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Phase II – Environmental Site Assessment

1452-1470 Hunt Club Road &
1525-1545 Sieveright Avenue
Ottawa, Ontario

Prepared For

DCR Phoenix Group

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Report: PE5015-2

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the properties addressed 1452-1470 Hunt Club Road and 1525-1545 Sieveright Avenue, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the potentially contaminating activities (PCAs) that were identified during the Phase I ESA and were considered to result in areas of potential environmental concern (APECs) on the subject site.

The subsurface investigation for this assessment was conducted on August 25 and 26, 2020. The field program consisted of drilling seven (7) boreholes (BH1-BH7) throughout the subject site, of which four (4) were instrumented with groundwater monitoring wells (BH2, BH4, BH6, and BH7). The boreholes were advanced to depths ranging from approximately 6.70 m to 7.62 m below ground surface and terminated within the underlying layers of native silty sand/sandy silt or silty clay.

Eight (8) soil samples were submitted for laboratory analysis of either: BTEX, PHCs F_1-F_4, VOCs, PAHs, metals, EC, and/or SAR. Based on the analytical results, all detected parameter concentrations in the soil samples analyzed comply with the selected MECP Table 3 residential standards.

Four (4) groundwater samples were recovered from the monitoring wells installed in BH2, BH4, BH6, and BH7 and submitted for laboratory analysis of either: BTEX, PHCs F_1-F_4, VOCs, metals, and/or chlorides. Based on the analytical results, all detected parameter concentrations in the groundwater samples analyzed comply with the selected MECP Table 3 residential standards.

Recommendations

While the soil and groundwater conditions comply with the applicable site standards, it is anticipated that select areas with surficial soil staining (exceeding the MECP Table 1 background standards) will need to be removed and disposed of at a licensed waste disposal site. This can be done at the time of site redevelopment activities. It is recommended that Paterson personnel be present on-site at the time of site redevelopment to monitor the removal of any obviously stained soils.

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

If the groundwater monitoring wells installed in BH2, BH4, BH6, and BH7 are not going to be used in the future, or will be destroyed during future redevelopment activities, then they must be decommissioned according to Ontario Regulation Reg. 903 (Ontario Water Resources Act). The monitoring wells will be registered with the MECP under this regulation. Further information can be provided upon request in this regard.

1.0 INTRODUCTION

At the request of Mr. Michael Boucher, of DCR Phoenix Group, Paterson Group (Paterson) conducted a Phase II – Environmental Site Assessment (Phase II ESA) for the properties addressed 1452-1470 Hunt Club Road and 1525-1545 Sieveright Avenue, in the City of Ottawa, Ontario. The purpose of this Phase II ESA has been to address the areas of potential environmental concern (APECs) identified on the subject site as a result the findings of the Phase I ESA, conducted by Paterson in September 2020.

1.1 Site Description

Addresses:	1452 Hunt Club Road, Ottawa, Ontario; 1460 Hunt Club Road, Ottawa, Ontario; 1470 Hunt Club Road, Ottawa, Ontario; 1525 Sieveright Avenue, Ottawa, Ontario; 1531 Sieveright Avenue, Ottawa, Ontario; 1545 Sieveright Avenue, Ottawa, Ontario.
Legal Description:	Part of Lot 6, Concession 4 (Rideau Front), Formerly the Township of Gloucester, in the City of Ottawa.
Location:	The subject site is located on the south side of Hunt Club Road, approximately 90 m west of Cahill Drive, in the City of Ottawa, Ontario. Refer to Figure 1 – Key Plan for the site location.
Latitude and Longitude:	45° 21' 24" N, 75° 38' 18" W
Site Description:	
Configuration:	Irregular
Site Area:	19,900 m^2 (approximate)
Zoning:	GM16[2294] – General Mixed-Use Zone; IL2 H(14) – Light Industrial Zone.
Current Uses:	The subject site is currently occupied with two (2) auto service garages, five (5) self-storage buildings, three (3) commercial office buildings, a used car sales lot, a warehouse storage building, as well as multiple storage sheds.

Services:	The subject site is located within a municipally serviced area.

1.2 Property Ownership

The subject properties are currently owned by Sulphur Properties Inc. Paterson was retained to complete this Phase II ESA by Mr. Michael Boucher of DCR Phoenix Homes, whose offices are located at 18 Bentley Avenue, Ottawa, Ontario. Mr. Boucher can be contacted by telephone at 613-723-9227.

1.3 Current and Proposed Future Uses

The subject site is currently occupied with several commercial buildings, including two (2) auto service garages, three (3) commercial office buildings, five (5) self-storage buildings, a storage warehouse, a used car sales lot, as well as multiple storage sheds.

It is our understanding that the property is to be redeveloped with one (1) commercial retail building and one (1) multi-storey residential building.

1.4 Applicable Site Condition Standard

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

- ❒ Coarse-grained soil conditions;
- ❒ Non-potable groundwater conditions;
- ❒ Residential land use.

The residential standards were selected based on the future land use of the subject site. Grain size analysis was not conducted as part of this assessment, however, the coarse-grained soil standards were chosen as a conservative approach.

The MECP Table 1 standards for Full Depth Background Site Conditions were also selected for additional consideration in order to assess the on-site soil conditions prior to future off-site disposal.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The subject site consists of a composition of multiple individual properties, each used for various commercial purposes. The properties addressed 1452, 1460, and 1470 Hunt Club Road, located in the northern portion of the subject site, contain residential dwellings which have since been repurposed into commercial offices. These properties also contain an auto service garage, a storage warehouse, as well as an auto sales lot. The properties addressed 1525, 1531, and 1545 Sieveright Avenue, located in the southern portion of the subject site, contain a multi-tenant commercial building as well as a self-storage facility.

The ground surface throughout the subject site consists of either asphaltic concrete, gravel, and/or grassy landscaped areas. The site topography is relatively flat, whereas the regional topography appears to slope gradually down to the north, towards Hunt Club Road. Water drainage on the subject site occurs primarily via infiltration in the landscaped areas, as well as via surface run-off towards catch basins located the adjacent roads.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation for this assessment was conducted on August 25 and 26, 2020. The field program consisted of drilling seven (7) boreholes (BH1-BH7) throughout the subject site, of which four (4) were instrumented with groundwater monitoring wells (BH2, BH4, BH6, and BH7). The boreholes were advanced to depths ranging from approximately 6.70 m to 7.62 m below ground surface and terminated within the underlying native silty sand/sandy silt or silty clay.

3.2 Media Investigated

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

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

- ❒ Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- ❒ Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4);
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs);
- ❒ Metals (including Mercury, Hexavalent Chromium);
- ❒ Sodium;
- ❒ Electrical Conductivity (EC);
- ❒ Sodium Adsorption Ratio (SAR);
- ❒ Inorganics (Chlorides).

3.3 Phase I ESA Conceptual Site Model

Existing Buildings and Structures

The subject site is current occupied with two (2) auto service garages, five (5) self-storage buildings, three (3) commercial office buildings, a warehouse storage building, as well as multiple storage sheds.

Water Bodies and Areas of Natural and Scientific Interest

No areas of natural and scientific interest are known to exist within the Phase I study area. The nearest named water body with respect to the subject site is Sawmill Creek, located approximately 500 m to the south.

Geological and Hydrogeological Setting

Based on the available information, the bedrock in the area of the subject site consists of shale of the Carlsbad Formation, whereas the surficial geology consists of glaciofluvial deposits, with an overburden thickness ranging from approximately 15 m to 25 m. Groundwater is anticipated to be encountered within the overburden and flow in a northerly direction.

Neighbouring Land Use

Neighbouring land use within the Phase I study area consists mainly of residential and commercial properties. Several properties to the west of the subject site were observed to contain automotive dealerships and/or service garages, however, based on their separation distances and/or cross-gradient orientation, these properties are not considered to pose an environmental concern to the subject site.

Drinking Water Wells

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

Potentially Contaminating Activities and Areas of Potential Environmental Concern

Based on the findings of this Phase I ESA, nine (9) PCAs, resulting in APECs, were identified as pertaining to the subject site. These APECs include:

- ❒ Fill material of unknown quality, located throughout the subject site;
- ❒ An auto service garage, located at 1525 Sieveright Avenue and situated in the southwestern portion of the subject site;
- ❒ An auto service garage, located at 1452 Hunt Club Road and situated in the northwestern portion of the subject site;
- ❒ An area of surficial staining in the vicinity of an empty aboveground fuel storage tank, located at 1460 Hunt Club Road and situated in the northwestern portion of the subject site;
- ❒ An aboveground fuel oil storage tank, located at the rear of the auto service garage at 1452 Hunt Club Road, and situated in the northwestern portion of the subject site;
- ❒ An empty aboveground fuel oil storage tank, located in the basement of the former residential dwelling at 1460 Hunt Club Road and situated in the northwestern portion of the subject site;
- ❒ A road salt storage tent, located at 1470 Hunt Club Road and situated within the central portion of the subject site;
- ❒ A former autobody shop, located at 1521 Sieveright Avenue and situated adjacent to the southwestern portion of the subject site;
- ❒ A former auto service garage, located at 1517 Sieveright Avenue, and situated adjacent to the western portion of the subject site.

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

Contaminants of Potential Concern

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

- ❒ Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- ❒ Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4);
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs);
- ❒ Metals (including Mercury, Hexavalent Chromium);
- ❒ Sodium;
- ❒ Electrical Conductivity (EC);
- ❒ Sodium Adsorption Ratio (SAR);
- ❒ Inorganics (Chlorides).

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

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of the Phase I ESA is considered to be sufficient to conclude that there are PCAs and APECs associated with the subject site. The presence of these PCAs were confirmed by a variety of independent sources, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation for this assessment was conducted on August 25 and 26, 2020. The field program consisted of drilling seven (7) boreholes (BH1-BH7) throughout the subject site, of which four (4) were instrumented with groundwater monitoring wells (BH2, BH4, BH6, and BH7). The boreholes were advanced to depths ranging from approximately 6.70 m to 7.62 m below ground surface and terminated within the underlying native silty sand/sandy silt or silty clay.

Under the full-time supervision of Paterson personnel, the boreholes were drilled using a low-clearance drill rig provided by George Downing Estate Drilling of Hawkesbury, Ontario. The locations of the boreholes are illustrated on Drawing PE5015-3 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

Fifty-five (55) soil samples were obtained from the boreholes by means of auger and split spoon sampling. The depths at which auger and split spoon samples were obtained from the boreholes are shown as "**AU**" and "**SS**", respectively, on the Soil Profile and Test Data Sheets, appended to this report.

Site soils generally consist of fill material (brown silty sand with crushed stone underlain by brown silty clay), underlain by brown silty sand or brown coarse sand, underlain by stiff grey silty clay or compact sandy silt. Bedrock was not encountered during the subsurface investigation.

4.3 Field Screening Measurements

All soil samples collected were subjected to a preliminary screening procedure, which included visual screening for colour and evidence of metals, as well as soil vapour screening with a Photo Ionization Detector. The soil vapours were measured by inserting the analyzer probe into the nominal headspace above the soil sample. The samples were then agitated/manipulated gently as the measurements were taken, and the peak reading registered within the first 15 seconds was recorded as the vapour measurement. The organic vapour readings were found to range from 0 ppm to 1.9 parts per million (ppm). The measured vapour readings are depicted on the Soil Profile and Test Data Sheets in Appendix 1.

4.4 Groundwater Monitoring Well Installation

Four (4) groundwater monitoring wells were installed on the subject site as part of this Phase II ESA investigation. These monitoring wells were constructed using 50 mm diameter Schedule 40 threaded PVC risers and screens. A sand pack consisting of silica sand was placed around the screen and a bentonite seal was placed above the screen to minimize cross-contamination. A summary of the monitoring well construction details are listed below in Table 1 as well as on the Soil Profile and Test Data Sheets provided in Appendix 1.

Upon completion, the groundwater monitoring wells were developed using a dedicated inertial lift pump, with a minimum of three (3) well volumes being removed from the wells at the time of installation. The wells were developed until

the appearance of the water was noted to be stabilized. In addition, the ground surface elevations of each borehole were subsequently surveyed with respect to a known geodetic elevation.

Table 1
Monitoring Well Construction Details

Well ID	Ground Surface Elevation (m ASL)	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH2	93.36	6.70	3.70-6.70	3.35-6.70	0.18-3.35	Flushmount
BH4	92.66	4.57	1.57-4.57	1.22-6.70	0.18-1.22	Flushmount
BH6	92.91	7.62	4.62-7.62	4.27-7.62	0.23-7.62	Flushmount
BH7	93.01	6.70	3.70-6.70	3.35-6.70	0.18-3.35	Flushmount

4.5 Field Measurement of Water Quality Parameters

Groundwater sampling was conducted at BH2, BH4, BH6, and BH7 on September 2, 2020. No water quality parameters were measured in the field at that time.

4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MECP document entitled, *"Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario"*, dated May 1996. Standing water was purged from each monitoring well prior to the recovery of the groundwater samples using dedicated sampling equipment. The samples were then stored in coolers to reduce possible analyte volatilization during their transportation. Further details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan, appended to this report.

4.7 Analytical Testing

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

Table 2
Testing Parameters for Submitted Soil Samples

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed								Rationale
		BTEX	PHCs F_1-F_4	PHCs F_2-F_4	VOCs	PAHs	Metals	EC	SAR	
BH1-SS2	0.76 – 1.37 m Silty Sand						X			To assess for potential impacts resulting from the presence of fill material of unknown quality.
BH2-SS2	0.76 – 1.37 m Fill Material					X	X	X	X	To assess for potential impacts resulting from the presence of fill material of unknown quality, as well as the presence of a road salt storage tent.
BH2-SS7	4.57 – 5.18 m Sandy Silt	X	X							For general coverage purposes.
BH4-SS5	3.05 – 3.66 m Sand		X		X					To assess for potential impacts resulting from an on-site auto service garage.
BH6-SS2	0.76 – 1.37 m Fill Material					X	X			To assess for potential impacts resulting from the presence of fill material of unknown quality.
BH6-SS9	6.10 – 6.76 m Sand	X	X							To assess for potential impacts resulting from an empty AST.
BH7-SS2	0.76 – 1.37 m Fill Material			X						To assess for potential impacts resulting from the presence of fill material of unknown quality, an active AST, an area of surficial staining in the vicinity of an empty AST, as well as an on-site auto service garage.
BH7-SS7	4.57 – 5.18 m Sandy Silt	X	X							To assess for potential impacts resulting from an active aboveground fuel storage tank, an area of surficial staining in the vicinity of an empty AST, as well as an on-site auto service garage.

Table 3
Testing Parameters for Submitted Groundwater Samples

Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed					Rationale
		BTEX	PHCs F_1-F_4	VOCs	Metals	Chlorides	
BH2-GW	3.70 – 6.70 m Sandy Silt / Silty Sand	X	X		X	X	To assess for potential impacts resulting from a road salt storage tent.
BH4-GW	1.57 – 4.57 m Sand / Silty Clay	X	X	X			To assess for potential impacts resulting from the presence of an auto service garage and a former off-site autobody shop.
BH6-GW	4.62 – 7.62 m Sandy Silt / Sand	X	X				To assess for potential impacts resulting from an empty AST.
BH7-GW	3.70 – 6.70 m Silty Sand / Sandy Silt	X	X				To assess for potential impacts resulting from an active AST, an area of surficial staining in the vicinity of an empty AST, an on-site auto service garage, as well as a former off-site auto service garage.

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

4.8 Residue Management

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

4.9 Elevation Surveying

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

4.10 Quality Assurance and Quality Control Measures

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

5.0 REVIEW AND EVALUATION

5.1 Geology

Generally, the subsurface profile encountered at the borehole locations consists of topsoil, asphalt, or fill material underlain by a layer of sand or silty sand. The fill material was encountered overlying the native sand layer and extending to depths ranging between approximately 0.5 m to 2.2 m below the existing ground surface at all borehole locations, with the exception of BH5.

The native sand deposit was observed to be underlain by a layer of stiff grey silty clay extending to depths ranging between approximately 3.0 m and 6.7 m below the existing ground surface. The silty clay deposit was observed to be further underlain by layers of sandy silty and silty sand throughout the north and central portions of the subject site.

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

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

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured using an electronic water level meter at the monitoring wells installed in BH2, BH4. BH6, and BH7 on September 2, 2020. The groundwater levels are summarized below in Table 4.

Table 4
Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH2	93.36	4.61	88.75	September 2, 2020
BH4	92.66	2.41	90.25	September 2, 2020
BH6	92.91	4.35	88.56	September 2, 2020
BH7	93.01	5.48	87.53	September 2, 2020

The groundwater at the subject site was typically encountered within the overburden layer of brown sand or grey sand/sandy silt, at depths ranging from approximately 2.41 m to 5.48 m below the existing ground surface. No unusual visual or olfactory observations were noted in the groundwater samples recovered from the boreholes.

Using the groundwater elevations recorded during the September 2, 2020 sampling event, groundwater contour mapping was completed as part of this assessment. According to the mapped contour data, illustrated on Drawing PE5015-3 Test Hole Location Plan in the appendix, the groundwater flow on the subject site is interpreted to be in a northwesterly direction. A horizontal hydraulic gradient of approximately 0.08 m/m was also calculated as part of this assessment.

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

5.3 Fine/Coarse Soil Texture

Grain size analysis was not completed as part of this investigation. Coarse grained soil standards were chosen based on the nature of the recovered soil samples.

5.4 Field Screening

Field screening of the soil samples collected during the drilling program resulted in organic vapour readings ranging from 0 ppm to 1.9 ppm. The organic vapour readings obtained from the field screening indicate that there is a negligible potential for the presence of volatile substances. Heavier substances, such as heavy oil, may not be detected by the above field screening method.

Field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

5.5 Soil Quality

Eight (8) soil samples were submitted for laboratory analysis of either: BTEX, PHCs F_1-F_4, VOCs, PAHs, metals, EC, and/or SAR. The results of the analytical testing are presented below in Tables 5 to 9, as well as on the laboratory certificates of analysis included in Appendix 1.

Table 5
Analytical Test Results – Soil
BTEX & PHCs (F_1-F_4)

Parameter	MDL (µg/g)	Soil Samples (µg/g) August 25 & 26, 2020					MECP Table 1 Residential Soil Standards (µg/g)	MECP Table 3 Residential Soil Standards (µg/g)
		BH2-SS7	BH4-SS5	BH6-SS9	BH7-SS2	BH7-SS7		
Benzene	0.05	nd	nd	nd	nt	nd	0.02	0.21
Ethylbenzene	0.05	nd	nd	nd	nt	nd	0.05	2
Toluene	0.05	nd	nd	nd	nt	nd	0.2	2.3
Xylenes	0.05	nd	nd	nd	nd	nd	0.05	3.1
PHCs F_1	7	nd	nd	nd	nd	nd	25	55
PHCs F_2	4	nd	nd	nd	nd	nd	10	98
PHCs F_3	8	nd	nd	nd	nd	nd	240	300
PHCs F_4	6	nd	nd	nd	nd	nd	120	2,800

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

No BTEX or PHC parameters were detected in the soil samples analyzed. The results are in compliance with the selected MECP Table 3 standards as well as the MECP Table 1 standards.

Table 6
Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Samples (ug/g)	MECP Table 1 Residential Soil Standards (µg/g)	MECP Table 3 Residential Soil Standards (µg/g)
		August 26, 2020		
		BH4-SS5		
Acetone	0.50	nd	0.5	16
Benzene	0.02	nd	0.02	0.21
Bromodichloromethane	0.05	nd	0.05	13
Bromoform	0.05	nd	0.05	0.27
Bromomethane	0.05	nd	0.05	0.05
Carbon Tetrachloride	0.05	nd	0.05	0.05
Chlorobenzene	0.05	nd	0.05	2.4
Chloroform	0.05	nd	0.05	0.05
Dibromochloromethane	0.05	nd	0.05	9.4
Dichlorodifluoromethane	0.05	nd	0.05	16
1,2-Dichlorobenzene	0.05	nd	0.05	3.4
1,3-Dichlorobenzene	0.05	nd	0.05	4.8
1,4-Dichlorobenzene	0.05	nd	0.05	0.083
1,1-Dichloroethane	0.05	nd	0.05	3.5
1,2-Dichloroethane	0.05	nd	0.05	0.05
1,1-Dichloroethylene	0.05	nd	0.05	0.05
cis-1,2-Dichloroethylene	0.05	nd	0.05	3.4
trans-1,2-Dichloroethylene	0.05	nd	0.05	0.084
1,2-Dichloropropane	0.05	nd	0.05	0.05
1,3-Dichloropropene	0.05	nd	0.05	0.05
Ethylbenzene	0.05	nd	0.05	2
Ethylene Dibromide	0.05	nd	0.05	0.05
Hexane	0.05	nd	0.05	2.8
Methyl Ethyl Ketone	0.50	nd	0.5	16
Methyl Isobutyl Ketone	0.50	nd	0.5	1.7
Methyl tert-butyl ether	0.05	nd	0.05	0.75
Methylene Chloride	0.05	nd	0.05	0.1
Styrene	0.05	nd	0.05	0.7
1,1,1,2-Tetrachloroethane	0.05	nd	0.05	0.058
1,1,2,2-Tetrachloroethane	0.05	nd	0.05	0.05
Tetrachloroethylene	0.05	nd	0.05	0.28
Toluene	0.05	nd	0.2	2.3
1,1,1-Trichloroethane	0.05	nd	0.05	0.38
1,1,2-Trichloroethane	0.05	nd	0.05	0.05
Trichloroethylene	0.05	nd	0.05	0.061
Trichlorofluoromethane	0.05	nd	0.25	4
Vinyl Chloride	0.02	nd	0.02	0.02
Xylenes	0.05	nd	0.05	0.31

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- Underlined – Value exceeds MECP Table 1 standards
- **Bold and Underlined** – value exceeds selected MECP standards

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

Table 7
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g) August 25, 2020		MECP Table 1 Residential Soil Standards (µg/g)	MECP Table 3 Residential Soil Standards (µg/g)
		BH2-SS2	BH6-SS2		
Acenaphthene	0.02	nd	nd	0.072	7.9
Acenaphthylene	0.02	nd	nd	0.093	0.15
Anthracene	0.02	nd	nd	0.16	0.67
Benzo[a]anthracene	0.02	nd	nd	0.36	0.5
Benzo[a]pyrene	0.02	nd	nd	0.3	0.3
Benzo[b]fluoranthene	0.02	nd	nd	0.47	0.78
Benzo[g,h,i]perylene	0.02	nd	nd	0.68	6.6
Benzo[k]fluoranthene	0.02	nd	nd	0.48	0.78
Chrysene	0.02	nd	nd	2.8	7
Dibenzo[a,h]anthracene	0.02	nd	nd	0.1	0.1
Fluoranthene	0.02	nd	nd	0.56	0.69
Fluorene	0.02	nd	nd	0.12	62
Indeno[1,2,3-cd]pyrene	0.02	nd	nd	0.23	0.38
1-Methylnaphthalene	0.02	nd	nd	0.59	0.99
2-Methylnaphthalene	0.02	nd	nd	0.59	0.99
Methylnaphthalene (1&2)	0.04	nd	nd	0.59	0.99
Naphthalene	0.01	nd	0.01	0.09	0.6
Phenanthrene	0.02	nd	nd	0.69	6.2
Pyrene	0.02	nd	nd	1	78

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- Underlined – Value exceeds MECP Table 1 standards
- **Bold and Underlined** – value exceeds selected MECP standards

All PAH parameter concentrations detected in the soil samples analyzed are in compliance with the selected MECP Table 3 standards as well as the MECP Table 1 standards.

Table 8
Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g) August 25 & 26, 2020			MECP Table 1 Residential Soil Standards (µg/g)	MECP Table 3 Residential Soil Standards (µg/g)
		BH1-SS2	BH2-SS2	BH6-SS2		
Antimony	1.0	nd	nd	nd	1.3	7.5
Arsenic	1.0	2.7	4.2	2.8	18	18
Barium	1.0	57.6	126	38.9	220	390
Beryllium	0.5	nd	0.8	nd	2.5	4
Boron	5.0	nd	8.5	nd	36	120
Cadmium	0.5	nd	nd	nd	1.2	1.2
Chromium	5.0	23.3	40.6	19.4	70	160
Cobalt	1.0	6.0	12.0	4.7	21	22
Copper	5.0	11.4	24.9	8.7	92	140
Lead	1.0	6.4	15.7	8.5	120	120
Molybdenum	1.0	nd	1.4	nd	2	6.9
Nickel	5.0	13.4	29.2	11.6	82	100
Selenium	1.0	nd	nd	nd	1.5	2.4
Silver	0.3	nd	nd	nd	0.5	20
Thallium	1.0	nd	nd	nd	1	1
Uranium	1.0	nd	1.3	nd	2.5	23
Vanadium	10.0	32.6	49.2	22.9	86	86
Zinc	20.0	28.3	62.2	24.8	290	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- Underlined – Value exceeds MECP Table 1 standards
- **Bold and Underlined** – value exceeds selected MECP standards

All detected metal concentrations in the soil samples analysed are in compliance with the selected MECP Table 3 standards as well as the MECP Table 1 standards.

Table 9
Analytical Test Results – Soil
EC & SAR

Parameter	MDL	Soil Sample August 25, 2020 BH2-SS2	MECP Table 1 Residential Soil Standards	MECP Table 3 Residential Soil Standards
EC	5 µS/cm	184	570 µS/cm	700 µS/cm
SAR	0.01	0.47	2.4	5.0

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- Underlined – Value exceeds MECP Table 1 standards
- **Bold and Underlined** – value exceeds selected MECP standards

The EC and SAR parameters in the soil sample analyzed are in compliance with the selected MECP Table 3 standards as well as the MECP Table 1 standards.

Table 10
Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
Naphthalene	0.01	BH6-SS2	0.76 – 1.37
Arsenic	4.2	BH2-SS2	0.76 – 1.37
Barium	126	BH2-SS2	0.76 – 1.37
Beryllium	0.8	BH2-SS2	0.76 – 1.37
Boron	8.5	BH2-SS2	0.76 – 1.37
Chromium	40.6	BH2-SS2	0.76 – 1.37
Cobalt	12.0	BH2-SS2	0.76 – 1.37
Copper	24.9	BH2-SS2	0.76 – 1.37
Lead	15.7	BH2-SS2	0.76 – 1.37
Molybdenum	1.4	BH2-SS2	0.76 – 1.37
Nickel	29.2	BH2-SS2	0.76 – 1.37
Uranium	1.3	BH2-SS2	0.76 – 1.37
Vanadium	49.2	BH2-SS2	0.76 – 1.37
Zinc	62.2	BH2-SS2	0.76 – 1.37
EC	184 (µS/cm)	BH2-SS2	0.76 – 1.37
SAR	0.01 (units)	BH2-SS2	0.76 – 1.37

Notes:
- Underlined – Value exceeds MECP Table 1 standards
- **Bold and Underlined** – value exceeds selected MECP standards

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

5.6 Groundwater Quality

Groundwater samples were recovered from the monitoring wells installed in BH2, BH4, BH6, and BH7 and submitted for laboratory analysis of either: BTEX, PHCs F_1-F_4, VOCs, metals, and/or chlorides. The results of the analytical testing are presented below in Tables 11 to 13, as well as on the laboratory certificates of analysis included in Appendix 1.

Table 11
Analytical Test Results – Groundwater
BTEX & PHCs (F_1-F_4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)				MECP Table 3 Residential Groundwater Standards (µg/L)
		September 2, 2020				
		BH2-GW	BH4-GW	BH6-GW	BH7-GW	
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 F_1	25	nd	nd	nd	nd	750
PHC F_2	100	nd	nd	nd	nd	150
PHC F_3	100	nd	nd	nd	nd	500
PHC F_4	100	nd	nd	nd	nd	500

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

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

Table 12
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Sample (ug/L)	MECP Table 3 Residential Groundwater Standards (µg/L)
		September 2, 2020	
		BH4-GW	
Acetone	5.0	nd	130,000
Benzene	0.5	nd	44
Bromodichloromethane	0.5	nd	85,000
Bromoform	0.5	nd	380
Bromomethane	0.5	nd	5.6
Carbon Tetrachloride	0.2	nd	0.79
Chlorobenzene	0.5	nd	630
Chloroform	0.5	nd	2.4
Dibromochloromethane	0.5	nd	82,000
Dichlorodifluoromethane	1.0	nd	4,400
1,2-Dichlorobenzene	0.5	nd	4,600
1,3-Dichlorobenzene	0.5	nd	9,600
1,4-Dichlorobenzene	0.5	nd	8
1,1-Dichloroethane	0.5	nd	320
1,2-Dichloroethane	0.5	nd	1.6
1,1-Dichloroethylene	0.5	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	1.6
1,2-Dichloropropane	0.5	nd	16
1,3-Dichloropropene	0.5	nd	5.2
Ethylbenzene	0.5	nd	2,300
Ethylene Dibromide	0.2	nd	0.25
Hexane	1.0	nd	51
Methyl Ethyl Ketone	5.0	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	140,000
Methyl tert-butyl ether	2.0	nd	190
Methylene Chloride	5.0	nd	610
Styrene	0.5	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	3.2
Tetrachloroethylene	0.5	nd	1.6
Toluene	0.5	nd	18,000
1,1,1-Trichloroethane	0.5	nd	640
1,1,2-Trichloroethane	0.5	nd	4.7
Trichloroethylene	0.5	nd	1.6
Trichlorofluoromethane	1.0	nd	2,500
Vinyl Chloride	0.5	nd	0.5
Xylenes	0.5	nd	4,200

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

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

Table 13
Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)	MECP Table 3 Residential Groundwater Standards (µg/L)
		September 2, 2020	
		BH2-GW	
Antimony	0.5	nd	20,000
Arsenic	1.0	1.0	1,900
Barium	1.0	115	29,000
Beryllium	0.5	nd	67
Boron	10	19	45,000
Cadmium	0.1	nd	2.7
Chromium	1.0	nd	810
Cobalt	0.5	1.1	66
Copper	0.5	1.5	87
Lead	0.1	nd	25
Molybdenum	0.5	0.6	9,200
Nickel	1.0	2	490
Selenium	1.0	nd	63
Silver	0.1	nd	1.5
Sodium	200	233,000	2,300,000
Thallium	0.1	nd	510
Uranium	0.1	1.0	420
Vanadium	0.5	0.5	250
Zinc	5.0	nd	1,100

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

All detected metal concentrations in the groundwater samples analysed are in compliance with the selected MECP Table 3 standards.

Table 14
Analytical Test Results – Groundwater
Inorganics

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)	MECP Table 3 Residential Groundwater Standards (µg/L)
		September 2, 2020	
		BH2-GW	
Chlorides	1,000	119,000	2,300,000

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

The concentration of chlorides detected in the groundwater sample analyzed are in compliance with the selected MECP Table 3 standards.

Table 15
Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Sample ID	Depth Interval (m BGS)
Arsenic	1.0	BH2-GW	3.70 – 6.70 m
Barium	115	BH2-GW	3.70 – 6.70 m
Boron	19	BH2-GW	3.70 – 6.70 m
Cobalt	1.1	BH2-GW	3.70 – 6.70 m
Copper	1.5	BH2-GW	3.70 – 6.70 m
Molybdenum	0.6	BH2-GW	3.70 – 6.70 m
Nickel	2	BH2-GW	3.70 – 6.70 m
Sodium	233,000	BH2-GW	3.70 – 6.70 m
Uranium	1.0	BH2-GW	3.70 – 6.70 m
Vanadium	0.5	BH2-GW	3.70 – 6.70 m
Chlorides	119,000	BH2-GW	3.70 – 6.70 m

Notes:
- **Bold and Underlined** – value exceeds selected MECP standards

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

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of this Phase II ESA were handled in accordance with the analytical protocols with respect to holding time, preservation method, storage requirement, and container type. As per Subsection 47(3) of O.Reg. 153/04, as amended by the Environmental Protection Act, the certificates of analysis have been received for each sample submitted for laboratory analysis and have been appended to this report.

As per the Sampling and Analysis Plan, a duplicate groundwater sample was obtained from the monitoring well installed in BH4 and analyzed for VOC parameters. No VOC parameter concentrations were detected in both the original or the duplicate samples, and as such, the RPD results are considered to be acceptable. As a result, the quality of the field data collected during this Phase II ESA is considered to be sufficient to meet the overall objectives of this assessment.

5.8 Phase II Conceptual Site Model

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

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

As described in Section 7.1 of the Phase I ESA report, as well as Section 2.2 of this report, the following PCAs, as described by Table 2 of O.Reg. 153/04, are considered to result in APECs on the subject site:

- *Item 10: "Commercial Autobody Shops"*

This PCA was identified as a result of a former autobody shop, located immediately to the west of the subject site at 1521 Sieveright Avenue.

- *Item 28: "Gasoline and Associated Products Storage in Fixed Tanks"*

This PCA was identified as a result of surficial staining found in the vicinity of an empty aboveground fuel storage tank at 1460 Hunt Club Road, an aboveground fuel storage tank at the rear of 1452 Hunt Club Road, and an empty aboveground fuel storage tank in the basement of the former residence at 1460 Hunt Club Road.

- *Item 30: "Importation of Fill Material of Unknown Quality"*

This PCA was identified as a result of the presence of fill material, located throughout the subject site.

- *Item 48: "Salt Manufacturing, Processing, and Bulk Storage"*

This PCA was identified as a result of a road salt storage tent, located at 1470 Hunt Club Road.

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

This PCA was identified as a result of an on-site auto service garage located at 1525 Sieveright Avenue, an on-site auto service garage located at 1452 Hunt Club Road, and a former auto service garage located immediately to the west of the subject site at 1517 Sieveright Avenue.

Contaminants of Potential Concern

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

- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Metals (including Mercury, Hexavalent Chromium, and Sodium);
- Sodium;
- Electrical Conductivity (EC);
- Sodium Adsorption Ratio (SAR);
- Inorganics (Chlorides).

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

Subsurface Structures and Utilities

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

Physical Setting

Site Stratigraphy

The stratigraphy of the subject site generally consists of:

- Asphaltic concrete; encountered at ground surface and extending to a depth of approximately 0.08 m below ground surface (BH1, BH3, BH4 only);
- Topsoil; encountered at ground surface and extending to a depth of approximately 0.20 m below ground surface (BH5 only)
- Fill material, consisting of brown silty sand and/or brown silty clay with gravel; encountered at a depth of approximately 0.08 m below ground surface;

- Silty sand/sandy silt; encountered at a depth of approximately 0.20 m to 2.29 m below ground surface (BH1, BH5, and BH6);
- Coarse brown sand; encountered at a depth of approximately 0.51 m to 2.29 m below ground surface (BH1, BH2, BH3, and BH4);
- Silty clay; encountered at a depth of approximately 1.52 m to 4.11 m below ground surface (BH1, BH2, BH3, BH4, BH5, and BH7);
- Silty sand/sandy silt; encountered at a depth of approximately 3.05 m to 5.94 m below ground surface (BH1, BH2, BH3, and BH7);
- Grey sand; encountered at a depth of approximately 5.13 m to 5.33 m below ground surface (BH6 and BH7 only).

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

Hydrogeological Characteristics

The groundwater beneath the subject site was encountered within the overburden layer of brown sand or grey sand/sandy silt, at depths ranging from approximately 2.41 m to 5.48 m below ground surface. Based on the regional topography, in combination with the measured groundwater levels, the groundwater is interpreted to flow in a northwesterly direction.

Approximate Depth to Bedrock

Bedrock was not encountered in any of the borehole locations at the time of the field drilling program. According to the available mapping information, the bedrock is interpreted to lie at a depth of approximately 15 m to 25 m below ground level.

Approximate Depth to Water Table

The depth to the water table is approximately 2.41 m to 5.48 m below the existing ground surface.

Sections 41 and 43.1 of Ontario Regulation 153/04

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

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

Existing Buildings and Structures

The subject site is current occupied with two (2) auto service garages, five (5) self-storage buildings, three (3) commercial office buildings, a warehouse storage building, as well as multiple storage sheds.

Fill Placement

Fill material, consisting of either brown silty sand and/or brown silty clay with gravel, was identified throughout the subject site.

Proposed Buildings and Other Structures

It is our understanding that the property is to be redeveloped with one (1) commercial retail building and one (1) multi-storey residential building.

Water Bodies and Areas of Natural and Scientific Interest

No areas of natural and scientific interest are known to exist within the Phase I study area. The nearest named water body with respect to the subject site is Sawmill Creek, located approximately 500 m to the south.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of this Phase II ESA, there are no contaminant concentrations exceeding the selected MECP Table 3 residential standards present within the soil or the groundwater on the subject site.

Types of Contaminants

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding the MECP Table 3 residential standards were identified on-site.

Contaminated Media

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

What Is Known About Areas Where Contaminants Are Present

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding the MECP Table 3 residential standards were identified on-site.

Distribution and Migration of Contaminants

No contamination was identified on the subject site.

Discharge of Contaminants

No contaminants have been discharged on the subject site.

Potential for Vapour Intrusion

Based on the findings of this assessment, there is no potential for vapour intrusion on the subject site.

Climatic and Meteorological Conditions

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

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

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the properties addressed 1452-1470 Hunt Club Road and 1525-1545 Sieveright Avenue, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the potentially contaminating activities (PCAs) that were identified during the Phase I ESA and were considered to result in areas of potential environmental concern (APECs) on the subject site.

The subsurface investigation for this assessment was conducted on August 25 and 26, 2020. The field program consisted of drilling seven (7) boreholes (BH1-BH7) throughout the subject site, of which four (4) were instrumented with groundwater monitoring wells (BH2, BH4, BH6, and BH7). The boreholes were advanced to depths ranging from approximately 6.70 m to 7.62 m below ground surface and terminated within the underlying layers of native silty sand/sandy silt or silty clay.

Eight (8) soil samples were submitted for laboratory analysis of either: BTEX, PHCs F_1-F_4, VOCs, PAHs, metals, EC, and/or SAR. Based on the analytical results, all detected parameter concentrations in the soil samples analyzed comply with the selected MECP Table 3 residential standards.

Four (4) groundwater samples were recovered from the monitoring wells installed in BH2, BH4, BH6, and BH7 and submitted for laboratory analysis of either: BTEX, PHCs F_1-F_4, VOCs, metals, and/or chlorides. Based on the analytical results, all detected parameter concentrations in the groundwater samples analyzed comply with the selected MECP Table 3 residential standards.

Recommendations

While the soil and groundwater conditions comply with the applicable site standards, it is anticipated that select areas with surficial soil staining (exceeding the MECP Table 1 background standards) will need to be removed and disposed of at a licensed waste disposal site. This can be done at the time of site redevelopment activities. It is recommended that Paterson personnel be present on-site at the time of site redevelopment to monitor the removal of any obviously stained soils.

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

If the groundwater monitoring wells installed in BH2, BH4, BH6, and BH7 are not going to be used in the future, or will be destroyed during future redevelopment activities, then they must be decommissioned according to Ontario Regulation Reg. 903 (Ontario Water Resources Act). The monitoring wells will be registered with the MECP under this regulation. Further information can be provided upon request in this regard.

7.0 STATEMENT OF LIMITATIONS

This Phase II – Environmental Site Assessment report has been prepared in general accordance with O.Reg. 153/04, as amended, and meets the requirements of CSA Z769-00. The conclusions presented herein are based on information gathered from a limited sampling and testing program. The test results represent conditions at specific test locations at the time of the field program.

The client should be aware that any information pertaining to soils and all test hole logs are furnished as a matter of general information only and test hole descriptions or logs are not to be interpreted as descriptive of conditions at locations other than those of the test holes themselves.

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

This report was prepared for the sole use of DCR Phoenix Group. Permission and notification from the DCR Phoenix Group and Paterson Group will be required prior to the release of this report to any other party.

Paterson Group Inc.

Nick Sullivan, B.Sc.

Mark S. D'Arcy, P.Eng., QP$_{ESA}$

Report Distribution:

- DCR Phoenix Group
- Paterson Group Inc.

FIGURES

FIGURE 1 - KEY PLAN

DRAWING PE5015-3 – TEST HOLE LOCATION PLAN

DRAWING PE5015-4 – ANALYTICAL TESTING PLAN – SOIL

DRAWING PE5015-4A – CROSS SECTION A-A' – SOIL

DRAWING PE5015-5 – ANALYTICAL TESTING PLAN – GROUNDWATER

DRAWING PE5015-5A – CROSS SECTION A-A' – GROUNDWATER

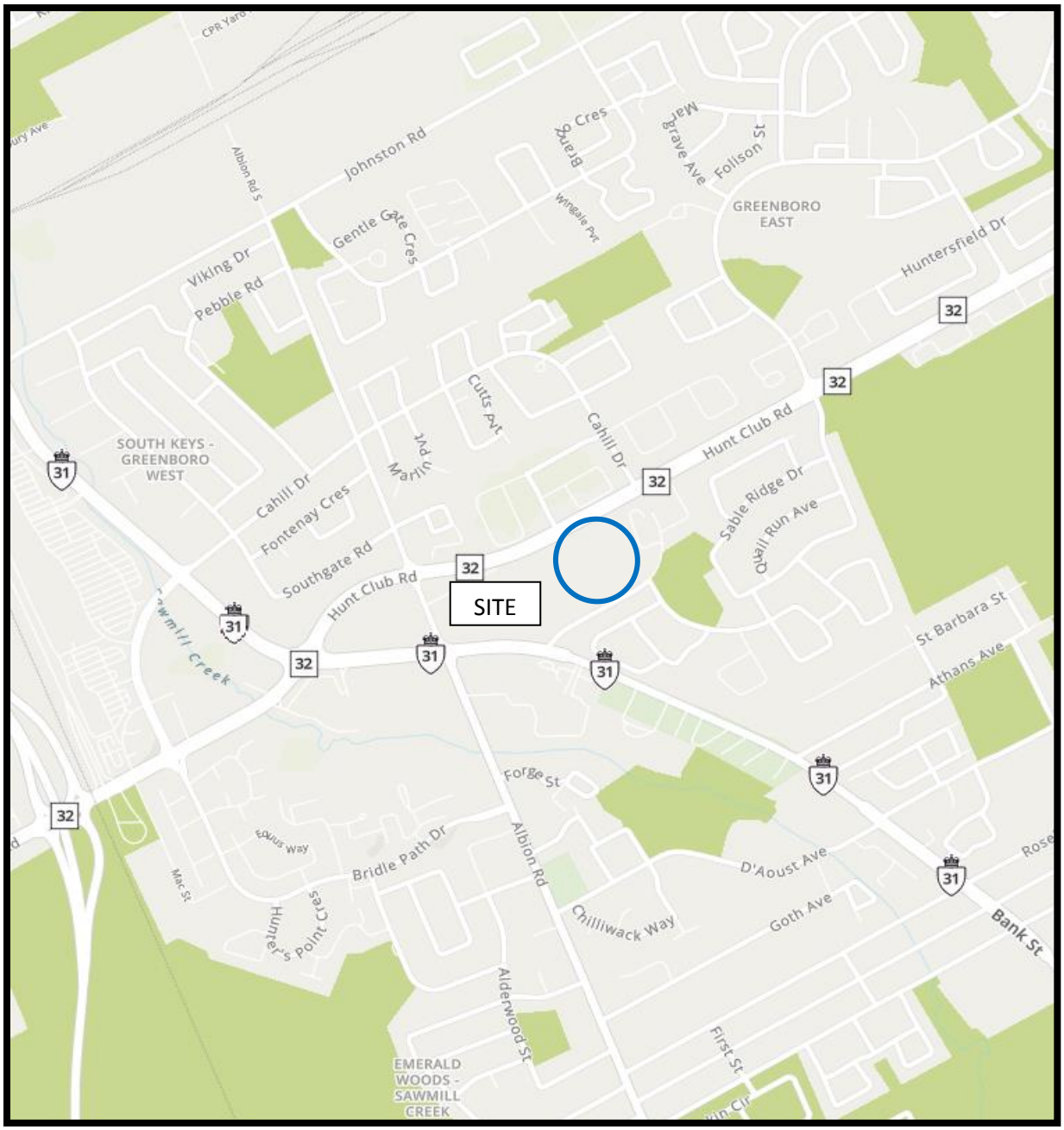
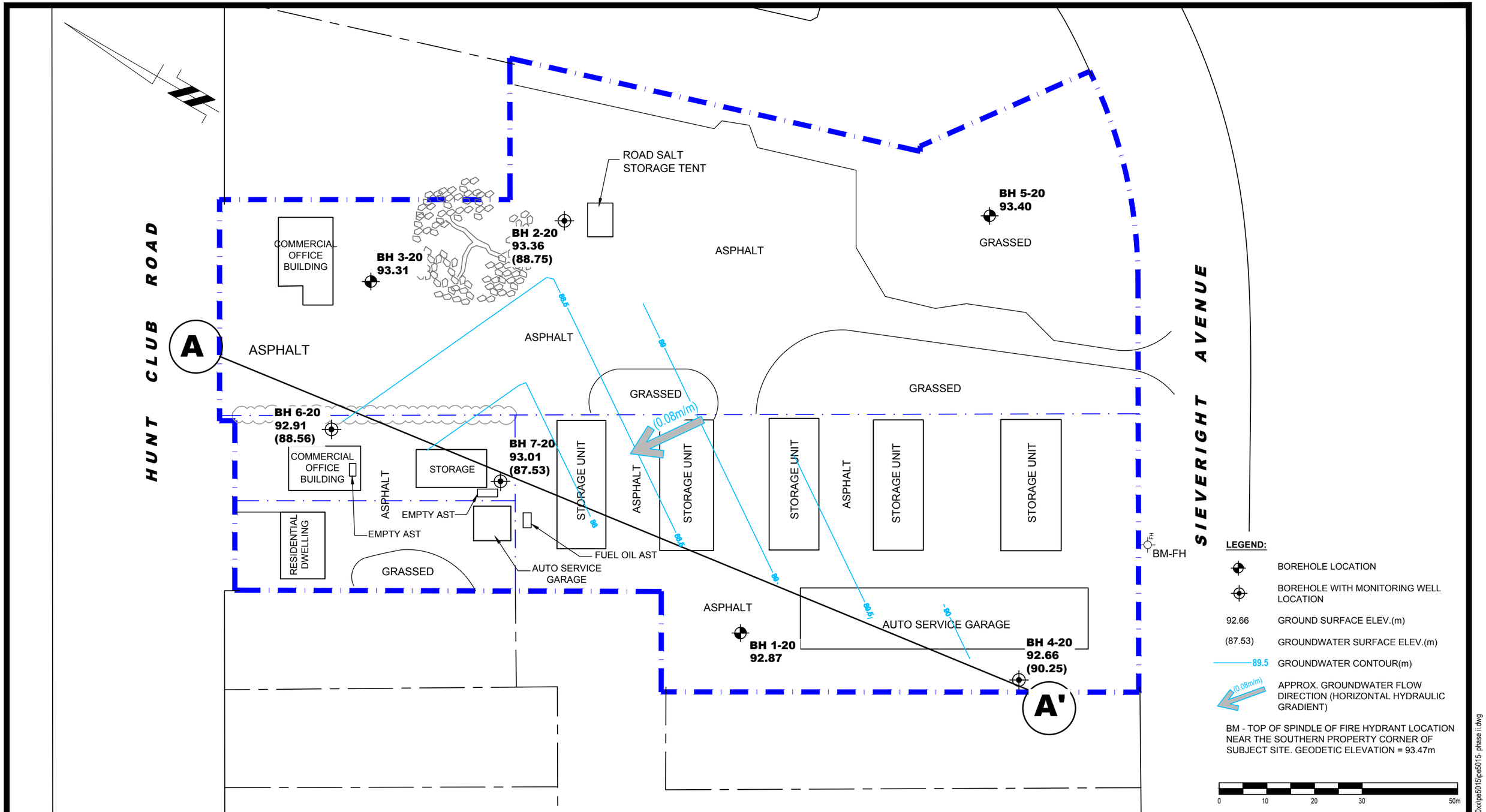


FIGURE 1

KEY PLAN



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NO.	REVISIONS	DATE	INITIAL

DCR PHOENIX GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1452-1470 HUNT CLUB ROAD & 1525-1545 SIEVERIGHT AVENUE
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:750	Date: 09/2020
Drawn by: RCG	Report No.: PE5015-2
Checked by: NS	Dwg. No.: PE5015-3
Approved by: MSD	Revision No.:

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BH2-SS2 (0.76-1.37 m) August 25, 2020
EC, SAR, PAHs and Metals comply with MECP Table 3 Standards

BH2-SS7 (4.57-5.18 m) August 25, 2020
BTEX and PHCs comply with MECP Table 3 Standards

BH6-SS2 (0.76-1.37 m) August 25, 2020
PAHs and Metals comply with MECP Table 3 Standards

BH6-SS9 (6.10-6.76 m) August 25, 2020
BTEX and PHCs comply with MECP Table 3 Standards

HUNT CLUB ROAD

SIEVERIGHT AVENUE

ROAD SALT STORAGE TENT

BH 2-20
93.36
(88.75)

BH 3-20
93.31

BH 5-20
93.40

COMMERCIAL OFFICE BUILDING

ASPHALT

GRASSED

A

A'

BH 6-20
92.91
(88.56)

BH 7-20
93.01
(87.53)

COMMERCIAL OFFICE BUILDING

STORAGE

EMPTY AST

EMPTY AST

RESIDENTIAL DWELLING

GRASSED

AUTO SERVICE GARAGE

FUEL OIL AST

STORAGE UNIT

STORAGE UNIT

STORAGE UNIT

STORAGE UNIT

STORAGE UNIT

BM-FH

BH 1-20
92.87

BH 4-20
92.66
(90.25)

AUTO SERVICE GARAGE

BH7-SS2 (0.76-1.37 m) August 25, 2020
PHCs comply with MECP Table 3 Standards

BH7-SS7 (4.57-5.18 m) August 25, 2020
BTEX and PHCs comply with MECP Table 3 Standards

BH1-SS2 (0.76-1.37 m) August 25, 2020
Metals comply with MECP Table 3 Standards

BH4-SS5 (3.05-3.66 m) August 25, 2020
VOCs and PHCs comply with MECP Table 3 Standards

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 92.66 GROUND SURFACE ELEV.(m)
- (87.53) GROUNDWATER SURFACE ELEV.(m)

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

BM - TOP OF SPINDLE OF FIRE HYDRANT LOCATION NEAR THE SOUTHERN PROPERTY CORNER OF SUBJECT SITE. GEODETIC ELEVATION = 93.47m

0 10 20 30 50m

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NO.	REVISIONS	DATE	INITIAL

DCR PHOENIX GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1452-1470 HUNT CLUB ROAD & 1525-1545 SIEVERIGHT AVENUE
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - SOIL

Scale: 1:750	Date: 09/2020
Drawn by: RCG	Report No.: PE5015-2
Checked by: NS	Dwg. No.: PE5015-4
Approved by: MSD	Revision No.:

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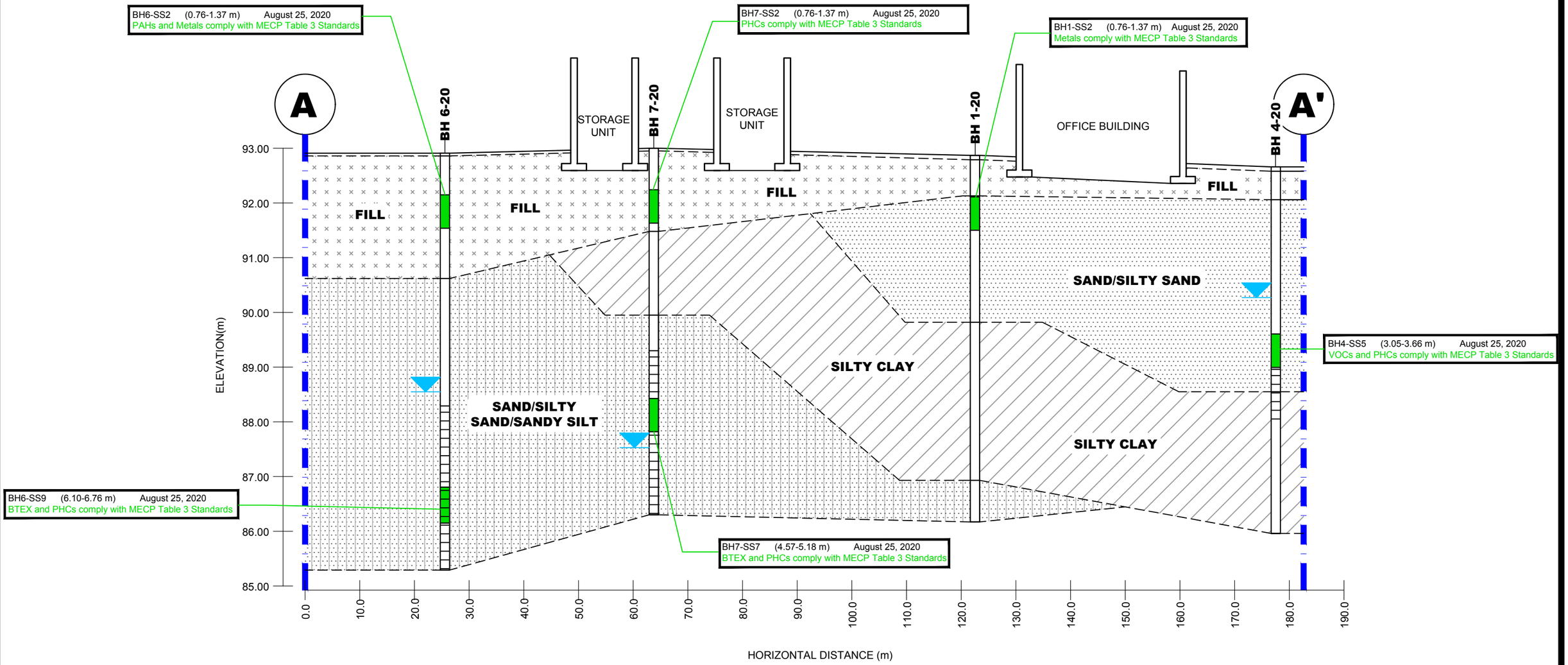

LEGEND:

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

patersongroup
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NO.	REVISIONS	DATE	INITIAL

DCR PHOENIX GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1452-1470 HUNT CLUB ROAD & 1525-1545 SIEVERIGHT AVENUE
OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL

Scale: AS SHOWN	Date: 09/2020
Drawn by: RCG	Report No.: PE5015-2
Checked by: NS	Dwg. No.: PE5015-4A
Approved by: MSD	Revision No.:

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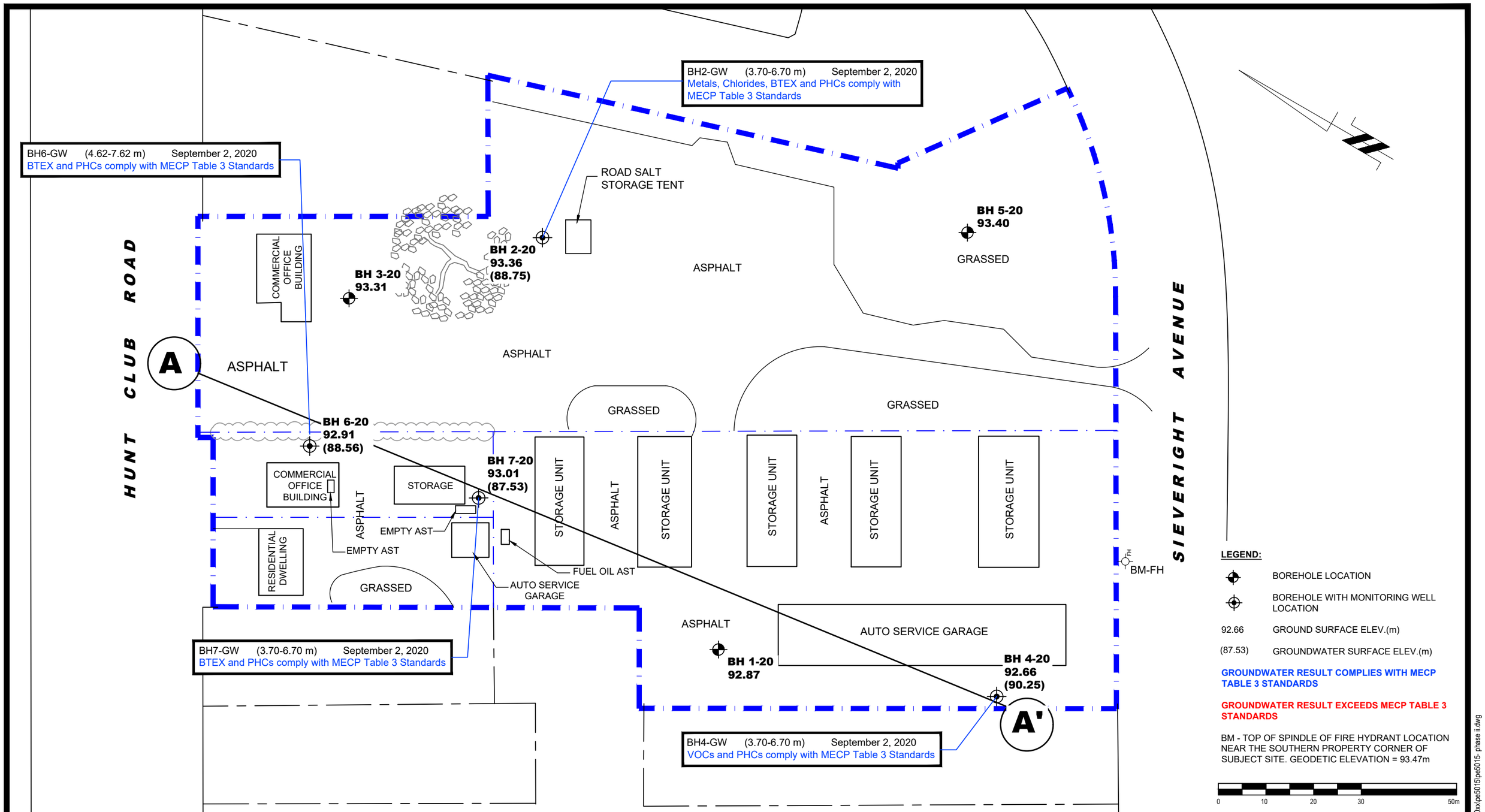

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1452-1470 HUNT CLUB ROAD & 1525-1545 SIEVERIGHT AVENUE
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - GROUNDWATER

Scale: 1:750	Date: 09/2020
Drawn by: RCG	Report No.: PE5015-2
Checked by: NS	Dwg. No.: PE5015-5
Approved by: MSD	Revision No.:

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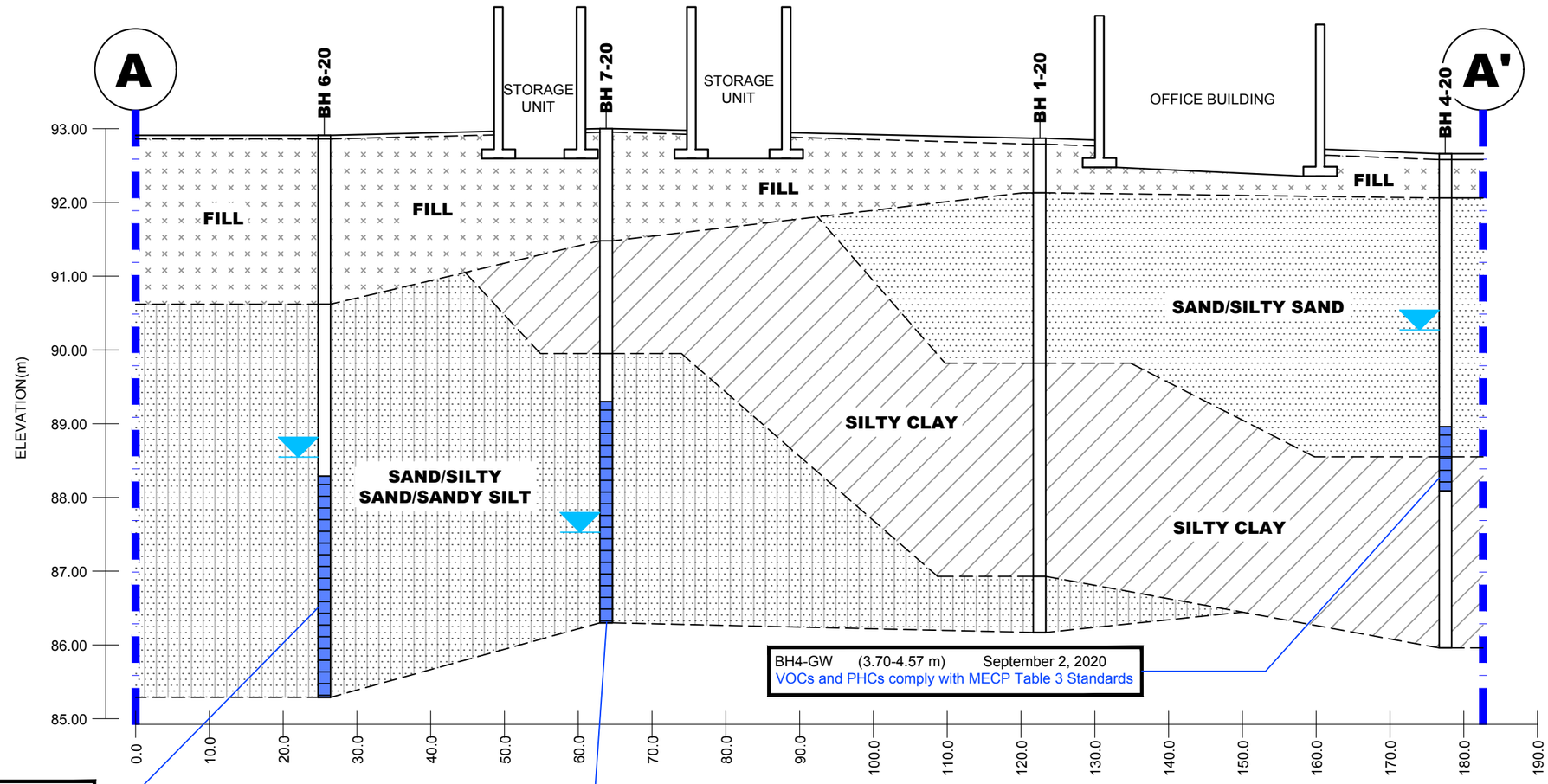

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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DCR PHOENIX GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1452-1470 HUNT CLUB ROAD & 1525-1545 SIEVERIGHT AVENUE
OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - GROUNDWATER

Scale: AS SHOWN	Date: 09/2020
Drawn by: RCG	Report No.: PE5015-2
Checked by: NS	Dwg. No.: PE5015-5A
Approved by: MSD	Revision No.:

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

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Sampling & Analysis Plan

Phase II – Environmental Site Assessment
1452-1470 Hunt Club Road &
1525-1545 Sieveright Avenue
Ottawa, Ontario

Prepared For

DCR Phoenix Group

August 15, 2020

Report: PE5015-SAP

TABLE OF CONTENTS

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by DCR Phoenix Group, to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for the property addressed 1452-1470 Hunt Club Road and 1525-1545 Sieveright Avenue, in the City of Ottawa, Ontario.

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

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1	Western portion of subject site; to assess for potential impacts resulting from the presence of fill material of unknown quality.	6-10 m; for geotechnical and general coverage purposes.
BH2	North-eastern portion of subject site; to assess for potential impacts resulting from the presence of fill material of unknown quality as well as a road salt storage tent.	6-10 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH3	Northern portion of subject site; for general coverage purposes.	6-10 m; for geotechnical and general coverage purposes.
BH4	Southwestern portion of subject site; to assess for potential impacts resulting from the presence of an on-site auto service garage as well as a former off-site autobody shop.	6-10 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH5	Southeastern portion of subject site; for general coverage purposes.	6-10 m; for geotechnical and general coverage purposes.
BH6	Northern portion of subject site; to assess for potential impacts resulting from the presence of fill material of unknown quality as well as an empty AST.	6-10 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH7	Northwestern portion of subject site; to assess for potential impacts resulting from the presence of fill material of unknown quality, an active AST, an area of surficial staining in the vicinity of an empty AST, an on-site auto service garage, as well as a former off-site auto service garage.	6-10 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.

Borehole locations are shown on Drawing PE5015-3 – Test Hole Location Plan, appended to the main report.

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

Following the borehole drilling, groundwater monitoring wells will be installed in boreholes BH2, BH4, BH6, and BH7 for the collection of groundwater samples.

2.0 ANALYTICAL TESTING PROGRAM

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

- ❒ At least one sample from each borehole should be submitted, in order to delineate the horizontal extent of contamination across the site.
- ❒ At least one sample from each stratigraphic unit should be submitted, in order to delineate the vertical extent of contamination at the site.
- ❒ In boreholes where there is visual or olfactory evidence of contamination, or where organic vapour meter or photoionization detector readings indicate the presence of contamination, the 'worst-case' sample from each borehole should be submitted for comparison with MECP site condition standards.
- ❒ In boreholes with evidence of contamination as described above, a sample should be submitted from the stratigraphic unit below the 'worst-case' sample to determine whether the contaminant(s) have migrated downward.
- ❒ Parameters analyzed should be consistent with the Contaminants of Potential Concern identified in the Phase I ESA.

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

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

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

- ❒ Glass soil sample jars
- ❒ two buckets
- ❒ cleaning brush (toilet brush works well)
- ❒ dish detergent
- ❒ methyl hydrate
- ❒ water (if not available on site - water jugs available in trailer)
- ❒ latex or nitrile gloves (depending on suspected contaminant)
- ❒ RKI Eagle organic vapour meter or MiniRae photoionization detector (depending on contamination suspected)

Determining Borehole Locations

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

After drilling is completed a plan with the borehole locations must be provided. Distances and orientations of boreholes with respect to site features (buildings, roadways, etc.) must be provided. Distances should be measured using a measuring tape or wheel rather than paced off. Ground surface elevations at each borehole should be surveyed relative to a geodetic benchmark, if one is available, or a temporary site benchmark which can be tied in at a later date if necessary.

Drilling Procedure

The actual drilling procedure for environmental boreholes is the same as geotechnical boreholes (see SOP for drilling and sampling) with a few exceptions as follows:

- ❒ Continuous split spoon samples (every 0.6 m or 2') or semi-continuous (every 0.76 m or 2'6") are required.
- ❒ Make sure samples are well sealed in plastic bags with no holes prior to screening and are kept cool but unfrozen.
- ❒ If sampling for VOCs, BTEX, or PHCs F_1, a soil core from each soil sample, which may be analyzed, must be taken and placed in the laboratory-provided methanol vial.
- ❒ Note all and any odours or discolouration of samples.
- ❒ Split spoon samplers must be washed between samples.
- ❒ If obvious contamination is encountered, continue sampling until vertical extent of contamination is delineated.
- ❒ As a general rule, environmental boreholes should be deep enough to intercept the groundwater table (unless this is impossible/impractical - call project manager to discuss).
- ❒ If at all possible, soil samples should be submitted to a preliminary screening procedure on site, either using a RKI Eagle, PID, etc. depending on type of suspected contamination.

Spoon Washing Procedure

All sampling equipment (spilt spoons, etc.) must be washed between samples in order to prevent cross contamination of soil samples.

- ❒ Obtain two buckets of water (preferably hot if available)
- ❒ Add a small amount of dish soap to one bucket
- ❒ Scrub spoons with brush in soapy water, inside and out, including tip
- ❒ Rinse in clean water
- ❒ Apply a small amount of methyl hydrate to the inside of the spoon. (A spray bottle or water bottle with a small hole in the cap works well)
- ❒ Allow to dry (takes seconds)
- ❒ Rinse with distilled water, a spray bottle works well.

The methyl hydrate eliminates any soap residue that may be on the spoon and is especially important when dealing with suspected VOCs.

Screening Procedure

The RKI Eagle is used to screen most soil samples, particularly where petroleum hydrocarbon contamination is suspected. The MiniRae is used when VOCs are suspected, however it also can be useful for detecting petroleum. These tools are for screening purposes only and cannot be used in place of laboratory testing. Vapour results obtained from the RKI Eagle and the PID are relative and must be interpreted.

Screening equipment should be calibrated on an approximately monthly basis, more frequently if heavily used.

- ❒ Samples should be brought to room temperature; this is specifically important in colder weather. Soil must not be frozen.
- ❒ Turn instrument on and allow to come to zero - calibrate if necessary
- ❒ If using RKI Eagle, ensure instrument is in methane elimination mode unless otherwise directed.
- ❒ Ensure measurement units are ppm (parts per million) initially. RKI Eagle will automatically switch to %LEL (lower explosive limit) if higher concentrations are encountered.
- ❒ Break up large lumps of soil in the sample bag, taking care not to puncture bag.
- ❒ Insert probe into soil bag, creating a seal with your hand around the opening.
- ❒ Gently manipulate soil in bag while observing instrument readings.
- ❒ Record the highest value obtained in the first 15 to 25 seconds
- ❒ Make sure to indicate scale (ppm or LEL); also note which instrument was used (RKI Eagle 1 or 2, or MiniRae).
- ❒ Jar samples and refrigerate as per Sampling and Analysis Plan.

3.2 Monitoring Well Installation Procedure

Equipment

- ❒ 5’ x 2” threaded sections of Schedule 40 PVC slotted well screen (5’ x 1 ¼” if installing in cored hole in bedrock)
- ❒ 5’ x 2” threaded sections of Schedule 40 PVC riser pipe (5’ x 1 ¼” if installing in cored hole in bedrock)
- ❒ Threaded end-cap
- ❒ Slip-cap or J-plug
- ❒ Asphalt cold patch or concrete
- ❒ Silica Sand
- ❒ Bentonite chips (Holeplug)
- ❒ Steel flushmount casing

Procedure

- ❒ Drill borehole to required depth, using drilling and sampling procedures described above.
- ❒ If borehole is deeper than required monitoring well, backfill with bentonite chips to required depth. This should only be done on wells where contamination is not suspected, in order to prevent downward migration of contamination.
- ❒ Only one monitoring well should be installed per borehole.
- ❒ Monitoring wells should not be screened across more than one stratigraphic unit to prevent potential migration of contaminants between units.
- ❒ Where LNAPLs are the suspected contaminants of concern, monitoring wells should be screened straddling the water table in order to capture any free product floating on top of the water table.
- ❒ Thread the end cap onto a section of screen. Thread second section of screen if required. Thread risers onto screen. Lower into borehole to required depth. Ensure slip-cap or J-plug is inserted to prevent backfill materials entering well.
- ❒ As drillers remove augers, backfill borehole annulus with silica sand until the level of sand is approximately 0.3 m above the top of the screen.
- ❒ Backfill with holeplug until at least 0.3 m of holeplug is present above the top of the silica sand.
- ❒ Backfill remainder of borehole with holeplug or with auger cuttings (if contamination is not suspected).
- ❒ Install flushmount casing. Seal space between flushmount and borehole annulus with concrete, cold patch, or holeplug to match surrounding ground surface.

3.3 Monitoring Well Sampling Procedure

Equipment

- ❒ Water level metre or interface probe on hydrocarbon/LNAPL sites
- ❒ Spray bottles containing water and methanol to clean water level tape or interface probe
- ❒ Peristaltic pump
- ❒ Polyethylene tubing for peristaltic pump
- ❒ Flexible tubing for peristaltic pump
- ❒ Latex or nitrile gloves (depending on suspected contaminant)
- ❒ Allen keys and/or 9/16" socket wrench to remove well caps
- ❒ Graduated bucket with volume measurements
- ❒ pH/Temperature/Conductivity combo pen
- ❒ Laboratory-supplied sample bottles

Sampling Procedure

- ❒ Locate well and use socket wrench or Allan key to open metal flush mount protector cap. Remove plastic well cap.
- ❒ Measure water level, with respect to existing ground surface, using water level meter or interface probe. If using interface probe on suspected NAPL site, measure the thickness of free product.
- ❒ Measure total depth of well.
- ❒ Clean water level tape or interface probe using methanol and water. Change gloves between wells.
- ❒ Calculate volume of standing water within well and record.
- ❒ Insert polyethylene tubing into well and attach to peristaltic pump. Turn on peristaltic pump and purge into graduated bucket. Purge at least three well volumes of water from the well. Measure and record field chemistry. Continue to purge, measuring field chemistry after every well volume purged, until appearance or field chemistry stabilizes.
- ❒ Note appearance of purge water, including colour, opacity (clear, cloudy, silty), sheen, presence of LNAPL, and odour. Note any other unusual features (particulate matter, effervescence (bubbling) of dissolved gas, etc.).
- ❒ Fill required sample bottles. If sampling for metals, attach 75-micron filter to discharge tube and filter metals sample. If sampling for VOCs, use low flow rate to ensure continuous stream of non-turbulent flow into sample bottles. Ensure no headspace is present in VOC vials.
- ❒ Replace well cap and flushmount casing cap.

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

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

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

5.0 DATA QUALITY OBJECTIVES

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

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

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

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

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

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS

Physical impediments to the Sampling and Analysis plan may include:

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

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

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Asssessment
1452-1470 Hunt Club Road & 1525-1531 Sieveright Ave.
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5015

REMARKS

HOLE NO. BH 1-20

BORINGS BY CME-55 Low Clearance Drill **DATE** August 25, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	92.87
Asphaltic concrete 0.08		AU	1				
FILL: Brown silty clay with crushed stone 0.74						1	91.87
		SS	2	8	21		
Compact, brown **SILTY SAND**		SS	3	38	18	2	90.87
2.29							
Loose, brown coarse to medium **SAND**		SS	4	54	4		
3.05						3	89.87
		SS	5	100	W		
		SS	6	100	P	4	88.87
Stiff, grey **SILTY CLAY**		SS	7	100	P	5	87.87
		SS	8	100	P		
5.94						6	86.87
Compact, grey **SILTY SAND**		SS	6	42	19		
6.70							
End of Borehole							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Asssessment
1452-1470 Hunt Club Road & 1525-1531 Sieveright Ave.
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5015

REMARKS

HOLE NO. BH 2-20

BORINGS BY CME-55 Low Clearance Drill **DATE** August 25, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.36
FILL: Brown sand with crushed stone, trace asphalt (0.51)		AU	1				
FILL: Brown silty clay with sand and gravel (1.52)		SS	2	79	11	1	92.36
Loose, brown coarse to medium **SAND** (2.06)		SS	3	58	9	2	91.36
Stiff, grey **SILTY CLAY,** trace sand seams		SS	4	75	3		
		SS	5	100	5	3	90.36
(3.66)							
Compact, grey **SANDY SILT**		SS	6	54	23	4	89.36
- some clay by 4.6m depth		SS	7	62	26	5	88.36
		SS	8	75	15		
(6.10)						6	87.36
Compact, grey **SILTY SAND**		SS	9	46	24		
(6.70)							
End of Borehole							
(GWL @ 4.61m - Sept. 2, 2020)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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SOIL PROFILE AND TEST DATA

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1452-1470 Hunt Club Road & 1525-1531 Sieveright Ave.
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5015

REMARKS

HOLE NO. BH 3-20

BORINGS BY CME-55 Low Clearance Drill **DATE** August 26, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.31
Asphaltic concrete 0.05							
FILL: Brown silty sand with crushed stone 0.51		AU	1				
		SS	2	42	4	1	92.31
Loose, brown medium to coarse **SAND** with gravel		SS	3	54	7	2	91.31
2.29							
Very stiff, grey **SILTY CLAY,** some gravel		SS	4	33	29	3	90.31
3.05							
		SS	5	46	33		
Dense to compact, grey **SANDY SILT**		SS	6	50	18	4	89.31
4.57							
Compact, grey **SILTY SAND,** some gravel		SS	7	33	28	5	88.31
5.20							
		SS	8	29	12		
Compact, grey **SANDY SILT** with clay						6	87.31
		SS	9	33	21		
6.70							
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.

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DATUM Geodetic

FILE NO. PE5015

REMARKS

HOLE NO. BH 4-20

BORINGS BY CME-55 Low Clearance Drill **DATE** August 25, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	92.66
Asphaltic concrete 0.08		AU	1				
FILL: Brown silty sand with crushed stone 0.60						1	91.66
		SS	2	71	12		
		SS	3	79	12	2	90.66
Compact, brown medium to coarse **SAND**		SS	4	62	16		
		SS	5	67	16	3	89.66
4.11		SS	6	29	9	4	88.66
		SS	7	83	W		
Stiff, grey **SILTY CLAY**						5	87.66
						6	86.66
		SS	9	100	2		
6.70							
End of Borehole							
(GWL @ 2.41m - Sept. 2, 2020)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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SOIL PROFILE AND TEST DATA

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FILE NO. PE5015

REMARKS

HOLE NO. BH 5-20

BORINGS BY CME-55 Low Clearance Drill **DATE** August 25, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
TOPSOIL 0.20		AU	1			0	93.40
		SS	2	75	5	1	92.40
Loose to compact, brown **SILTY SAND**		SS	3	79	16	2	91.40
		SS	4	71	27		
3.05						3	90.40
		SS	5	88	2		
		SS	6	100	W	4	89.40
Stiff, grey **SILTY CLAY,** trace sand		SS	7	100	P	5	88.40
		SS	8	100	P		
		SS	9	100	P	6	87.40
6.70							
End of Borehole							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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REMARKS

HOLE NO. BH 6-20

BORINGS BY CME-55 Low Clearance Drill **DATE** August 25, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	92.91
FILL: Brown silty sand with crushed stone, trace asphalt		AU	1				
0.66							
FILL: Brown silty sand, trace gravel and clay		SS	2	54	14	1	91.91
1.52							
FILL: Dark brown silty clay with sand, gravel and organics		SS	3	46	10	2	90.91
2.29							
		SS	4	58	32	3	89.91
		SS	5	75	41		
Dense to compact, grey **SANDY SILT,** trace clay		SS	6	58	24	4	88.91
		SS	7	71	23	5	87.91
5.33							
		SS	8	38	26	6	86.91
Compact, grey **SAND**							
		SS	9	33	15		
- with clay by 6.1m depth						7	85.91
7.62							
End of Borehole							
(GWL @ 4.35m - Sept. 2, 2020)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Asssessment
1452-1470 Hunt Club Road & 1525-1531 Sieveright Ave.
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5015

REMARKS

HOLE NO. BH 7-20

BORINGS BY CME-55 Low Clearance Drill **DATE** August 25, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	93.01
FILL: Brown silty sand with crushed stone, trace organics		AU	1				
0.56							
FILL: Brown silty clay, some sand		SS	2	38	8	1	92.01
1.52							
Stiff, brown **SILTY CLAY,** trace sand		SS	3	21	7	2	91.01
		SS	4	38	7		
3.05						3	90.01
Compact, brown **SILTY SAND**		SS	5	29	13		
		SS	6	46	26	4	89.01
4.57							
Compact, grey **SANDY SILT**		SS	7	58	26	5	88.01
5.13							
Compact, grey medium **SAND**		SS	8	38	20		
						6	87.01
		SS	9	42	18		
6.70							
End of Borehole							
(GWL @ 5.48m - Sept. 2, 2020)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

The standard terminology to describe the 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

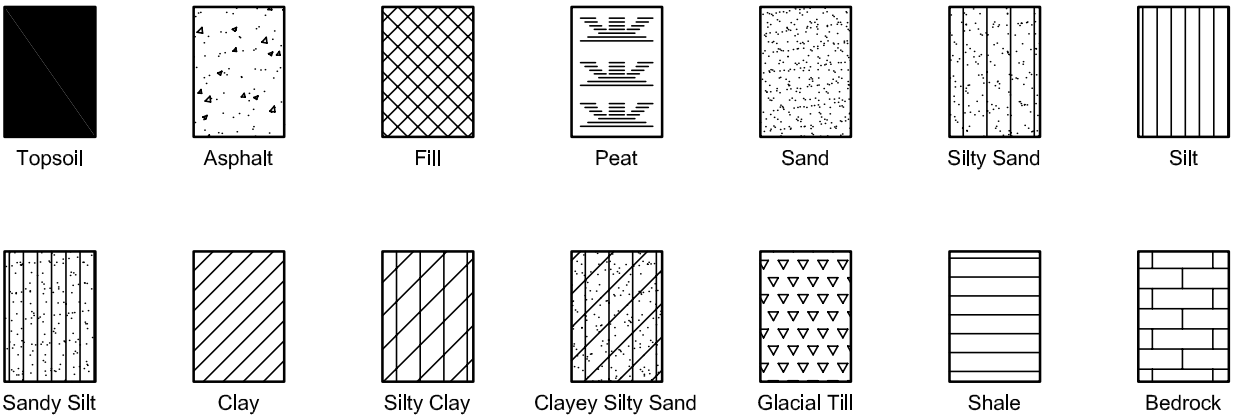
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

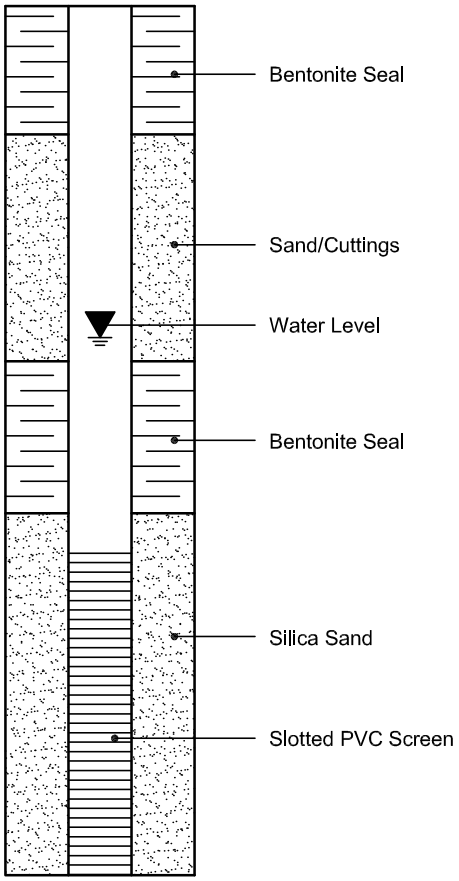
SYMBOLS AND TERMS (continued)

STRATA PLOT

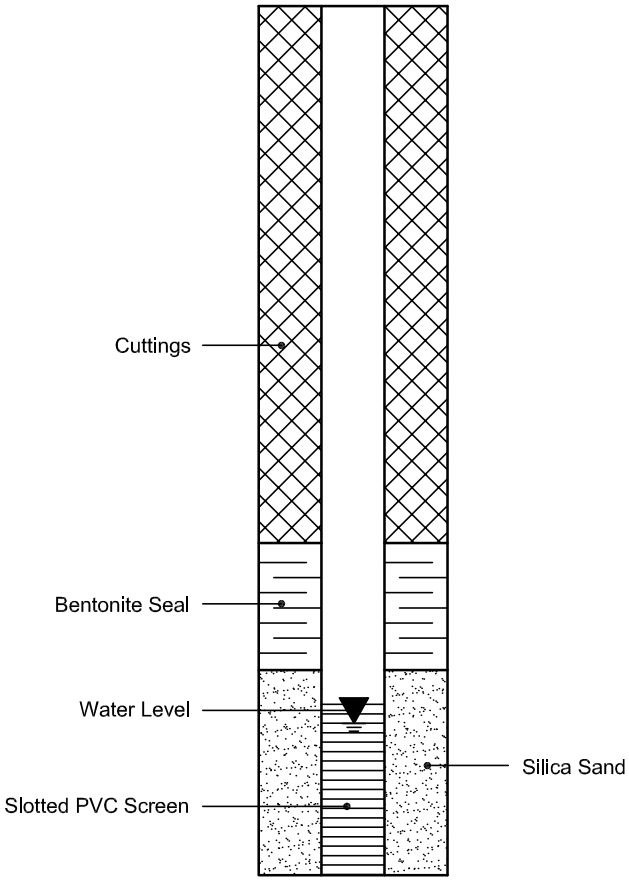


MONITORING WELL AND PIEZOMETER CONSTRUCTION

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: Nick Sullivan

Client PO: 30720
Project: PE5015
Custody: 128132

Report Date: 9-Sep-2020
Order Date: 2-Sep-2020

Order #: 2036316

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

Paracel ID	Client ID
2036316-01	BH1-SS2
2036316-02	BH2-SS2
2036316-03	BH2-SS7
2036316-04	BH4-SS5
2036316-05	BH6-SS2
2036316-06	BH6-SS9
2036316-07	BH7-SS2
2036316-08	BH7-SS7

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 09-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 2-Sep-2020

Client PO: 30720

Project Description: PE5015

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	2-Sep-20	3-Sep-20
Conductivity	MOE E3138 - probe @25 °C, water ext	3-Sep-20	4-Sep-20
PHC F1	CWS Tier 1 - P&T GC-FID	2-Sep-20	3-Sep-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	3-Sep-20	8-Sep-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	9-Sep-20	9-Sep-20
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	3-Sep-20	5-Sep-20
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	2-Sep-20	3-Sep-20
SAR	Calculated	4-Sep-20	4-Sep-20
Solids, %	Gravimetric, calculation	3-Sep-20	3-Sep-20

Certificate of Analysis

Report Date: 09-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 2-Sep-2020

Client PO: 30720

Project Description: PE5015

	Client ID:	BH1-SS2	BH2-SS2	BH2-SS7	BH4-SS5
	Sample Date:	26-Aug-20 09:00	25-Aug-20 09:00	25-Aug-20 09:00	26-Aug-20 09:00
	Sample ID:	2036316-01	2036316-02	2036316-03	2036316-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	93.2	88.2	85.2	81.1
General Inorganics					
SAR	0.01 N/A	-	0.47	-	-
Conductivity	5 uS/cm	-	184	-	-
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	-	-
Arsenic	1.0 ug/g dry	2.7	4.2	-	-
Barium	1.0 ug/g dry	57.6	126	-	-
Beryllium	0.5 ug/g dry	<0.5	0.8	-	-
Boron	5.0 ug/g dry	<5.0	8.5	-	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	-
Chromium	5.0 ug/g dry	23.3	40.6	-	-
Cobalt	1.0 ug/g dry	6.0	12.0	-	-
Copper	5.0 ug/g dry	11.4	24.9	-	-
Lead	1.0 ug/g dry	6.4	15.7	-	-
Molybdenum	1.0 ug/g dry	<1.0	1.4	-	-
Nickel	5.0 ug/g dry	13.4	29.2	-	-
Selenium	1.0 ug/g dry	<1.0	<1.0	-	-
Silver	0.3 ug/g dry	<0.3	<0.3	-	-
Thallium	1.0 ug/g dry	<1.0	<1.0	-	-
Uranium	1.0 ug/g dry	<1.0	1.3	-	-
Vanadium	10.0 ug/g dry	32.6	49.2	-	-
Zinc	20.0 ug/g dry	28.3	62.2	-	-
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

Certificate of Analysis

Report Date: 09-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 2-Sep-2020

Client PO: 30720

Project Description: PE5015

	Client ID:	BH1-SS2	BH2-SS2	BH2-SS7	BH4-SS5
	Sample Date:	26-Aug-20 09:00	25-Aug-20 09:00	25-Aug-20 09:00	26-Aug-20 09:00
	Sample ID:	2036316-01	2036316-02	2036316-03	2036316-04
	MDL/Units	Soil	Soil	Soil	Soil
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 (dibromoethane, 1,2-)	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
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	-	-	-	106%
Dibromofluoromethane	Surrogate	-	-	-	99.1%
Toluene-d8	Surrogate	-	-	-	115%
Benzene	0.02 ug/g dry	-	-	<0.02	-
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	-

Certificate of Analysis

Report Date: 09-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 2-Sep-2020

Client PO: 30720

Project Description: PE5015

	Client ID:	BH1-SS2	BH2-SS2	BH2-SS7	BH4-SS5
	Sample Date:	26-Aug-20 09:00	25-Aug-20 09:00	25-Aug-20 09:00	26-Aug-20 09:00
	Sample ID:	2036316-01	2036316-02	2036316-03	2036316-04
	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	-	-	116%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	-	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	-	-	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	-	-	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	-	-	<6	<6
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	-	-
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	-	87.8%	-	-
Terphenyl-d14	Surrogate	-	96.6%	-	-

Certificate of Analysis

Report Date: 09-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 2-Sep-2020

Client PO: 30720

Project Description: PE5015

	Client ID:	BH6-SS2	BH6-SS9	BH7-SS2	BH7-SS7
	Sample Date:	25-Aug-20 09:00	25-Aug-20 09:00	25-Aug-20 09:00	25-Aug-20 09:00
	Sample ID:	2036316-05	2036316-06	2036316-07	2036316-08
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	87.2	85.7	84.7	84.4
Metals					
Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	2.8	-	-	-
Barium	1.0 ug/g dry	38.9	-	-	-
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	19.4	-	-	-
Cobalt	1.0 ug/g dry	4.7	-	-	-
Copper	5.0 ug/g dry	8.7	-	-	-
Lead	1.0 ug/g dry	8.5	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	5.0 ug/g dry	11.6	-	-	-
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	22.9	-	-	-
Zinc	20.0 ug/g dry	24.8	-	-	-
Volatiles					
Benzene	0.02 ug/g dry	-	<0.02	-	<0.02
Ethylbenzene	0.05 ug/g dry	-	<0.05	-	<0.05
Toluene	0.05 ug/g dry	-	<0.05	-	<0.05
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
Toluene-d8	Surrogate	-	110%	-	115%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	<7	-	<7
F2 PHCs (C10-C16)	4 ug/g dry	-	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	-	<8	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	-	<6	<6	<6
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	<0.02	-	-	-

Certificate of Analysis

Report Date: 09-Sep-2020

Client: **Paterson Group Consulting Engineers**

Order Date: 2-Sep-2020

Client PO: **30720**

Project Description: PE5015

	Client ID:	BH6-SS2	BH6-SS9	BH7-SS2	BH7-SS7
	Sample Date:	25-Aug-20 09:00	25-Aug-20 09:00	25-Aug-20 09:00	25-Aug-20 09:00
	Sample ID:	2036316-05	2036316-06	2036316-07	2036316-08
	MDL/Units	Soil	Soil	Soil	Soil
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	-	-	-
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	87.7%	-	-	-
Terphenyl-d14	Surrogate	97.7%	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Conductivity	ND	5	uS/cm						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	*0.953*		*ug/g*		*71.5*	*50-140*			
Surrogate: Terphenyl-d14	*1.25*		*ug/g*		*93.7*	*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						

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, 1,2-	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*3.49*		*ug/g*		*109*	*50-140*			
Surrogate: Dibromofluoromethane	*3.62*		*ug/g*		*113*	*50-140*			
Surrogate: Toluene-d8	*3.63*		*ug/g*		*113*	*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	*3.63*		*ug/g*		*113*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.27	0.01	N/A	0.29			7.1	30	
Conductivity	97.5	5	uS/cm	95.5			2.1	5	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	32	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	15	6	ug/g dry	ND			NC	30	
Metals									
Antimony	1.0	1.0	ug/g dry	ND			NC	30	
Arsenic	5.5	1.0	ug/g dry	5.2			5.7	30	
Barium	50.6	1.0	ug/g dry	55.3			8.8	30	
Beryllium	ND	0.5	ug/g dry	ND			NC	30	
Boron	ND	5.0	ug/g dry	ND			NC	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium	17.6	5.0	ug/g dry	17.6			0.1	30	
Cobalt	4.5	1.0	ug/g dry	4.5			0.1	30	
Copper	11.0	5.0	ug/g dry	10.5			4.5	30	
Lead	89.9	1.0	ug/g dry	51.4			54.5	30	QR-03
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	10.6	5.0	ug/g dry	10.6			0.3	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	22.4	10.0	ug/g dry	22.1			1.4	30	
Zinc	56.7	20.0	ug/g dry	56.1			1.1	30	
Physical Characteristics									
% Solids	97.2	0.1	% by Wt.	95.3			1.9	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g dry	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g dry	ND			NC	40	
Anthracene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [a] pyrene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [g,h,i] perylene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Chrysene	ND	0.02	ug/g dry	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g dry	ND			NC	40	
Fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Fluorene	ND	0.02	ug/g dry	ND			NC	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g dry	ND			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g dry	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g dry	ND			NC	40	
Naphthalene	ND	0.01	ug/g dry	ND			NC	40	
Phenanthrene	ND	0.02	ug/g dry	ND			NC	40	
Pyrene	ND	0.02	ug/g dry	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	*1.78*		*ug/g dry*		*89.1*	*50-140*			
Surrogate: Terphenyl-d14	*1.84*		*ug/g dry*		*92.4*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g dry	ND			NC	50	
Bromoform	ND	0.05	ug/g dry	ND			NC	50	
Bromomethane	ND	0.05	ug/g dry	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Carbon Tetrachloride	ND	0.05	ug/g dry	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
Chloroform	ND	0.05	ug/g dry	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g dry	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g dry	ND			NC	50	
Hexane	ND	0.05	ug/g dry	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g dry	ND			NC	50	
Styrene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	*3.89*		*ug/g dry*		*115*	*50-140*			
Surrogate: Dibromofluoromethane	*3.03*		*ug/g dry*		*89.2*	*50-140*			
Surrogate: Toluene-d8	*3.95*		*ug/g dry*		*116*	*50-140*			
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*3.95*		*ug/g dry*		*116*	*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)	196	7	ug/g	ND	98.2	80-120			
F2 PHCs (C10-C16)	114	4	ug/g	ND	95.3	60-140			
F3 PHCs (C16-C34)	286	8	ug/g	ND	97.6	60-140			
F4 PHCs (C34-C50)	228	6	ug/g	ND	123	60-140			
Metals									
Antimony	45.8	1.0	ug/g	ND	91.2	70-130			
Arsenic	52.6	1.0	ug/g	2.1	101	70-130			
Barium	68.8	1.0	ug/g	22.1	93.3	70-130			
Beryllium	49.5	0.5	ug/g	ND	98.8	70-130			
Boron	45.3	5.0	ug/g	ND	88.4	70-130			
Cadmium	48.5	0.5	ug/g	ND	96.9	70-130			
Chromium	59.2	5.0	ug/g	7.1	104	70-130			
Cobalt	52.6	1.0	ug/g	1.8	102	70-130			
Copper	53.6	5.0	ug/g	ND	98.9	70-130			
Lead	68.9	1.0	ug/g	20.6	96.7	70-130			
Molybdenum	50.1	1.0	ug/g	ND	100	70-130			
Nickel	54.1	5.0	ug/g	ND	99.7	70-130			
Selenium	46.3	1.0	ug/g	ND	92.4	70-130			
Silver	43.1	0.3	ug/g	ND	86.1	70-130			
Thallium	48.2	1.0	ug/g	ND	96.3	70-130			
Uranium	52.4	1.0	ug/g	ND	105	70-130			
Vanadium	60.4	10.0	ug/g	ND	103	70-130			
Zinc	69.9	20.0	ug/g	22.4	95.0	70-130			
Semi-Volatiles									
Acenaphthene	0.245	0.02	ug/g	ND	98.2	50-140			
Acenaphthylene	0.203	0.02	ug/g	ND	81.7	50-140			
Anthracene	0.213	0.02	ug/g	ND	85.7	50-140			
Benzo [a] anthracene	0.178	0.02	ug/g	ND	71.5	50-140			
Benzo [a] pyrene	0.190	0.02	ug/g	ND	76.4	50-140			
Benzo [b] fluoranthene	0.259	0.02	ug/g	ND	104	50-140			
Benzo [g,h,i] perylene	0.194	0.02	ug/g	ND	77.7	50-140			
Benzo [k] fluoranthene	0.244	0.02	ug/g	ND	98.1	50-140			
Chrysene	0.195	0.02	ug/g	ND	78.4	50-140			
Dibenzo [a,h] anthracene	0.194	0.02	ug/g	ND	78.0	50-140			
Fluoranthene	0.209	0.02	ug/g	ND	83.7	50-140			
Fluorene	0.221	0.02	ug/g	ND	88.7	50-140			
Indeno [1,2,3-cd] pyrene	0.196	0.02	ug/g	ND	78.6	50-140			
1-Methylnaphthalene	0.252	0.02	ug/g	ND	101	50-140			
2-Methylnaphthalene	0.280	0.02	ug/g	ND	112	50-140			
Naphthalene	0.260	0.01	ug/g	ND	105	50-140			
Phenanthrene	0.202	0.02	ug/g	ND	80.9	50-140			
Pyrene	0.207	0.02	ug/g	ND	83.1	50-140			
Surrogate: 2-Fluorobiphenyl	*1.84*		*ug/g*		*92.1*	*50-140*			
Surrogate: Terphenyl-d14	*1.93*		*ug/g*		*96.7*	*50-140*			
Volatiles									
Acetone	9.71	0.50	ug/g	ND	97.1	50-140			
Benzene	2.89	0.02	ug/g	ND	72.3	60-130			
Bromodichloromethane	3.18	0.05	ug/g	ND	79.5	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromoform	4.10	0.05	ug/g	ND	102	60-130			
Bromomethane	3.51	0.05	ug/g	ND	87.6	50-140			
Carbon Tetrachloride	2.85	0.05	ug/g	ND	71.2	60-130			
Chlorobenzene	3.88	0.05	ug/g	ND	97.1	60-130			
Chloroform	3.18	0.05	ug/g	ND	79.5	60-130			
Dibromochloromethane	4.16	0.05	ug/g	ND	104	60-130			
Dichlorodifluoromethane	3.42	0.05	ug/g	ND	85.5	50-140			
1,2-Dichlorobenzene	3.24	0.05	ug/g	ND	81.0	60-130			
1,3-Dichlorobenzene	3.11	0.05	ug/g	ND	77.7	60-130			
1,4-Dichlorobenzene	3.29	0.05	ug/g	ND	82.2	60-130			
1,1-Dichloroethane	3.16	0.05	ug/g	ND	79.1	60-130			
1,2-Dichloroethane	3.00	0.05	ug/g	ND	75.0	60-130			
1,1-Dichloroethylene	2.75	0.05	ug/g	ND	68.7	60-130			
cis-1,2-Dichloroethylene	2.87	0.05	ug/g	ND	71.7	60-130			
trans-1,2-Dichloroethylene	3.00	0.05	ug/g	ND	74.9	60-130			
1,2-Dichloropropane	2.64	0.05	ug/g	ND	65.9	60-130			
cis-1,3-Dichloropropylene	2.70	0.05	ug/g	ND	67.5	60-130			
trans-1,3-Dichloropropylene	2.46	0.05	ug/g	ND	61.5	60-130			
Ethylbenzene	3.74	0.05	ug/g	ND	93.6	60-130			
Ethylene dibromide (dibromoethane, 1,2-	4.14	0.05	ug/g	ND	103	60-130			
Hexane	2.56	0.05	ug/g	ND	64.0	60-130			
Methyl Ethyl Ketone (2-Butanone)	8.35	0.50	ug/g	ND	83.5	50-140			
Methyl Isobutyl Ketone	8.09	0.50	ug/g	ND	80.9	50-140			
Methyl tert-butyl ether	6.01	0.05	ug/g	ND	60.1	50-140			
Methylene Chloride	3.15	0.05	ug/g	ND	78.7	60-130			
Styrene	3.28	0.05	ug/g	ND	81.9	60-130			
1,1,1,2-Tetrachloroethane	3.95	0.05	ug/g	ND	98.7	60-130			
1,1,2,2-Tetrachloroethane	4.75	0.05	ug/g	ND	119	60-130			
Tetrachloroethylene	3.39	0.05	ug/g	ND	84.6	60-130			
Toluene	4.00	0.05	ug/g	ND	100	60-130			
1,1,1-Trichloroethane	2.72	0.05	ug/g	ND	67.9	60-130			
1,1,2-Trichloroethane	3.08	0.05	ug/g	ND	77.0	60-130			
Trichloroethylene	2.65	0.05	ug/g	ND	66.3	60-130			
Trichlorofluoromethane	2.96	0.05	ug/g	ND	73.9	50-140			
Vinyl chloride	3.50	0.02	ug/g	ND	87.5	50-140			
m,p-Xylenes	7.95	0.05	ug/g	ND	99.3	60-130			
o-Xylene	4.28	0.05	ug/g	ND	107	60-130			
Surrogate: 4-Bromofluorobenzene	*2.53*		*ug/g*		*79.0*	*50-140*			
Surrogate: Dibromofluoromethane	*3.42*		*ug/g*		*107*	*50-140*			
Surrogate: Toluene-d8	*2.88*		*ug/g*		*90.1*	*50-140*			
Benzene	2.89	0.02	ug/g	ND	72.3	60-130			
Ethylbenzene	3.74	0.05	ug/g	ND	93.6	60-130			
Toluene	4.00	0.05	ug/g	ND	100	60-130			
m,p-Xylenes	7.95	0.05	ug/g	ND	99.3	60-130			
o-Xylene	4.28	0.05	ug/g	ND	107	60-130			
Surrogate: Toluene-d8	*2.88*		*ug/g*		*90.1*	*50-140*			

Qualifier Notes:

QC Qualifiers :

QR-03 : The RPD value for the sample duplicate or MS/MSD was outside of QC acceptance limits due to matrix interference. QC batch accepted based on LCS and/or LCSD recovery and/or RPD values.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

PARACEL LABORATORIES LTD.

Paracel ID: 2036316

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2036316	Nº 128132

Client Name: Paterson Group	Project Ref: PE5015	Page 1 of 1
Contact Name: Nick Sullivan	Quote #:	Turnaround Time
Address: 154 Colonnade Rd. S.	PO #: 30720	☐ 1 day ☐ 3 day
Telephone: 613-226-7381	E-mail: nsullivan@patersongroup.ca mdarcy@patersongroup.ca	☐ 2 day ☒ Regular
		Date Required:

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

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	PHCs F1-F4	PHCs F2-F4	E.C	SAR		
1	BH1-SS2	S		1	Aug 26/20					X									
2	BH2-SS2	S		1	Aug 25/20				X	X						X	X		
3	BH2-SS7	S		2	Aug 25/20		X												
4	BH4-SS5	S		2	Aug 26/20			X						X					
5	BH6-SS2	S		1	Aug 25/20				X	X									
6	BH6-SS9	S		2	Aug 25/20		X												
7	BH7-SS2	S		1	Aug 25/20										X				
8	BH7-SS7	S		2	Aug 25/20		X												
9																			
10																			

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): N. Sullivan	Received By Driver/Depot: M. DeCourse	Received at Lab: Sumeeporn Ohmai	Verified By:
Relinquished By (Print): Nick Sullivan	Date/Time: 02/09/20 9:46	Date/Time: Sep 02, 2020 12:15	Date/Time: Sep 2 2020 13:25
Date/Time: September 1, 2020	Temperature: °C AM	Temperature: 15.0 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 30726
Project: PE5015
Custody: 128139

Report Date: 11-Sep-2020
Order Date: 3-Sep-2020

Order #: 2036481

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

Paracel ID	Client ID
2036481-01	BH2-GW
2036481-02	BH4-GW
2036481-03	BH6-GW
2036481-04	BH7-GW
2036481-05	Dup

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 11-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 3-Sep-2020

Client PO: 30726

Project Description: PE5015

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	11-Sep-20	11-Sep-20
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	4-Sep-20	4-Sep-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	11-Sep-20	11-Sep-20
PHC F1	CWS Tier 1 - P&T GC-FID	4-Sep-20	4-Sep-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	11-Sep-20	11-Sep-20
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	4-Sep-20	4-Sep-20

Certificate of Analysis

Report Date: 11-Sep-2020

Client: **Paterson Group Consulting Engineers**

Order Date: 3-Sep-2020

Client PO: 30726

Project Description: PE5015

	Client ID:	BH2-GW	BH4-GW	BH6-GW	BH7-GW
	Sample Date:	02-Sep-20 09:00	02-Sep-20 09:00	02-Sep-20 09:00	02-Sep-20 09:00
	Sample ID:	2036481-01	2036481-02	2036481-03	2036481-04
	MDL/Units	Water	Water	Water	Water
Anions					
Chloride	1 mg/L	119	-	-	-
Metals					
Antimony	0.5 ug/L	<0.5	-	-	-
Arsenic	1 ug/L	1	-	-	-
Barium	1 ug/L	115	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-
Boron	10 ug/L	19	-	-	-
Cadmium	0.1 ug/L	<0.1	-	-	-
Chromium	1 ug/L	<1	-	-	-
Cobalt	0.5 ug/L	1.1	-	-	-
Copper	0.5 ug/L	1.5	-	-	-
Lead	0.1 ug/L	<0.1	-	-	-
Molybdenum	0.5 ug/L	0.6	-	-	-
Nickel	1 ug/L	2	-	-	-
Selenium	1 ug/L	<1	-	-	-
Silver	0.1 ug/L	<0.1	-	-	-
Sodium	200 ug/L	233000	-	-	-
Thallium	0.1 ug/L	<0.1	-	-	-
Uranium	0.1 ug/L	1.0	-	-	-
Vanadium	0.5 ug/L	0.5	-	-	-
Zinc	5 ug/L	<5	-	-	-
Volatiles					
Acetone	5.0 ug/L	-	<5.0	-	-
Benzene	0.5 ug/L	-	<0.5	-	-
Bromodichloromethane	0.5 ug/L	-	<0.5	-	-
Bromoform	0.5 ug/L	-	<0.5	-	-
Bromomethane	0.5 ug/L	-	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	-	<0.2	-	-
Chlorobenzene	0.5 ug/L	-	<0.5	-	-
Chloroform	0.5 ug/L	-	<0.5	-	-
Dibromochloromethane	0.5 ug/L	-	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	-	<1.0	-	-
1,2-Dichlorobenzene	0.5 ug/L	-	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	-	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	-	<0.5	-	-

Certificate of Analysis

Report Date: 11-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 3-Sep-2020

Client PO: 30726

Project Description: PE5015

	Client ID:	BH2-GW	BH4-GW	BH6-GW	BH7-GW
	Sample Date:	02-Sep-20 09:00	02-Sep-20 09:00	02-Sep-20 09:00	02-Sep-20 09:00
	Sample ID:	2036481-01	2036481-02	2036481-03	2036481-04
	MDL/Units	Water	Water	Water	Water
1,1-Dichloroethane	0.5 ug/L	-	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	-	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	-	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	-	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	-	<0.5	-	-
Ethylbenzene	0.5 ug/L	-	<0.5	-	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	-	<0.2	-	-
Hexane	1.0 ug/L	-	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	-	<5.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	-	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	-	<2.0	-	-
Methylene Chloride	5.0 ug/L	-	<5.0	-	-
Styrene	0.5 ug/L	-	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	-	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	-	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	-	<0.5	-	-
Toluene	0.5 ug/L	-	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L	-	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	-	<0.5	-	-
Trichloroethylene	0.5 ug/L	-	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	-	<1.0	-	-
Vinyl chloride	0.5 ug/L	-	<0.5	-	-
m,p-Xylenes	0.5 ug/L	-	<0.5	-	-
o-Xylene	0.5 ug/L	-	<0.5	-	-
Xylenes, total	0.5 ug/L	-	<0.5	-	-
4-Bromofluorobenzene	Surrogate	-	112%	-	-
Dibromofluoromethane	Surrogate	-	110%	-	-
Toluene-d8	Surrogate	-	114%	-	-
Benzene	0.5 ug/L	<0.5	-	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	-	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	-	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	-	<0.5	<0.5

Certificate of Analysis

Report Date: 11-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 3-Sep-2020

Client PO: 30726

Project Description: PE5015

	Client ID:	BH2-GW	BH4-GW	BH6-GW	BH7-GW
	Sample Date:	02-Sep-20 09:00	02-Sep-20 09:00	02-Sep-20 09:00	02-Sep-20 09:00
	Sample ID:	2036481-01	2036481-02	2036481-03	2036481-04
	MDL/Units	Water	Water	Water	Water
o-Xylene	0.5 ug/L	<0.5	-	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	-	<0.5	<0.5
Toluene-d8	Surrogate	122%	-	113%	113%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100

Certificate of Analysis

Report Date: 11-Sep-2020

Client: **Paterson Group Consulting Engineers**

Order Date: 3-Sep-2020

Client PO: **30726**

Project Description: **PE5015**

	Client ID:	Dup	-	-	-
	Sample Date:	02-Sep-20 09:00	-	-	-
	Sample ID:	2036481-05	-	-	-
	MDL/Units	Water	-	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Ethylene dibromide (dibromoethane, 1	0.2 ug/L	<0.2	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-

Certificate of Analysis

Report Date: 11-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 3-Sep-2020

Client PO: 30726

Project Description: PE5015

	Client ID:	Dup	-	-	-
	Sample Date:	02-Sep-20 09:00	-	-	-
	Sample ID:	2036481-05	-	-	-
	MDL/Units	Water	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	110%	-	-	-
Dibromofluoromethane	Surrogate	114%	-	-	-
Toluene-d8	Surrogate	116%	-	-	-

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						
Metals									
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*89.9*		*ug/L*		*112*	*50-140*			
Surrogate: Dibromofluoromethane	*81.5*		*ug/L*		*102*	*50-140*			
Surrogate: Toluene-d8	*95.2*		*ug/L*		*119*	*50-140*			
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	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: Toluene-d8	*95.2*		*ug/L*		*119*	*50-140*			

Certificate of Analysis

Report Date: 11-Sep-2020

Client: Paterson Group Consulting Engineers

Order Date: 3-Sep-2020

Client PO: 30726

Project Description: PE5015

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Metals									
Antimony	0.87	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	23.7	1	ug/L	21.6			9.1	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	22	10	ug/L	22			0.0	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	1.15	0.5	ug/L	1.14			1.4	20	
Lead	ND	0.1	ug/L	ND			NC	20	
Molybdenum	1.09	0.5	ug/L	1.06			3.2	20	
Nickel	ND	1	ug/L	ND			NC	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	16500	200	ug/L	16500			0.2	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	ND	0.1	ug/L	ND			NC	20	
Vanadium	ND	0.5	ug/L	ND			NC	20	
Zinc	12	5	ug/L	11			2.9	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*89.8*		*ug/L*		*112*	*50-140*			
Surrogate: Dibromofluoromethane	*82.5*		*ug/L*		*103*	*50-140*			
Surrogate: Toluene-d8	*94.5*		*ug/L*		*118*	*50-140*			
Benzene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: Toluene-d8	*94.5*		*ug/L*		*118*	*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)	1670	25	ug/L	ND	83.3	68-117			
F2 PHCs (C10-C16)	1590	100	ug/L	ND	99.1	60-140			
F3 PHCs (C16-C34)	4100	100	ug/L	ND	105	60-140			
F4 PHCs (C34-C50)	2430	100	ug/L	ND	97.8	60-140			
Metals									
Antimony	46.0	0.5	ug/L	ND	91.4	80-120			
Arsenic	50.1	1	ug/L	ND	99.2	80-120			
Barium	71.8	1	ug/L	21.6	100	80-120			
Beryllium	51.9	0.5	ug/L	ND	104	80-120			
Boron	65	10	ug/L	22	86.7	80-120			
Cadmium	48.6	0.1	ug/L	ND	97.1	80-120			
Chromium	54.4	1	ug/L	ND	109	80-120			
Cobalt	51.0	0.5	ug/L	ND	102	80-120			
Copper	49.1	0.5	ug/L	1.14	96.0	80-120			
Lead	44.4	0.1	ug/L	ND	88.7	80-120			
Molybdenum	47.3	0.5	ug/L	1.06	92.4	80-120			
Nickel	49.6	1	ug/L	ND	98.3	80-120			
Selenium	44.8	1	ug/L	ND	89.3	80-120			
Silver	46.3	0.1	ug/L	ND	92.6	80-120			
Sodium	24100	200	ug/L	16500	75.9	80-120			QM-07
Thallium	46.0	0.1	ug/L	ND	91.9	80-120			
Uranium	47.2	0.1	ug/L	ND	94.3	80-120			
Vanadium	54.3	0.5	ug/L	ND	108	80-120			
Zinc	58	5	ug/L	11	93.3	80-120			
Volatiles									
Acetone	87.1	5.0	ug/L	ND	87.1	50-140			
Benzene	36.2	0.5	ug/L	ND	90.4	60-130			
Bromodichloromethane	38.7	0.5	ug/L	ND	96.8	60-130			
Bromoform	40.6	0.5	ug/L	ND	101	60-130			
Bromomethane	35.4	0.5	ug/L	ND	88.4	50-140			
Carbon Tetrachloride	41.3	0.2	ug/L	ND	103	60-130			
Chlorobenzene	35.4	0.5	ug/L	ND	88.4	60-130			
Chloroform	35.9	0.5	ug/L	ND	89.7	60-130			
Dibromochloromethane	38.3	0.5	ug/L	ND	95.7	60-130			
Dichlorodifluoromethane	36.4	1.0	ug/L	ND	91.0	50-140			
1,2-Dichlorobenzene	40.4	0.5	ug/L	ND	101	60-130			
1,3-Dichlorobenzene	42.4	0.5	ug/L	ND	106	60-130			
1,4-Dichlorobenzene	42.1	0.5	ug/L	ND	105	60-130			
1,1-Dichloroethane	37.9	0.5	ug/L	ND	94.8	60-130			
1,2-Dichloroethane	34.4	0.5	ug/L	ND	86.0	60-130			
1,1-Dichloroethylene	37.6	0.5	ug/L	ND	93.9	60-130			
cis-1,2-Dichloroethylene	37.2	0.5	ug/L	ND	93.0	60-130			
trans-1,2-Dichloroethylene	38.8	0.5	ug/L	ND	97.0	60-130			
1,2-Dichloropropane	36.4	0.5	ug/L	ND	91.0	60-130			
cis-1,3-Dichloropropylene	38.9	0.5	ug/L	ND	97.2	60-130			
trans-1,3-Dichloropropylene	36.8	0.5	ug/L	ND	91.9	60-130			
Ethylbenzene	36.3	0.5	ug/L	ND	90.8	60-130			
Ethylene dibromide (dibromoethane, 1,2	33.7	0.2	ug/L	ND	84.2	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hexane	38.0	1.0	ug/L	ND	95.0	60-130			
Methyl Ethyl Ketone (2-Butanone)	81.4	5.0	ug/L	ND	81.4	50-140			
Methyl Isobutyl Ketone	93.1	5.0	ug/L	ND	93.1	50-140			
Methyl tert-butyl ether	93.5	2.0	ug/L	ND	93.5	50-140			
Methylene Chloride	36.3	5.0	ug/L	ND	90.6	60-130			
Styrene	32.9	0.5	ug/L	ND	82.2	60-130			
1,1,1,2-Tetrachloroethane	37.9	0.5	ug/L	ND	94.7	60-130			
1,1,2,2-Tetrachloroethane	42.5	0.5	ug/L	ND	106	60-130			
Tetrachloroethylene	36.1	0.5	ug/L	ND	90.4	60-130			
Toluene	36.8	0.5	ug/L	ND	92.0	60-130			
1,1,1-Trichloroethane	38.6	0.5	ug/L	ND	96.6	60-130			
1,1,2-Trichloroethane	35.4	0.5	ug/L	ND	88.5	60-130			
Trichloroethylene	35.4	0.5	ug/L	ND	88.6	60-130			
Trichlorofluoromethane	40.8	1.0	ug/L	ND	102	60-130			
Vinyl chloride	34.8	0.5	ug/L	ND	87.0	50-140			
m,p-Xylenes	73.5	0.5	ug/L	ND	91.8	60-130			
o-Xylene	35.6	0.5	ug/L	ND	89.0	60-130			
Surrogate: 4-Bromofluorobenzene	*91.0*		*ug/L*		*114*	*50-140*			
Surrogate: Dibromofluoromethane	*86.2*		*ug/L*		*108*	*50-140*			
Surrogate: Toluene-d8	*80.5*		*ug/L*		*101*	*50-140*			
Benzene	36.2	0.5	ug/L	ND	90.4	60-130			
Ethylbenzene	36.3	0.5	ug/L	ND	90.8	60-130			
Toluene	36.8	0.5	ug/L	ND	92.0	60-130			
m,p-Xylenes	73.5	0.5	ug/L	ND	91.8	60-130			
o-Xylene	35.6	0.5	ug/L	ND	89.0	60-130			
Surrogate: Toluene-d8	*80.5*		*ug/L*		*101*	*50-140*			

Qualifier Notes:

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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

PARA LABORATORI

Paracel ID: 2036481

t. Laurent Blvd.
tario K1G 4J8
9-1947
paracellabs.com
ellabs.com

Paracel Order Number (Lab Use Only): 2036481

Chain Of Custody (Lab Use Only) No. 128139

Client Name: PATERSON
Project Ref: PE5015
Page 1 of 1

Contact Name: MARK D'ARCY / Nick Sullivan
Quote #:

Address: 154 COLONNADE Rd. S OTTAWA, ONT.
PO #: 30726

E-mail: mdarcy@PATERSONGROUP.ca
nSullivan@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)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Chloride					
1	BH2 - GW	GW	\	5	Sept 2/20		✓		✓					✓					
2	BH4 - GW	GW	\	3			✓	✓											
3	BH6 - GW	GW	\	3			✓												
4	BH7 - GW	GW	\	3			✓												
5	Dup	GW	\	2			✓	✓											
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign):	Received By Driver/Depot: T. Krause	Received at Lab: Sunneparan Odumugi	Verified By:
Relinquished By (Print): Dominic Landry	Date/Time: 03/09/20 2:00	Date/Time: Sept 3, 2020 04:16	Date/Time: 9-3-20 16:35
Date/Time: September 3rd 2020	Temperature: °C FH	Temperature: 10.2 °C	pH Verified: ☐ By: