	5.0 ug/g dry	9.2	-	-	-
Lead	1.0 ug/g dry	21.3	-	-	-
Mercury	0.1 ug/g dry	<0.1	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	5.0 ug/g dry	6.5	-	-	-
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	22.5	-	-	-
Zinc	20.0 ug/g dry	156	-	-	-
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

Client: Paterson Group Consulting Engineers

Client PO: 29273

Report Date: 19-Dec-2019

Order Date: 6-Dec-2019

Project Description: PE4783

	Client ID:	BH3-SS2	BH3-SS6	BH3-SS16	BH5-SS2
	Sample Date:	03-Dec-19 09:00	03-Dec-19 09:00	03-Dec-19 09:00	03-Dec-19 09:00
	Sample ID:	1949563-05	1949563-06	1949563-07	1949563-08
	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 (dibromoethar	0.05 ug/g dry	-	<0.05	-	<0.05
Hexane	0.05 ug/g dry	-	<0.05	-	<0.05
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	<0.50	-	<0.50
Methyl Isobutyl Ketone	0.50 ug/g dry	-	<0.50	-	<0.50
Methyl tert-butyl ether	0.05 ug/g dry	-	<0.05	-	<0.05
Methylene Chloride	0.05 ug/g dry	-	<0.05	-	<0.05
Styrene	0.05 ug/g dry	-	<0.05	-	<0.05
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
Tetrachloroethylene	0.05 ug/g dry	-	<0.05	-	<0.05
Toluene	0.05 ug/g dry	-	<0.05	-	<0.05
1,1,1-Trichloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
1,1,2-Trichloroethane	0.05 ug/g dry	-	<0.05	-	<0.05
Trichloroethylene	0.05 ug/g dry	-	<0.05	-	<0.05
Trichlorofluoromethane	0.05 ug/g dry	-	<0.05	-	<0.05
Vinyl chloride	0.02 ug/g dry	-	<0.02	-	<0.02
m,p-Xylenes	0.05 ug/g dry	-	<0.05	-	<0.05
o-Xylene	0.05 ug/g dry	-	<0.05	-	<0.05
Xylenes, total	0.05 ug/g dry	-	<0.05	-	<0.05
4-Bromofluorobenzene	Surrogate	-	109%	-	108%
Dibromofluoromethane	Surrogate	-	105%	-	102%
Toluene-d8	Surrogate	-	102%	-	101%
Benzene	0.02 ug/g dry	-	-	<0.02	-
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 29273

Report Date: 19-Dec-2019

Order Date: 6-Dec-2019

Project Description: PE4783

	Client ID:	BH3-SS2	BH3-SS6	BH3-SS16	BH5-SS2
	Sample Date:	03-Dec-19 09:00	03-Dec-19 09:00	03-Dec-19 09:00	03-Dec-19 09:00
	Sample ID:	1949563-05	1949563-06	1949563-07	1949563-08
	MDL/Units	Soil	Soil	Soil	Soil
Toluene	0.05 ug/g dry	-	-	<0.05	-
m,p-Xylenes	0.05 ug/g dry	-	-	<0.05	-
o-Xylene	0.05 ug/g dry	-	-	<0.05	-
Xylenes, total	0.05 ug/g dry	-	-	<0.05	-
Toluene-d8	Surrogate	-	-	101%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	-	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	-	<8	<8	94
F4 PHCs (C34-C50)	6 ug/g dry	-	<6	<6	174 [2]
F4G PHCs (gravimetric)	50 ug/g dry	-	-	-	719
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	-	-	<0.02
Acenaphthylene	0.02 ug/g dry	-	-	-	0.02
Anthracene	0.02 ug/g dry	-	-	-	<0.02
Benzo [a] anthracene	0.02 ug/g dry	-	-	-	0.02
Benzo [a] pyrene	0.02 ug/g dry	-	-	-	0.02
Benzo [b] fluoranthene	0.02 ug/g dry	-	-	-	0.04
Benzo [g,h,i] perylene	0.02 ug/g dry	-	-	-	0.04
Benzo [k] fluoranthene	0.02 ug/g dry	-	-	-	0.02
Chrysene	0.02 ug/g dry	-	-	-	0.03
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	-	-	<0.02
Fluoranthene	0.02 ug/g dry	-	-	-	0.03
Fluorene	0.02 ug/g dry	-	-	-	<0.02
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	-	-	0.02
1-Methylnaphthalene	0.02 ug/g dry	-	-	-	<0.02
2-Methylnaphthalene	0.02 ug/g dry	-	-	-	<0.02
Methylnaphthalene (1&2)	0.04 ug/g dry	-	-	-	<0.04
Naphthalene	0.01 ug/g dry	-	-	-	<0.01
Phenanthrene	0.02 ug/g dry	-	-	-	<0.02
Pyrene	0.02 ug/g dry	-	-	-	0.03
2-Fluorobiphenyl	Surrogate	-	-	-	132%
Terphenyl-d14	Surrogate	-	-	-	121%

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 29273

Report Date: 19-Dec-2019

Order Date: 6-Dec-2019

Project Description: PE4783

	Client ID:	BH6-SS18	BH7-SS2	BH7-SS18	Dup1
	Sample Date:	04-Dec-19 09:00	04-Dec-19 09:00	04-Dec-19 09:00	04-Dec-19 09:00
	Sample ID:	1949563-09	1949563-10	1949563-11	1949563-12
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	94.2	92.5	84.2	92.2
General Inorganics					
pH	0.05 pH Units	-	7.85	-	-
Metals					
Antimony	1.0 ug/g dry	-	<1.0	-	-
Arsenic	1.0 ug/g dry	-	2.3	-	-
Barium	1.0 ug/g dry	-	34.8	-	-
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	-	10.3	-	-
Chromium (VI)	0.2 ug/g dry	-	<0.2	-	-
Cobalt	1.0 ug/g dry	-	3.6	-	-
Copper	5.0 ug/g dry	-	11.1	-	-
Lead	1.0 ug/g dry	-	30.9	-	-
Mercury	0.1 ug/g dry	-	<0.1	-	-
Molybdenum	1.0 ug/g dry	-	<1.0	-	-
Nickel	5.0 ug/g dry	-	6.0	-	-
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	-	21.2	-	-
Zinc	20.0 ug/g dry	-	68.7	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	-	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	-	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	-	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	-	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	-	<0.05	<0.05
Toluene-d8	Surrogate	101%	-	101%	101%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	<4	<4

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 29273

Report Date: 19-Dec-2019

Order Date: 6-Dec-2019

Project Description: PE4783

	Client ID:	BH6-SS18	BH7-SS2	BH7-SS18	Dup1
	Sample Date:	04-Dec-19 09:00	04-Dec-19 09:00	04-Dec-19 09:00	04-Dec-19 09:00
	Sample ID:	1949563-09	1949563-10	1949563-11	1949563-12
	MDL/Units	Soil	Soil	Soil	Soil
F3 PHCs (C16-C34)	8 ug/g dry	<8	-	24	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	27	<6
	Client ID:	Dup2	-	-	-
	Sample Date:	04-Dec-19 09:00	-	-	-
	Sample ID:	1949563-13	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	83.4	-	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05	-	-	-
Toluene-d8	Surrogate	101%	-	-	-
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						
F4G PHCs (gravimetric)	ND	50	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	*1.61*		*ug/g*		*121*	*50-140*			
Surrogate: Terphenyl-d14	*1.63*		*ug/g*		*122*	*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						

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 29273

Report Date: 19-Dec-2019
Order Date: 6-Dec-2019
Project Description: PE4783

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*9.19*		*ug/g*		*115*	*50-140*			
Surrogate: Dibromofluoromethane	*8.27*		*ug/g*		*103*	*50-140*			
Surrogate: Toluene-d8	*8.22*		*ug/g*		*103*	*50-140*			
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	*8.22*		*ug/g*		*103*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	8.16	0.05	pH Units	8.16			0.0	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	29	8	ug/g dry	45			43.8	30	QR-01
F4 PHCs (C34-C50)	32	6	ug/g dry	57			55.9	30	QR-01
F4G PHCs (gravimetric)	1280	83	ug/g dry	1680			27.2	30	
Metals									
Antimony	ND	1.0	ug/g dry	ND			0.0	30	
Arsenic	4.0	1.0	ug/g dry	3.6			11.1	30	
Barium	69.4	1.0	ug/g dry	59.2			15.9	30	
Beryllium	0.6	0.5	ug/g dry	0.5			12.4	30	
Boron	9.8	5.0	ug/g dry	8.2			17.7	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium (VI)	ND	0.2	ug/g dry	ND				35	
Chromium	21.3	5.0	ug/g dry	18.8			12.1	30	
Cobalt	7.6	1.0	ug/g dry	6.6			13.7	30	
Copper	21.9	5.0	ug/g dry	18.9			14.9	30	
Lead	15.6	1.0	ug/g dry	13.5			14.4	30	
Mercury	ND	0.1	ug/g dry	ND			0.0	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	16.9	5.0	ug/g dry	14.4			16.0	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	ND	0.3	ug/g dry	ND			0.0	30	
Thallium	ND	1.0	ug/g dry	ND			0.0	30	
Uranium	ND	1.0	ug/g dry	ND			0.0	30	
Vanadium	29.5	10.0	ug/g dry	26.3			11.2	30	
Zinc	62.0	20.0	ug/g dry	53.4			14.8	30	
Physical Characteristics									
% Solids	94.7	0.1	% by Wt.	94.1			0.7	25	
Semi-Volatiles									
Acenaphthene	0.442	0.02	ug/g dry	0.287			42.6	40	QR-04
Acenaphthylene	0.554	0.02	ug/g dry	0.353			44.5	40	QR-04
Anthracene	ND	0.02	ug/g dry	ND				40	
Benzo [a] anthracene	ND	0.02	ug/g dry	ND				40	
Benzo [a] pyrene	ND	0.02	ug/g dry	ND				40	
Benzo [b] fluoranthene	ND	0.02	ug/g dry	ND				40	
Benzo [g,h,i] perylene	ND	0.02	ug/g dry	ND				40	
Benzo [k] fluoranthene	ND	0.02	ug/g dry	ND				40	
Chrysene	ND	0.02	ug/g dry	ND				40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g dry	ND				40	
Fluoranthene	0.041	0.02	ug/g dry	0.034			17.1	40	
Fluorene	1.21	0.02	ug/g dry	1.01			17.6	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g dry	ND				40	
1-Methylnaphthalene	17.3	0.02	ug/g dry	14.6			17.1	40	
2-Methylnaphthalene	27.2	0.02	ug/g dry	21.2			24.9	40	
Naphthalene	7.77	0.01	ug/g dry	6.07			24.6	40	
Phenanthrene	2.66	0.02	ug/g dry	2.18			19.8	40	
Pyrene	0.118	0.02	ug/g dry	0.099			17.0	40	
Surrogate: 2-Fluorobiphenyl	*1.38*		*ug/g dry*		*87.6*	*50-140*			
Surrogate: Terphenyl-d14	*1.63*		*ug/g dry*		*104*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g dry	ND				50	
Benzene	ND	0.02	ug/g dry	ND				50	
Bromodichloromethane	ND	0.05	ug/g dry	ND				50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromoform	ND	0.05	ug/g dry	ND				50	
Bromomethane	ND	0.05	ug/g dry	ND				50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND				50	
Chlorobenzene	ND	0.05	ug/g dry	ND				50	
Chloroform	ND	0.05	ug/g dry	ND				50	
Dibromochloromethane	ND	0.05	ug/g dry	ND				50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND				50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND				50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND				50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND				50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND				50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Ethylene dibromide (dibromoethane	ND	0.05	ug/g dry	ND				50	
Hexane	ND	0.05	ug/g dry	ND				50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND				50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND				50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND				50	
Methylene Chloride	ND	0.05	ug/g dry	ND				50	
Styrene	ND	0.05	ug/g dry	ND				50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND				50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND				50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND				50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND				50	
Trichloroethylene	ND	0.05	ug/g dry	ND				50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND				50	
Vinyl chloride	ND	0.02	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: 4-Bromofluorobenzene	*8.97*		*ug/g dry*		*109*	*50-140*			
Surrogate: Dibromofluoromethane	*8.51*		*ug/g dry*		*103*	*50-140*			
Surrogate: Toluene-d8	*8.30*		*ug/g dry*		*101*	*50-140*			
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	*8.30*		*ug/g dry*		*101*	*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)	183	7	ug/g		91.4	80-120			
F2 PHCs (C10-C16)	99	4	ug/g	ND	108	60-140			
F3 PHCs (C16-C34)	290	8	ug/g	45	110	60-140			
F4 PHCs (C34-C50)	199	6	ug/g	57	99.9	60-140			
F4G PHCs (gravimetric)	1010	50	ug/g		101	80-120			
Metals									
Antimony	43.6		ug/L	ND	87.1	70-130			
Arsenic	56.5		ug/L	1.4	110	70-130			
Barium	77.6		ug/L	23.7	108	70-130			
Beryllium	57.6		ug/L	ND	115	70-130			
Boron	56.9		ug/L	ND	107	70-130			
Cadmium	51.2		ug/L	ND	102	70-130			
Chromium (VI)	3.9	0.2	ug/g		78.0	70-130			
Chromium	67.4		ug/L	7.5	120	70-130			
Cobalt	58.9		ug/L	2.6	112	70-130			
Copper	63.0		ug/L	7.5	111	70-130			
Lead	50.3		ug/L	5.4	89.8	70-130			
Mercury	1.68	0.1	ug/g	ND	112	70-130			
Molybdenum	55.8		ug/L	ND	111	70-130			
Nickel	61.5		ug/L	5.8	111	70-130			
Selenium	54.5		ug/L	ND	109	70-130			
Silver	44.3		ug/L	ND	88.5	70-130			
Thallium	44.6		ug/L	ND	89.1	70-130			
Uranium	47.0		ug/L	ND	93.7	70-130			
Vanadium	69.8		ug/L	10.5	119	70-130			
Zinc	73.8		ug/L	21.4	105	70-130			
Semi-Volatiles									
Acenaphthene	0.520	0.02	ug/g	0.287	119	50-140			
Acenaphthylene	0.569	0.02	ug/g	0.353	110	50-140			
Anthracene	0.213	0.02	ug/g	ND	108	50-140			
Benzo [a] anthracene	0.125	0.02	ug/g	ND	63.5	50-140			
Benzo [a] pyrene	0.101	0.02	ug/g	ND	51.2	50-140			
Benzo [b] fluoranthene	0.168	0.02	ug/g	ND	85.7	50-140			
Benzo [g,h,i] perylene	0.118	0.02	ug/g	ND	60.0	50-140			
Benzo [k] fluoranthene	0.149	0.02	ug/g	ND	76.0	50-140			
Chrysene	0.171	0.02	ug/g	ND	86.8	50-140			
Dibenzo [a,h] anthracene	0.105	0.02	ug/g	ND	53.6	50-140			
Fluoranthene	0.175	0.02	ug/g	0.034	71.4	50-140			
Fluorene	1.27	0.02	ug/g	1.01	129	50-140			
Indeno [1,2,3-cd] pyrene	0.095	0.02	ug/g	ND	48.6	50-140			QM-06
1-Methylnaphthalene	0.164	0.02	ug/g		98.4	50-140			
2-Methylnaphthalene	0.155	0.02	ug/g		92.7	50-140			
Naphthalene	0.140	0.01	ug/g		84.0	50-140			
Phenanthrene	0.143	0.02	ug/g		86.0	50-140			
Pyrene	0.227	0.02	ug/g	0.099	65.3	50-140			
Surrogate: 2-Fluorobiphenyl	*1.50*		*ug/g*		*95.2*	*50-140*			
Volatiles									
Acetone	6.64	0.50	ug/g		66.4	50-140			
Benzene	3.25	0.02	ug/g		81.2	60-130			
Bromodichloromethane	3.60	0.05	ug/g		90.0	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromoform	3.48	0.05	ug/g		87.0	60-130			
Bromomethane	4.75	0.05	ug/g		119	50-140			
Carbon Tetrachloride	3.06	0.05	ug/g		76.5	60-130			
Chlorobenzene	4.08	0.05	ug/g		102	60-130			
Chloroform	3.59	0.05	ug/g		89.7	60-130			
Dibromochloromethane	4.20	0.05	ug/g		105	60-130			
Dichlorodifluoromethane	4.19	0.05	ug/g		105	50-140			
1,2-Dichlorobenzene	4.10	0.05	ug/g		102	60-130			
1,3-Dichlorobenzene	3.83	0.05	ug/g		95.8	60-130			
1,4-Dichlorobenzene	4.05	0.05	ug/g		101	60-130			
1,1-Dichloroethane	3.60	0.05	ug/g		90.0	60-130			
1,2-Dichloroethane	3.39	0.05	ug/g		84.8	60-130			
1,1-Dichloroethylene	3.53	0.05	ug/g		88.4	60-130			
cis-1,2-Dichloroethylene	3.65	0.05	ug/g		91.4	60-130			
trans-1,2-Dichloroethylene	3.48	0.05	ug/g		87.0	60-130			
1,2-Dichloropropane	3.31	0.05	ug/g		82.7	60-130			
cis-1,3-Dichloropropylene	3.01	0.05	ug/g		75.1	60-130			
trans-1,3-Dichloropropylene	2.59	0.05	ug/g		64.8	60-130			
Ethylbenzene	4.11	0.05	ug/g		103	60-130			
Ethylene dibromide (dibromoethane	3.60	0.05	ug/g		90.1	60-130			
Hexane	3.72	0.05	ug/g		93.0	60-130			
Methyl Ethyl Ketone (2-Butanone)	9.25	0.50	ug/g		92.5	50-140			
Methyl Isobutyl Ketone	5.29	0.50	ug/g		52.9	50-140			
Methyl tert-butyl ether	7.37	0.05	ug/g		73.7	50-140			
Methylene Chloride	2.93	0.05	ug/g		73.2	60-130			
Styrene	3.76	0.05	ug/g		94.0	60-130			
1,1,1,2-Tetrachloroethane	4.12	0.05	ug/g		103	60-130			
1,1,2,2-Tetrachloroethane	3.30	0.05	ug/g		82.6	60-130			
Tetrachloroethylene	4.08	0.05	ug/g		102	60-130			
Toluene	3.58	0.05	ug/g		89.6	60-130			
1,1,1-Trichloroethane	3.26	0.05	ug/g		81.4	60-130			
1,1,2-Trichloroethane	2.00	0.05	ug/g		49.9	60-130			
Trichloroethylene	3.14	0.05	ug/g		78.5	60-130			
Trichlorofluoromethane	3.69	0.05	ug/g		92.3	50-140			
Vinyl chloride	4.95	0.02	ug/g		124	50-140			
m,p-Xylenes	7.92	0.05	ug/g		99.0	60-130			
o-Xylene	4.12	0.05	ug/g		103	60-130			
Benzene	3.25	0.02	ug/g		81.2	60-130			
Ethylbenzene	4.11	0.05	ug/g		103	60-130			
Toluene	3.58	0.05	ug/g		89.6	60-130			
m,p-Xylenes	7.92	0.05	ug/g		99.0	60-130			
o-Xylene	4.12	0.05	ug/g		103	60-130			

Qualifier Notes:

Login Qualifiers :

Container(s) - Bottle and COC sample ID don't match -
Applies to samples: BH1-SS17

Sample Qualifiers :

2 : GC-FID signal did not return to baseline by C50

QC Qualifiers :

QM-06 : Due to noted non-homogeneity of the QC sample matrix, the spike recoveries were out side the accepted range. Batch data accepted based on other QC.

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

QR-04 : Duplicate results exceeds RPD limits due to non-homogeneous matrix.

Sample Data Revisions

None

Work Order Revisions / Comments:

Revision 1 This report includes additional data as per client.

Other Report Notes:

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

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

CCME PHC additional information:

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

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Page 1 of 2

Client Name: Paterson
Contact Name: Karya Munch
Address: 154 Colonnade Rd
Telephone: 613 226 7381

Project Ref: PE4783
Quote #:
PO #: 29273
E-mail: kmunch@patersongroup.ca

Turnaround Time
☐ 1 day ☐ 3 day
☐ 2 day ☑ Regular
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: BTEX/PHCs	VOCs	Metals, HgCrVI	pH								
1	BH1-SS5	S		2	Dec 2	—	✓			✓							1 Gen + 1 Jar	
2	BH1-SS17	S			Dec 2	—	✓										- 10 on Jar need = BH17-SS17	
3	BH2-SS4	S			Dec 2	—	✓	✓										
4	BH2-SS17	S			Dec 2	—	✓											
5	BH3-SS2	S			Dec 3	—			✓									
6	BH3-SS6	S			Dec 3	—	✓	✓										
7	BH3-SS16	S			Dec 3	—	✓											
8	~~BH4-SS2~~	S			Dec 3													
9	BH5-SS2	S			Dec 3	—	✓	✓										
10	BH6-SS18	S		↓	Dec 4	—	✓											

Comments:

Method of Delivery: Paracel

Relinquished By (Sign):	Received By Driver/Depot: T. Sease	Received at Lab: Timepoint	Verified By:
Relinquished By (Print): Nic Doucette	Date/Time: 06/12/19 1245	Date/Time: Dec 06, 2019 12:30	Date/Time: 12-6-19 15:40
Date/Time:	Temperature: °C PT	Temperature: 11.6 °C	pH Verified: ☐ By:

Paracel ID: 1949563

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Paracel Order Number (Lab Use Only): 1949563

Chain Of Custody

(Lab Use Only)

Nº 51751

Page 2 of 2

Client Name: Paterson
Contact Name: Karyn Munch
Address: 154 Colonnade Rd,
Telephone: 613 226 7381

Project Ref: PE4783
Quote #:
PO #: 29273
E-mail: kmunch@patersongroup.ca

Turnaround Time

☐ 1 day ☐ 3 day
☐ 2 day ☑ Regular
Date Required:

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

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

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Time	BTEX/PHCS	VOCs	metals, Hg, CrVI	PH		
1	~~BH6-SS19~~	S		2	Dec 4	—			✓	✓	120ml + 1 vial	
2	~~BH7-SS2~~	S			Dec 4	—						
3	~~BH7-SS5~~	S			Dec 4	—	✓				120ml + 1 vial.	
4	BH7-SS8	S			Dec 4	—	✓					
5	DUP1	S			—	—	✓					
6	DUP2	S		↓								
7												
8												
9												
10												

Comments:

Method of Delivery: Paracel

Relinquished By (Sign): KMunch
Relinquished By (Print): KMunch
Date/Time: Dec. 6, 2018

Received By Driver/Depot: [signature]
Date/Time: 06/12/19 1245
Temperature: °C

Received at Lab: Suneeporn Dohmai
Date/Time: DEC 06, 2019 09.20
Temperature: 11.6 °C

Verified By: [signature]
Date/Time: 12-6-19 15:10
pH Verified: ☐ By:

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: 29090
Project: PE4783
Custody: 51691

Report Date: 19-Dec-2019
Order Date: 13-Dec-2019

Order #: 1950636

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

Paracel ID	Client ID
1950636-01	BH1-19-GW1
1950636-02	BH2-19-GW1
1950636-03	BH3-19-GW1
1950636-04	BH6-19-GW1

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 29090

Report Date: 19-Dec-2019
Order Date: 13-Dec-2019
Project Description: PE4783

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	17-Dec-19	18-Dec-19
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	17-Dec-19	19-Dec-19
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	18-Dec-19	18-Dec-19
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	17-Dec-19	18-Dec-19

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 29090

Report Date: 19-Dec-2019

Order Date: 13-Dec-2019

Project Description: PE4783

	Client ID:	BH1-19-GW1	BH2-19-GW1	BH3-19-GW1	BH6-19-GW1
	Sample Date:	11-Dec-19 09:00	10-Dec-19 09:00	11-Dec-19 09:00	10-Dec-19 09:00
	Sample ID:	1950636-01	1950636-02	1950636-03	1950636-04
	MDL/Units	Water	Water	Water	Water
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethan	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 29090

Report Date: 19-Dec-2019
Order Date: 13-Dec-2019
Project Description: PE4783

	Client ID:	BH1-19-GW1	BH2-19-GW1	BH3-19-GW1	BH6-19-GW1
	Sample Date:	11-Dec-19 09:00	10-Dec-19 09:00	11-Dec-19 09:00	10-Dec-19 09:00
	Sample ID:	1950636-01	1950636-02	1950636-03	1950636-04
	MDL/Units	Water	Water	Water	Water
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	110%	111%	110%	107%
Dibromofluoromethane	Surrogate	89.5%	95.0%	87.7%	84.2%
Toluene-d8	Surrogate	72.7%	73.6%	72.4%	70.8%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
Semi-Volatiles					
Acenaphthene	0.05 ug/L	-	-	-	<0.05
Acenaphthylene	0.05 ug/L	-	-	-	<0.05
Anthracene	0.01 ug/L	-	-	-	<0.01
Benzo [a] anthracene	0.01 ug/L	-	-	-	<0.01
Benzo [a] pyrene	0.01 ug/L	-	-	-	<0.01
Benzo [b] fluoranthene	0.05 ug/L	-	-	-	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	-	-	-	<0.05
Benzo [k] fluoranthene	0.05 ug/L	-	-	-	<0.05
Chrysene	0.05 ug/L	-	-	-	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	-	-	-	<0.05
Fluoranthene	0.01 ug/L	-	-	-	<0.01
Fluorene	0.05 ug/L	-	-	-	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	-	-	-	<0.05
1-Methylnaphthalene	0.05 ug/L	-	-	-	<0.05
2-Methylnaphthalene	0.05 ug/L	-	-	-	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	-	-	-	<0.10
Naphthalene	0.05 ug/L	-	-	-	<0.05
Phenanthrene	0.05 ug/L	-	-	-	<0.05
Pyrene	0.01 ug/L	-	-	-	<0.01
2-Fluorobiphenyl	Surrogate	-	-	-	95.4%
Terphenyl-d14	Surrogate	-	-	-	119%

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	*22.1*		*ug/L*		*111*	*50-140*			
Surrogate: Terphenyl-d14	*24.1*		*ug/L*		*120*	*50-140*			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 29090

Report Date: 19-Dec-2019
Order Date: 13-Dec-2019
Project Description: PE4783

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*101*		*ug/L*		*127*	*50-140*			
Surrogate: Dibromofluoromethane	*73.0*		*ug/L*		*91.2*	*50-140*			
Surrogate: Toluene-d8	*76.4*		*ug/L*		*95.5*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Volatiles									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Ethylene dibromide (dibromoethane	ND	0.2	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	*101*		*ug/L*		*126*	*50-140*			
Surrogate: Dibromofluoromethane	*88.2*		*ug/L*		*110*	*50-140*			
Surrogate: Toluene-d8	*75.3*		*ug/L*		*94.1*	*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)	2020	25	ug/L		101	68-117			
F2 PHCs (C10-C16)	1720	100	ug/L		107	60-140			
F3 PHCs (C16-C34)	4250	100	ug/L		109	60-140			
F4 PHCs (C34-C50)	2160	100	ug/L		87.0	60-140			
Semi-Volatiles									
Acenaphthene	4.76	0.05	ug/L		95.3	50-140			
Acenaphthylene	4.54	0.05	ug/L		90.8	50-140			
Anthracene	4.34	0.01	ug/L		86.9	50-140			
Benzo [a] anthracene	4.77	0.01	ug/L		95.4	50-140			
Benzo [a] pyrene	4.08	0.01	ug/L		81.7	50-140			
Benzo [b] fluoranthene	5.87	0.05	ug/L		117	50-140			
Benzo [g,h,i] perylene	4.19	0.05	ug/L		83.7	50-140			
Benzo [k] fluoranthene	5.55	0.05	ug/L		111	50-140			
Chrysene	5.38	0.05	ug/L		108	50-140			
Dibenzo [a,h] anthracene	4.41	0.05	ug/L		88.1	50-140			
Fluoranthene	4.10	0.01	ug/L		82.1	50-140			
Fluorene	4.77	0.05	ug/L		95.4	50-140			
Indeno [1,2,3-cd] pyrene	4.59	0.05	ug/L		91.8	50-140			
1-Methylnaphthalene	5.26	0.05	ug/L		105	50-140			
2-Methylnaphthalene	5.74	0.05	ug/L		115	50-140			
Naphthalene	5.03	0.05	ug/L		101	50-140			
Phenanthrene	3.96	0.05	ug/L		79.2	50-140			
Pyrene	4.19	0.01	ug/L		83.7	50-140			
Surrogate: 2-Fluorobiphenyl	*22.9*		*ug/L*		*115*	*50-140*			
Volatiles									
Acetone	60.0	5.0	ug/L		60.0	50-140			
Benzene	27.6	0.5	ug/L		68.9	60-130			
Bromodichloromethane	30.5	0.5	ug/L		76.3	60-130			
Bromoform	31.0	0.5	ug/L		77.5	60-130			
Bromomethane	44.9	0.5	ug/L		112	50-140			
Carbon Tetrachloride	29.6	0.2	ug/L		74.0	60-130			
Chlorobenzene	30.5	0.5	ug/L		76.2	60-130			
Chloroform	30.0	0.5	ug/L		75.0	60-130			
Dibromochloromethane	28.8	0.5	ug/L		72.1	60-130			
Dichlorodifluoromethane	30.8	1.0	ug/L		76.9	50-140			
1,2-Dichlorobenzene	25.0	0.5	ug/L		62.6	60-130			
1,3-Dichlorobenzene	29.5	0.5	ug/L		73.7	60-130			
1,4-Dichlorobenzene	29.1	0.5	ug/L		72.8	60-130			
1,1-Dichloroethane	32.4	0.5	ug/L		81.0	60-130			
1,2-Dichloroethane	24.6	0.5	ug/L		61.4	60-130			
1,1-Dichloroethylene	42.1	0.5	ug/L		105	60-130			
cis-1,2-Dichloroethylene	27.8	0.5	ug/L		69.6	60-130			
trans-1,2-Dichloroethylene	27.0	0.5	ug/L		67.5	60-130			
1,2-Dichloropropane	29.2	0.5	ug/L		73.1	60-130			
cis-1,3-Dichloropropylene	44.2	0.5	ug/L		110	60-130			
trans-1,3-Dichloropropylene	50.0	0.5	ug/L		125	60-130			
Ethylbenzene	27.2	0.5	ug/L		68.1	60-130			
Ethylene dibromide (dibromoethane	28.7	0.2	ug/L		71.8	60-130			
Hexane	30.8	1.0	ug/L		77.0	60-130			
Methyl Ethyl Ketone (2-Butanone)	61.5	5.0	ug/L		61.5	50-140			

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 29090

Report Date: 19-Dec-2019
Order Date: 13-Dec-2019
Project Description: PE4783

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl Isobutyl Ketone	53.7	5.0	ug/L		53.7	50-140			
Methyl tert-butyl ether	55.7	2.0	ug/L		55.7	50-140			
Methylene Chloride	28.7	5.0	ug/L		71.7	60-130			
Styrene	28.5	0.5	ug/L		71.3	60-130			
1,1,1,2-Tetrachloroethane	28.7	0.5	ug/L		71.8	60-130			
1,1,2,2-Tetrachloroethane	26.9	0.5	ug/L		67.2	60-130			
Tetrachloroethylene	33.9	0.5	ug/L		84.7	60-130			
Toluene	29.1	0.5	ug/L		72.8	60-130			
1,1,1-Trichloroethane	26.3	0.5	ug/L		65.7	60-130			
1,1,2-Trichloroethane	28.5	0.5	ug/L		71.3	60-130			
Trichloroethylene	27.9	0.5	ug/L		69.6	60-130			
Trichlorofluoromethane	30.2	1.0	ug/L		75.5	60-130			
Vinyl chloride	29.0	0.5	ug/L		72.6	50-140			
m,p-Xylenes	59.3	0.5	ug/L		74.2	60-130			
o-Xylene	29.0	0.5	ug/L		72.4	60-130			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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

PARACEL LABORATORIES LTD.

Paracel ID: 1950636

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
1950636	№ 51691

Client Name: Paterson Group | Project Ref: PE4783 | Page 1 of 1

Contact Name: Karyn Munch | Quote #:

Address: 154 Colonnade Rd. S. | PO #: 24090

E-mail: Kmunch@patersongroup.ca

Telephone: 613-226-7381

Turnaround Time

☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular

Date Required:

Regulation 153/04

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

Other Regulation

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

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	VOCs	PHCs (F1-F4)	PAHs									
1	BH1-19-GW1	GW		4	Dec 11/19		X	X									HOLD PAHs	
2	BH2-19-GW1	"		"	Dec 10/19		X	X	X								HOLD PAHs	
3	BH3-19-GW1	"		"	Dec 11/19		X	X	X								HOLD PAHs	
4	BH6-19-GW1	"		✓	Dec 10/19		X	X	X									
5	DUP	"		2	Dec 10/19		~~X~~										HOLD DUP	
6																		
7																		
8																		
9																		
10																		

Comments: The All VOCs + Na2S2O3

Method of Delivery:

Relinquished By (Sign): N. Sullivan	Received By Driver/Depot:	Received at Lab: D Poon	Verified By: SCO
Relinquished By (Print): Nick Sullivan	Date/Time:	Date/Time: Dec. 13, 15 24	Date/Time: Dec 13/19 4:37p
Date/Time: Dec 13, 19	Temperature: °C	Temperature: 17.3 °C	pH Verified: ☐ By: N/A