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Phase II – Environmental Site Assessment

Trail's Edge: Phase 5 (North)
Ottawa, Ontario

Prepared For

Richcraft Group of Companies

October 27, 2020

Report: PE5000-1

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for a portion of land situated within the proposed Trail's Edge: Phase 5 (North) residential subdivision development, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the potentially contaminating activity (PCA) that was identified during the Phase I ESA and was considered to result in an area of potential environmental concern (APEC) on the subject site.

The subsurface investigation for this assessment was conducted on September 28, 2020. The field program consisted of drilling three (3) boreholes on the subject site (BH1-20 - BH3-20), all of which were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 3.96 m to 5.06 m below ground surface and terminated within the bedrock.

A second soil sampling program was carried out on October 5, 2020. The program consisted of the direct sampling of surficial soils (G1-G12) within the subject area. The soil samples were obtained using a hand shovel dug within select areas to an average depth of 0.30 m below ground surface.

Three (3) soil samples recovered from the boreholes, as well as three (3) surficial soil grab samples were submitted for laboratory analysis of: BTEX, PHCs (F_1-F_4), metals, SAR, and EC. According to the analytical results, the levels of EC and SAR were detected in soil samples BH1-20-SS2, BH2-20-SS4, and/or G7 which exceed the MECP Table 3 residential standards.

Three (3) groundwater samples were recovered from the monitoring wells installed in BH1-BH3 and submitted for laboratory analysis of: BTEX, PHCs (F_1-F_4), metals, and chloride. All detected parameter concentrations in the groundwater samples analyzed comply with the selected MECP Table 3 residential standards.

Recommendations

Based on the findings of this Phase II ESA, elevated levels of EC and SAR were detected in the soil within the vicinity of BH1-20, BH2-20, and surficial sample G7. Despite exceeding the MECP Table 3 residential and/or commercial standards, this material is deemed suitable for use as subgrade material for future roadways within the proposed subdivision development where salt will be applied.

If the soil with the elevated EC and SAR levels cannot be reused on-site beneath future roadways, and off-site reuse sites cannot be identified to accept this soil, then it will have to be disposed of at an approved waste disposal facility.

Prior to any off-site soil 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 BH1, BH2, and BH3 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 Richcraft Group of Companies (Richcraft), Paterson Group (Paterson) conducted a Phase II – Environmental Site Assessment (Phase II ESA) for a portion of land situated within the proposed Trail's Edge: Phase 5 (North) residential subdivision development, in the City of Ottawa, Ontario. The purpose of this Phase II ESA has been to address the area of potential environmental concern (APEC) identified on the subject site as a result the findings of the Phase I ESA Update, conducted by Paterson in September 2020.

1.1 Phase II Study Area Information

Address:	Formerly part of 3672 Innes Road, Ottawa, ON.
Legal Description:	Part of Lots 1, 2, 3, and 4, Concession 3 (Ottawa Front), Formerly the Geographic Township of Gloucester, in the City of Ottawa.
Location:	The Phase II study area for this assessment is located approximately 440 m south of Innes Road and approximately 650 m west of Frank Bender Street, in the City of Ottawa. Refer to Figure 1 – Key Plan for the site location.
Latitude and Longitude:	45° 26' 47" N, 75° 30' 59" W

Site Description

Configuration:	Rectangular
Site Area:	2.08 hectares (approximate)
Zoning:	IL2 – Light Industrial Zone;
Current Use:	The subject site is currently vacant and partially used for agricultural purposes.
Services:	The subject site is located within a municipally serviced area.

1.2 Property Ownership

The subject site is currently owned by Richcraft. Paterson was retained to complete this Phase II ESA by Mr. Patrick Gaudreault of Richcraft, whose offices are located at 2280 St. Laurent Boulevard, Suite 201, Ottawa, Ontario. Mr. Gaudreault can be contacted by telephone at 613-739-1111.

1.3 Current and Proposed Future Uses

The subject site is currently vacant and partially used for agricultural purposes.

It is our understanding that the subject site is to be redeveloped for residential purposes as part of a residential subdivision.

1.4 Applicable Site Condition Standard

The site condition standards for the subject site 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:

- Fine-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.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II study area is currently vacant and consists of a combination of vacant grassland, light brush, and agricultural land. A small stormwater management pond is present immediately to the east. The subject site is considered to be at grade with the adjacent roads as well as the surrounding properties.

The site topography is relatively flat, whereas the regional topography slopes very gently down towards the south, in the general direction of Mer Bleue Bog.

Water drainage on the subject site occurs primarily via infiltration throughout the property, as well as via surface run-off towards the stormwater management pond on-site or towards drainage ditches present along the neighbouring roads.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation for this assessment was conducted on September 28, 2020. The field program consisted of drilling three (3) boreholes on the subject site (BH1-20 - BH3-20), all of which were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 3.96 m to 5.06 m below ground surface and terminated within the bedrock.

A second soil sampling program was carried out on October 5, 2020. The program consisted of the direct sampling of surficial soils (G1-G12) within the subject area. The soil samples were obtained using a hand shovel dug within select areas to an average depth of 0.30 m below ground surface.

Refer to Drawing PE5000-3 Test Hole Location Plan for the location of all boreholes and surficial grab samples.

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);
- Metals (including Mercury and Hexavalent Chromium);
- Sodium Adsorption Ratio (SAR);
- Electrical Conductivity (EC);
- Sodium;
- Inorganics (Chloride).

3.3 Phase I ESA Conceptual Site Model

Geological and Hydrogeological Setting

Based on the available mapping information, the bedrock within the vicinity of the subject site consists primarily of interbedded limestone and shale of the Lindsay Formation, whereas the surficial geology consists mainly of offshore marine deposits (clay and silt) with an overburden ranging from approximately 0 m to 5 m (northern portion) or 5 m to 25 m (southern portion) in thickness.

Based on the regional topography, the groundwater is interpreted to be moving in a southerly direction towards Mer Bleue Bog.

Existing Buildings and Structures

No buildings or structures are currently present on the subject site.

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 Mer Bleue Bog, located approximately 2.75 km to the south.

Neighbouring Land Use

The neighbouring lands within the Phase I study area consist of residential and commercial properties or vacant land.

Drinking Water Wells

Based on the available MECP water well records, it is likely that some of the residential properties adjacent to Mer Bleue Road may still utilize private drinking water wells.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

Based on the findings of the Phase I ESA Update, one (1) potentially contaminating activity (PCA), resulting in an area of potential environmental concern (APEC), was identified as pertaining to the subject site:

- A former snow disposal area, located in the northwestern 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);
- Metals (including Mercury and Hexavalent Chromium).
- Sodium Adsorption Ratio (SAR);
- Electrical Conductivity (EC);
- Sodium;
- Inorganics (Chloride).

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 September 28, 2020. The field program consisted of drilling three (3) boreholes on the subject site (BH1-20 - BH3-20), all of which were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 3.96 m to 5.06 m below ground surface and terminated within the bedrock.

Under the full-time supervision of Paterson personnel, the boreholes were drilled using a track-mounted drill rig provided by George Downing Estate Drilling of Hawkesbury, Ontario. The locations of the boreholes are illustrated on Drawing PE5000-3 – Test Hole Location Plan, appended to this report.

A second soil sampling program was carried out on October 5, 2020. The program consisted of the direct sampling of surficial soils (G1-G12) within the subject area. The soil samples were obtained using a hand shovel dug within select areas to an average depth of 0.30 m below ground surface.

4.2 Soil Sampling

Soil sampling protocols were followed using the MECP document entitled, *"Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario"*, dated May 1996. The samples were recovered using a stainless-steel split spoon while wearing protective gloves (changed after each sample), and immediately placed into plastic bags. If significant contamination was encountered, the samples were instead placed into glass jars. Sampling equipment was routinely washed in soapy water and rinsed with methylhydrate after each split spoon to prevent any cross contamination of the samples. The samples were also stored in coolers to reduce analyte volatilization during transportation.

Eleven (11) soil samples were obtained from the boreholes by means of auger and split spoon sampling, with samples taken at approximate 0.76 m intervals. The depths at which auger, split spoon, and rock core samples were obtained from the boreholes are shown as "**AU**", "**SS**", and "**RC**", respectively, on the Soil Profile and Test Data Sheets, appended to this report.

An additional twelve (12) soil samples were obtained via grab sampling of surficial soils. The location at which grab samples were obtained from the subject site are shown as "**G**", on Drawing PE5000-3 Test Hole Location Plan.

Site soils generally consist of brown silty clay with trace organics and gravel, underlain by stiff brown silty clay over top of limestone bedrock.

4.3 Field Screening Measurements

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

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

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

4.4 Groundwater Monitoring Well Installation

Three (3) groundwater monitoring wells were installed on the subject site as part of this assessment. These monitoring wells were constructed using 32 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 the appendix.

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

Table 1
Monitoring Well Construction Details

Well ID	Ground Surface Elevation (m ASL)	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1-20	89.22	3.96	2.46-3.96	2.13-3.96	0.00-2.13	Stick-Up
BH2-20	88.86	5.06	3.56-5.06	3.20-5.06	0.00-3.20	Stick-Up
BH3-20	88.90	4.75	3.25-4.75	2.87-4.75	0.00-2.87	Stick-Up

4.5 Field Measurement of Water Quality Parameters

Groundwater sampling was conducted at BH1-20, BH2-20, and BH3-20 on October 5, 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 Residue Management

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

4.8 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	Metals[1]	SAR	EC	
BH1-20-SS2	0.76 – 1.37 m Brown Silty Clay	X	X	X	X	X	To assess for potential impacts resulting from the presence of a former snow disposal site.
BH2-20-SS4	2.29 – 2.90 m Grey Silty Clay	X	X	X	X	X	
BH3-20-SS4	2.29 – 2.44 m Grey Silty Clay	X	X	X	X	X	
G2	0.00 – 0.30 m Brown Silty Clay	X	X	X	X	X	
G4	0.00 – 0.30 m Brown Silty Clay	X	X	X	X	X	
G7	0.00 – 0.30 m Brown Silty Clay	X	X	X	X	X	

1 – Including Mercury and Hexavalent Chromium

Table 3
Testing Parameters for Submitted Groundwater Samples

Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed					Rationale
		BTEX	PHCs F_1-F_4	Metals[1]	Sodium	Chloride	
BH1-20-GW1	2.46 – 3.96 m Bedrock	X	X	X	X	X	To assess for potential impacts resulting from the presence of a former snow disposal site.
BH2-20-GW1	3.56 – 5.06 m Bedrock	X	X	X	X	X	
BH3-20-GW1	3.25 – 4.75 m Bedrock	X	X	X	X	X	

1 – Including Mercury and Hexavalent Chromium

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.

4.9 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 brown silty clay with trace amounts of organic material and gravel, underlain by stiff brown silty clay over top of limestone bedrock. The bedrock was encountered at depths ranging from approximately 1.68 m to 2.59 m below ground surface.

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 BH1, BH2 and BH3 on October 5, 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
BH1-20	89.22	1.60	87.62	October 5, 2020
BH2-20	88.86	1.57	87.29	October 5, 2020
BH3-20	88.90	1.52	87.38	October 5, 2020

The groundwater at the subject site was typically encountered within the native brown silty clay, at depths ranging from approximately 1.52 m to 1.60 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 October 5, 2020 sampling event, groundwater contour mapping was completed as part of this assessment. According to the mapped contour data, illustrated on Drawing PE5000-3 Test Hole Location Plan in the appendix, the groundwater flow on the subject site is interpreted to be in a southerly direction. A horizontal hydraulic gradient of approximately 0.005 m/m was also calculated as part of this assessment.

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

5.3 Fine/Coarse Soil Texture

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

5.4 Field Screening

Field screening of the soil samples collected during the drilling program resulted in organic vapour readings ranging from 0.4 ppm to 5.7 ppm. The organic vapour readings obtained from the field screening indicate that there is a negligible potential for the presence of volatile substances.

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

Three (3) soil samples, recovered from the boreholes, were submitted for laboratory analysis of either: BTEX, PHCs (F_1-F_4), metals, SAR, and EC. Three (3) other soil samples, recovered via surficial grab sampling, were submitted for laboratory analysis of: BTEX, PHCs (F_1-F_4), metals, SAR, and EC. The results of the analytical testing are presented below in Tables 5 to 10, as well as on the laboratory certificates of analysis included in Appendix 1.

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

Parameter	MDL (µg/g)	Soil Samples (µg/g) September 28, 2020			MECP Table 1 Residential Soil Standards (µg/g)	MECP Table 3 Residential Soil Standards (µg/g)
		BH1-20-SS2	BH2-20-SS4	BH3-20-SS4		
Benzene	0.05	nd	nd	nd	0.02	0.21
Ethylbenzene	0.05	nd	nd	nd	0.05	2
Toluene	0.05	nd	nd	nd	0.2	2.3
Xylenes	0.05	nd	nd	nd	0.05	3.1
PHCs F_1	7	nd	nd	nd	25	55
PHCs F_2	4	nd	nd	nd	10	98
PHCs F_3	8	nd	63	nd	240	300
PHCs F_4	6	nd	66	nd	120	2,800

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 BTEX and PHC parameters in the soil samples analyzed are in compliance with the selected MECP Table 3 standards as well as the MECP Table 1 standards.

Table 6
Analytical Test Results – Soil (Surficial Samples)
BTEX & PHCs (F_1-F_4)

Parameter	MDL (µg/g)	Soil Samples (µg/g) October 5, 2020			MECP Table 1 Residential Soil Standards (µg/g)	MECP Table 3 Residential Soil Standards (µg/g)
		G2	G4	G7		
Benzene	0.05	nd	nd	nd	0.02	0.21
Ethylbenzene	0.05	nd	nd	nd	0.05	2
Toluene	0.05	nd	nd	nd	0.2	2.3
Xylenes	0.05	nd	nd	nd	0.05	3.1
PHCs F_1	7	nd	nd	nd	25	55
PHCs F_2	4	nd	nd	nd	10	98
PHCs F_3	8	62	nd	nd	240	300
PHCs F_4	6	134	nd	nd	120	2,800
PHCs F_{4G}	50	164	nt	nt	120	2,800

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 BTEX and PHC parameters in the soil samples analyzed are in compliance with the selected MECP Table 3 standards.

The concentration of PHCs F_4 and $F_{4G\ (gravimetric)}$ in soil sample G2 is in excess of the MECP Table 1 standards.

Table 7
Analytical Test Results – Soil (Boreholes)
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g) September 28, 2020			MECP Table 1 Residential Soil Standards (µg/g)	MECP Table 3 Residential Soil Standards (µg/g)
		BH1-20-SS2	BH2-20-SS4	BH3-20-SS4		
Antimony	1.0	nd	nd	nd	1.3	7.5
Arsenic	1.0	3.9	3.5	2.8	18	18
Barium	1.0	371	361	204	220	390
Beryllium	0.5	1.0	1.0	0.7	2.5	4
Boron	5.0	5.8	7.4	6.4	36	120
Cadmium	0.5	nd	nd	nd	1.2	1.2
Chromium	5.0	100	70.4	49.8	70	160
Chromium (VI)	0.2	0.4	nd	nd	0.66	8
Cobalt	1.0	21.2	18.1	12.4	21	22
Copper	5.0	44.9	35.9	28.0	92	140
Lead	1.0	7.9	8.2	7.6	120	120
Mercury	0.1	nd	nd	nd	0.27	0.27
Molybdenum	1.0	nd	nd	nd	2	6.9
Nickel	5.0	56.2	40.4	29.2	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	nd	nd	2.5	23
Vanadium	10.0	**94.3**	77.9	58.3	86	86
Zinc	20.0	112	108	72.7	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, with the exception of the concentration of vanadium detected in sample BH1-20-SS4. Based on the native origins of the soil sample, as well as the relative consistency in detected metal parameters between soil samples obtained at similar depths from the other boreholes, this exceedance is considered to be a naturally occurring elevated level, commonly found in Ottawa Valley clays, and does not present a contaminant issue to the subject site.

While in compliance with the MECP Table 3 standards, it should also be noted that several metal parameters in sample BH1-20-SS2 and BH2-20-SS4 are in excess of the MECP Table 1 standards.

Table 8
Analytical Test Results – Soil (Surficial Samples)
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g) October 5, 2020			MECP Table 1 Residential Soil Standards (µg/g)	MECP Table 3 Residential Soil Standards (µg/g)
		G2	G4	G7		
Antimony	1.0	nd	nd	nd	1.3	7.5
Arsenic	1.0	3.0	2.3	2.6	18	18
Barium	1.0	96.6	137	150	220	390
Beryllium	0.5	nd	0.6	0.6	2.5	4
Boron	5.0	5.4	nd	nd	36	120
Cadmium	0.5	nd	nd	nd	1.2	1.2
Chromium	5.0	50.1	60.6	50.9	70	160
Chromium (VI)	0.2	nd	nd	nd	0.66	8
Cobalt	1.0	8.5	9.4	8.8	21	22
Copper	5.0	24.1	19.4	26.8	92	140
Lead	1.0	43.5	9.4	11.0	120	120
Mercury	0.1	nd	nd	nd	0.27	0.27
Molybdenum	1.0	1.1	nd	nd	2	6.9
Nickel	5.0	23.4	28.7	26.5	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	nd	nd	2.5	23
Vanadium	10.0	37.3	51.7	47.1	86	86
Zinc	20.0	92.8	64.6	68.5	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 (Borehole Samples)
SAR & EC

Parameter	MDL	Soil Samples (µg/g)			MECP Table 1 Residential Soil Standards	MECP Table 3 Residential Soil Standards
		September 28, 2020				
		BH1-20-SS2	BH2-20-SS4	BH3-20-SS4		
SAR	0.01	3.24	2.85	3.96	2.40	5.00
EC	5 (µS/cm)	547	**1,690**	**865**	570	700

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 electrical conductivity levels detected in soil samples BH2-20-SS4 and BH3-20-SS4 are both in excess of the MECP Table 3 standards.

It should also be noted that the SAR detected in soil samples BH1-20-SS2, BH2-20-SS4, and BH3-20-SS4 are in excess of the MECP Table 1 standards.

Table 10
Analytical Test Results – Soil (Surficial Samples)
SAR & EC

Parameter	MDL	Soil Samples (µg/g)			MECP Table 1 Residential Soil Standards	MECP Table 3 Residential Soil Standards
		October 5, 2020				
		G2	G4	G7		
SAR	0.01	2.61	3.13	**5.03**	2.40	5.00
EC	5 (µS/cm)	322	376	658	570	700

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 sodium adsorption ratio detected in sample G7 is marginally in excess of the MECP Table 3 standards.

It should be noted that the EC and SAR levels detected in all soil samples analyzed are in compliance with the MECP Table 3 commercial standards, with the exception of BH2-20-SS4.

Table 11
Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
PHCs F_3	63	BH2-20-SS4	2.29 – 2.90 m
PHCs F_4	134	G2	0.00 – 0.30 m
PHCs F_{4G}	164	G2	0.00 – 0.30 m
Arsenic	3.9	BH1-20-SS2	0.76 – 1.37 m
Barium	371	BH1-20-SS2	0.76 – 1.37 m
Beryllium	1.0	BH1-20-SS2 / BH2-20-SS4	0.76 – 1.37 m / 2.29 – 2.90 m
Boron	7.4	BH2-20-SS4	2.29 – 2.90 m
Chromium	100	BH1-20-SS2	0.76 – 1.37 m
Chromium (VI)	0.4	BH1-20-SS2	0.76 – 1.37 m
Cobalt	21.2	BH1-20-SS2	0.76 – 1.37 m
Copper	44.9	BH1-20-SS2	0.76 – 1.37 m
Lead	43.5	G2	0.00 – 0.30 m
Molybdenum	1.1	G2	0.00 – 0.30 m
Nickel	56.2	BH1-20-SS2	0.76 – 1.37 m
Vanadium	**94.3**	BH1-20-SS2	0.76 – 1.37 m
Zinc	112	BH1-20-SS2	0.76 – 1.37 m
SAR	**5.03**	G7	0.00 – 0.30 m
EC	**1,690**	BH2-20-SS4	2.29 – 2.90 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.

Based on the native origins of the soil sample, as well as the relative consistency in detected metal parameters between soil samples obtained at similar depths from the other boreholes, the vanadium exceedance identified in soil sample BH1-20-SS4 is considered to be a naturally occurring elevated level, commonly found in Ottawa Valley clays, and does not present a contaminant issue to the subject site.

5.6 Groundwater Quality

Groundwater samples were recovered from the monitoring wells installed in BH2-20, BH4-20, and BH5-20 and submitted for laboratory analysis of either: BTEX, PHCs (F_1-F_4), metals, and chloride. The results of the analytical testing are presented below in Tables 12 to 14, as well as on the laboratory certificates of analysis included in Appendix 1.

Table 12
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)
		October 5, 2020			
		BH1-20-GW1	BH2-20-GW1	BH3-20-GW1	
Benzene	0.5	nd	nd	nd	44
Ethylbenzene	0.5	nd	nd	nd	2,300
Toluene	0.5	nd	nd	nd	18,000
Xylenes	0.5	nd	nd	nd	4,200
PHC F_1	25	nd	nd	nd	750
PHC F_2	100	nd	nd	nd	150
PHC F_3	100	nd	nd	nd	500
PHC F_4	100	nd	nd	nd	500

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 13
Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)			MECP Table 3 Residential Groundwater Standards (µg/L)
		October 5, 2020			
		BH1-20-GW1	BH2-20-GW1	BH3-20-GW1	
Antimony	0.5	nd	nd	nd	20,000
Arsenic	1.0	nd	nd	nd	1,900
Barium	1.0	352	258	260	29,000
Beryllium	0.5	nd	nd	nd	67
Boron	10	32	nd	nd	45,000
Cadmium	0.1	nd	nd	nd	2.7
Chromium	1.0	nd	nd	nd	810
Chromium (VI)	0.2	nd	nd	nd	140
Cobalt	0.5	nd	nd	nd	66
Copper	0.5	0.6	2.8	2.2	87
Lead	0.1	nd	0.1	nd	25
Mercury	0.05	nd	nd	nd	0.29
Molybdenum	0.5	3.8	nd	nd	9,200
Nickel	1.0	3	3	2	490
Selenium	1.0	nd	nd	nd	63
Silver	0.1	nd	nd	nd	1.5
Sodium	200	146,000	302,000	324,000	2,300,000
Thallium	0.1	nd	nd	nd	510
Uranium	0.1	1.9	1.0	1.0	420
Vanadium	0.5	nd	3.7	3.1	250
Zinc	5.0	nd	nd	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)
		October 5, 2020			
		BH1-20-GW1	BH2-20-GW1	BH3-20-GW1	
Chloride	1,000	410,000	1,010,000	1,050,000	2,300,000

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

All detected chloride concentrations in the groundwater samples analysed 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)
Barium	352	BH1-20-GW1	2.46 m – 3.96 m
Boron	32	BH1-20-GW1	2.46 m – 3.96 m
Copper	2.8	BH2-20-GW1	3.56 m – 5.06 m
Lead	0.1	BH2-20-GW1	3.56 m – 5.06 m
Molybdenum	3.8	BH1-20-GW1	2.46 m – 3.96 m
Nickel	3	BH1-20-GW1 / BH2-20-GW1	2.46 m – 3.96 m / 3.56 m – 5.06 m
Sodium	324,000	BH3-20-GW1	3.25 m – 4.75 m
Uranium	1.9	BH1-20-GW1	2.46 m – 3.96 m
Chlorides	1,050,000	BH3-20-GW1	3.25 m – 4.75 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 BH1-20 and analyzed for BTEX and PHC F_1 parameters. No parameter concentrations were detected in either 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 the Phase I ESA Update report, as well as in Section 2.2 of this report, the following PCA is considered to result in an APEC on the subject site:

- *No Item Number: "Snow Disposal"*

This PCA was identified as a result of the presence of a former snow disposal site, located in the northwestern portion of the subject site.

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);
- Metals (including Mercury and Hexavalent Chromium);
- Sodium Adsorption Ratio (SAR);
- Electrical Conductivity (EC);
- Sodium;
- Inorganics (Chloride).

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. No underground utilities were identified on the subject site.

Physical Setting

Site Stratigraphy

The stratigraphy of the subject site generally consists of:

- Brown silty clay with trace organics and gravel; encountered at ground surface and extending to 0.61 m below ground surface;
- Stiff brown/grey silty clay; extending to depths ranging between approximately 1.68 m to 2.59 m below ground surface;
- Limestone bedrock; encountered at depths ranging between approximately 1.68 m to 2.59 m below ground surface.

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 native silty clay, at depths ranging from approximately 1.52 m to 1.60 m below the existing ground surface. Based on the regional topography, in combination with the measured groundwater levels, the groundwater is interpreted to flow in a southerly direction.

Approximate Depth to Bedrock

Bedrock was encountered in all three (3) boreholes at depths ranging from approximately 1.68 m to 2.59 m below ground surface.

Approximate Depth to Water Table

The depth to the water table is approximately 1.52 m to 1.60 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 beneath the majority of the subject site, and thus is not considered to be a shallow soil property.

Existing Buildings and Structures

No buildings or structures are currently present on the subject site.

Proposed Buildings and Other Structures

It is our understanding that the subject site is to be redeveloped for residential purposes as part of the surrounding residential subdivision.

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 Mer Bleue Bog, located approximately 2.75 km to the south.

Environmental Condition

Areas Where Contaminants are Present

Based on the analytical results, several SAR and EC exceedances were detected above the selected MECP Table 3 residential standards in soil samples BH1-20-SS2, BH2-20-SS4, and/or G7. These exceedances were identified within the soil in the southern portion of the Phase II study area, immediately to the west of the existing on-site stormwater management pond.

Types of Contaminants

Based on the analytical results, the following parameters were identified in the soil at BH1, BH2, and/or the location of surficial grab sample G7 at concentrations exceeding the MECP Table 3 residential standards:

- Sodium Adsorption Ratio (SAR);
- Electrical Conductivity (EC).

Contaminated Media

Based on the findings of this Phase II ESA, the soil in the vicinity of BH1, BH2, and/or surficial grab sample G7 contain levels of EC and SAR in excess of the MECP Table 3 standards.

What Is Known About Areas Where Contaminants Are Present

BH1, BH2, and the location of surficial sample G7 are situated within a vacant agricultural field, formerly utilized as a snow disposal site.

Distribution and Migration of Contaminants

As previously noted, elevated levels of EC and SAR were identified in the soil at BH1, BH2, and/or the location of surficial sample G7. Based on the clean groundwater results, these exceedances are anticipated to be contained within the overburden soils at these locations.

Discharge of Contaminants

The elevated EC and/or SAR levels detected in BH1-20, BH2-20, and/or G7 may have been the result of the former use of the Phase II study area as a snow disposal 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.

Downward leaching is not considered to have affected contaminant distribution at the subject site since the groundwater results comply with the MECP Table 3 residential standards.

Potential for Vapour Intrusion

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

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for a portion of land situated within the proposed Trail's Edge: Phase 5 (North) residential subdivision development, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the potentially contaminating activity (PCA) that was identified during the Phase I ESA and was considered to result in an area of potential environmental concern (APEC) on the subject site.

The subsurface investigation for this assessment was conducted on September 28, 2020. The field program consisted of drilling three (3) boreholes on the subject site (BH1-20 - BH3-20), all of which were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 3.96 m to 5.06 m below ground surface and terminated within the bedrock.

A second soil sampling program was carried out on October 5, 2020. The program consisted of the direct sampling of surficial soils (G1-G12) within the subject area. The soil samples were obtained using a hand shovel dug within select areas to an average depth of 0.30 m below ground surface.

Three (3) soil samples recovered from the boreholes, as well as three (3) surficial soil grab samples were submitted for laboratory analysis of: BTEX, PHCs (F_1-F_4), metals, SAR, and EC. According to the analytical results, the levels of EC and SAR were detected in soil samples BH1-20-SS2, BH2-20-SS4, and/or G7 which exceed the MECP Table 3 residential standards.

Three (3) groundwater samples were recovered from the monitoring wells installed in BH1-BH3 and submitted for laboratory analysis of: BTEX, PHCs (F_1-F_4), metals, and chloride. All detected parameter concentrations in the groundwater samples analyzed comply with the selected MECP Table 3 residential standards.

Recommendations

Based on the findings of this Phase II ESA, elevated levels of EC and SAR were detected in the soil within the vicinity of BH1-20, BH2-20, and surficial sample G7. Despite exceeding the MECP Table 3 residential and/or commercial standards, this material is deemed suitable for use as subgrade material for future roadways within the proposed subdivision development where salt will be applied.

If the soil with the elevated EC and SAR levels cannot be reused on-site beneath future roadways, and off-site reuse sites cannot be identified to accept this soil, then it will have to be disposed of at an approved waste disposal facility.

Prior to any off-site soil 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 BH1, BH2, and BH3 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 Richcraft Group of Companies. Permission and notification from the Richcraft Group of Companies 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$_{ESA}$

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FIGURES

FIGURE 1 - KEY PLAN

DRAWING PE5000-3 – TEST HOLE LOCATION PLAN

DRAWING PE5000-4 – ANALYTICAL TESTING PLAN – SOIL (BTEX, PHCS, METALS)

DRAWING PE5000-4A – CROSS SECTION A-A' – SOIL (BTEX, PHCS, METALS)

DRAWING PE5000-5 – ANALYTICAL TESTING PLAN – SOIL (EC & SAR)

DRAWING PE5000-5A – CROSS SECTION A-A' – SOIL (EC & SAR)

DRAWING PE5000-6 – ANALYTICAL TESTING PLAN – GROUNDWATER

DRAWING PE5000-6A – CROSS SECTION A-A' – GROUNDWATER

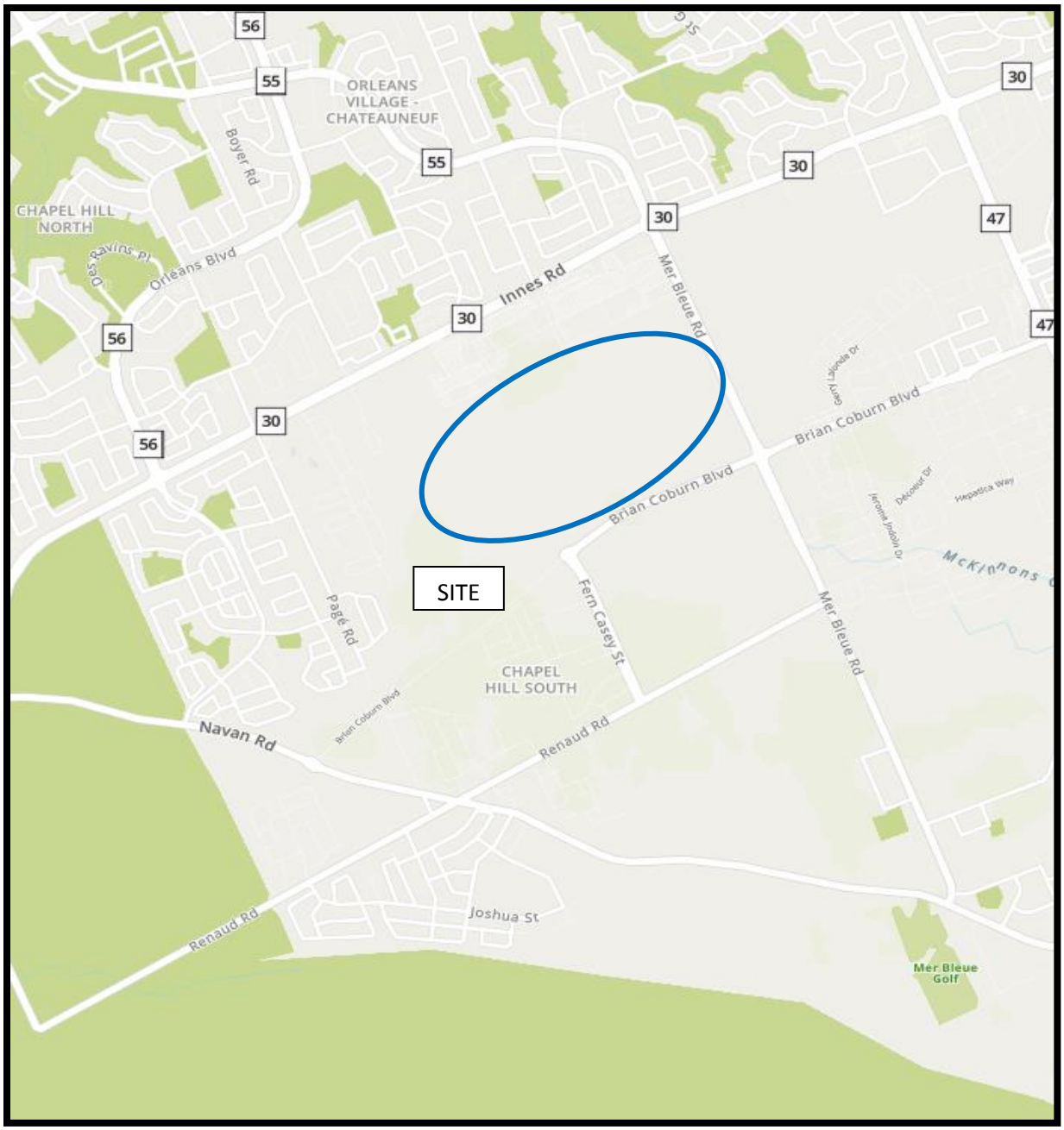
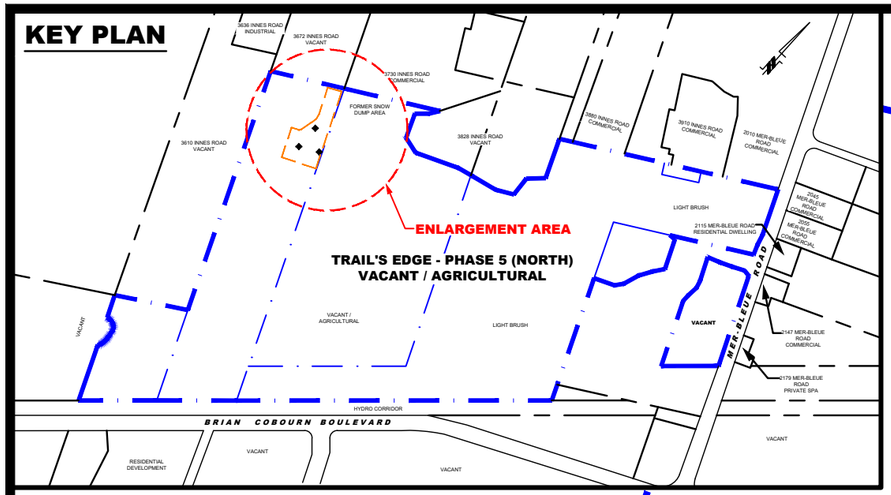


FIGURE 1

KEY PLAN

KEY PLAN



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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TRAILS EDGE - PHASE 5 (NORTH)

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:1250	Date: 11/2020
Drawn by: YA	Report No.: PE5000-1
Checked by: NS	Dwg. No.: PE5000-3
Approved by: MSD	Revision No.:

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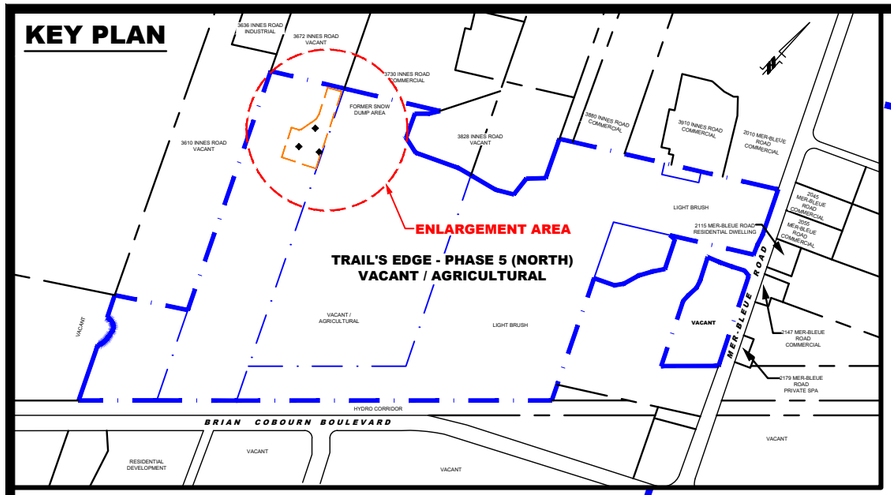
KEY PLAN



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
TRAILS EDGE - PHASE 5 (NORTH)

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (BTEX, PHCs, METALS)

Scale: 1:1250	**Date:** 11/2020
Drawn by: YA	**Report No.:** PE5000-1
Checked by: NS	**Dwg. No.:** PE5000-4
Approved by: MSD	**Revision No.:**

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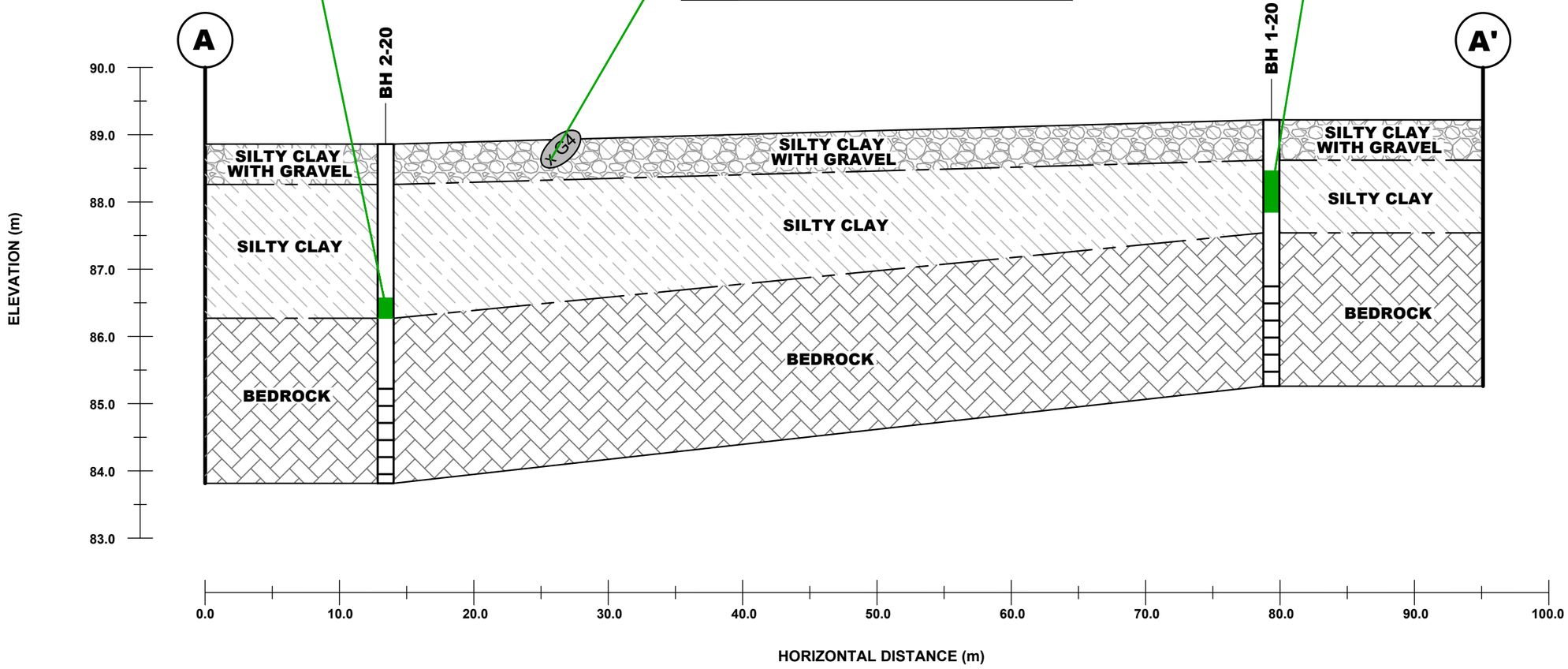
BH2-20-SS4 (2.29-2.90m) September 28, 2020
BTEX, PHCs, and Metals comply with MECP Table 3 Standards

G4 (0.00-0.30m) October 5, 2020
BTEX, PHCs, and Metals comply with MECP Table 3 Standards

BH1-20-SS2 (0.76-1.37m) September 28, 2020
BTEX, PHCs, and Metals comply with MECP Table 3 Standards



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TRAILS EDGE - PHASE 5 (NORTH)

OTTAWA, ONTARIO

Title:
CROSS SECTION A-A' - SOIL (BTEX, PHCs, METALS)

Scale: AS SHOWN	Date: 11/2020
Drawn by: YA	Report No.: PE5000-1
Checked by: NS	Dwg. No.: PE5000-4A
Approved by: MSD	Revision No.:

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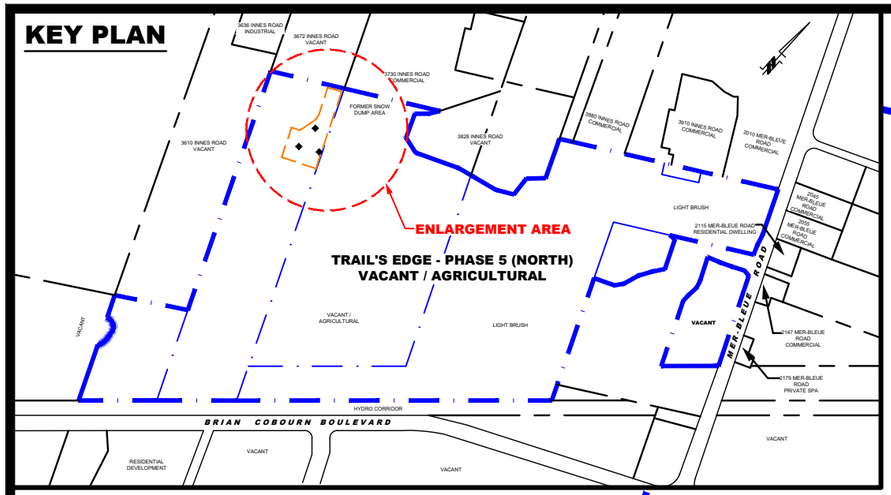
KEY PLAN



3672 INNES ROAD
VACANT

3730 INNES ROAD
COMMERCIAL

3610 INNES ROAD
VACANT

G7	(0.00-0.30m)	October 5, 2020
Parameter	Result (µS/cm)	Standard (µS/cm)
SAR	5.03	5.00

EC complies with MECP Table 3 Standards

FORMER ACCESS ROAD

BH1-20-SS2 (0.76-1.37m) September 28, 2020
EC and SAR comply with MECP Table 3 Standards

G2 (0.00-0.30m) October 5, 2020
EC and SAR comply with MECP Table 3 Standards

BH3-20-SS4	(2.29-2.44m)	September 28, 2020
Parameter	Result (µS/cm)	Standard (µS/cm)
EC	865	700

SAR complies with MECP Table 3 Standards

G4	(0.00-0.30m)	October 5, 2020

EC and SAR comply with MECP Table 3 Standards

BH2-20-SS4	(2.29-2.90m)	September 28, 2020
Parameter	Result (µS/cm)	Standard (µS/cm)
EC	1,690	700

SAR complies with MECP Table 3 Standards

BH 1-20
89.22
[87.54]
(87.62)

BH 2-20
88.86
[86.27]
(87.29)

BH 3-20
88.90
[86.46]
(87.38)

STORM WATER
MANAGEMENT POND

LEGEND:

- PROPERTY BOUNDARY
- PHASE II STUDY AREA BOUNDARY
- BOREHOLE WITH MONITORING WELL LOCATION
- x G6 — SURFICIAL SOIL GRAB SAMPLE
- x G2 — SURFICIAL SOIL GRAB SAMPLE SUBMITTED FOR LABORATORY ANALYSIS
- 88.86 — GROUND SURFACE ELEVATION (m)
- [86.27] — BEDROCK SURFACE ELEVATION (m)
- (87.29) — GROUNDWATER SURFACE ELEVATION (m)
- A — A' — CROSS SECTION

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

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TRAILS EDGE - PHASE 5 (NORTH)

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (EC, SAR)

Scale: 1:1250	Date: 11/2020
Drawn by: YA	Report No.: PE5000-1
Checked by: NS	Dwg. No.: **PE5000-5**
Approved by: MSD	Revision No.:

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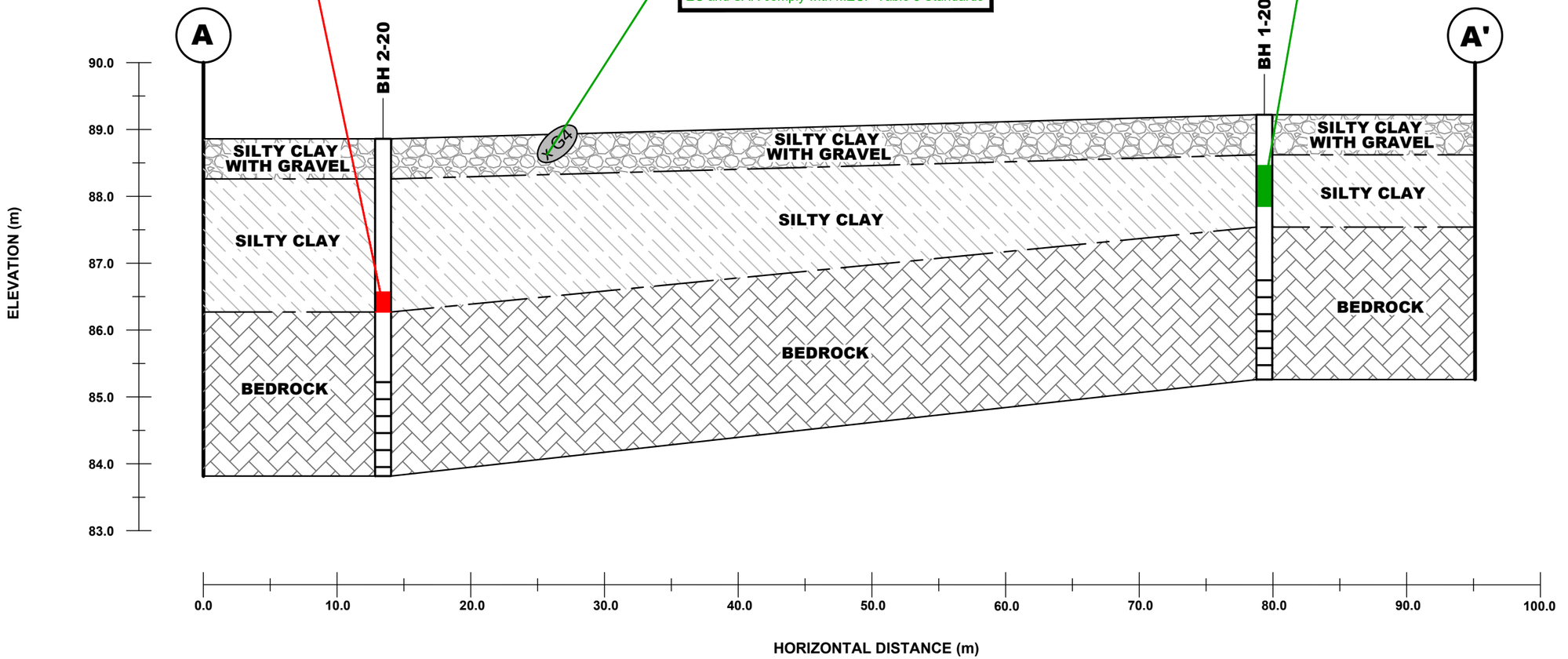
BH2-20-SS4	(2.29-2.90m)	September 28, 2020
Parameter	Result (µS/cm)	Standard (µS/cm)
EC	1,690	700

SAR complies with MECP Table 3 Standards

G4 (0.00-0.30m) October 5, 2020
EC and SAR comply with MECP Table 3 Standards

BH1-20-SS2 (0.76-1.37m) September 28, 2020
EC and SAR comply with MECP Table 3 Standards



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TRAILS EDGE - PHASE 5 (NORTH)

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (EC, SAR)

Scale: AS SHOWN	Date: 11/2020
Drawn by: YA	Report No.: PE5000-1
Checked by: NS	Dwg. No.: PE5000-5A
Approved by: MSD	Revision No.:

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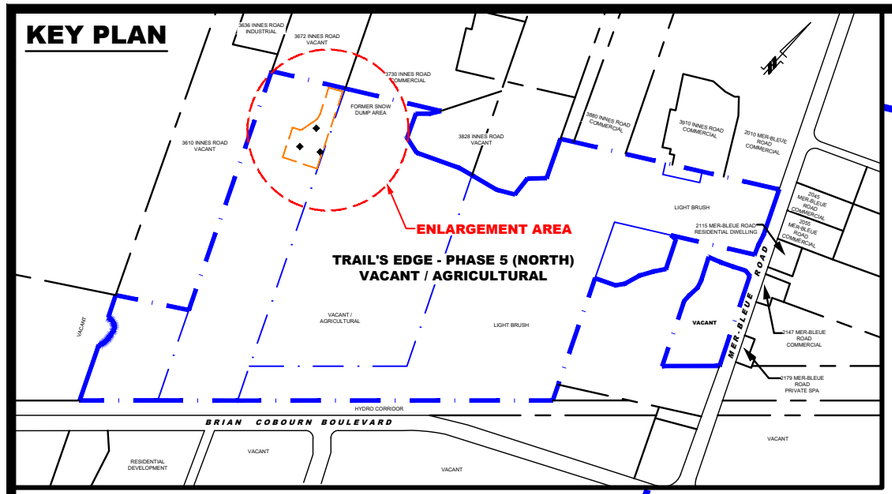

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NO.	REVISIONS	DATE	INITIAL

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TRAILS EDGE - PHASE 5 (NORTH)

OTTAWA, ONTARIO

Title:

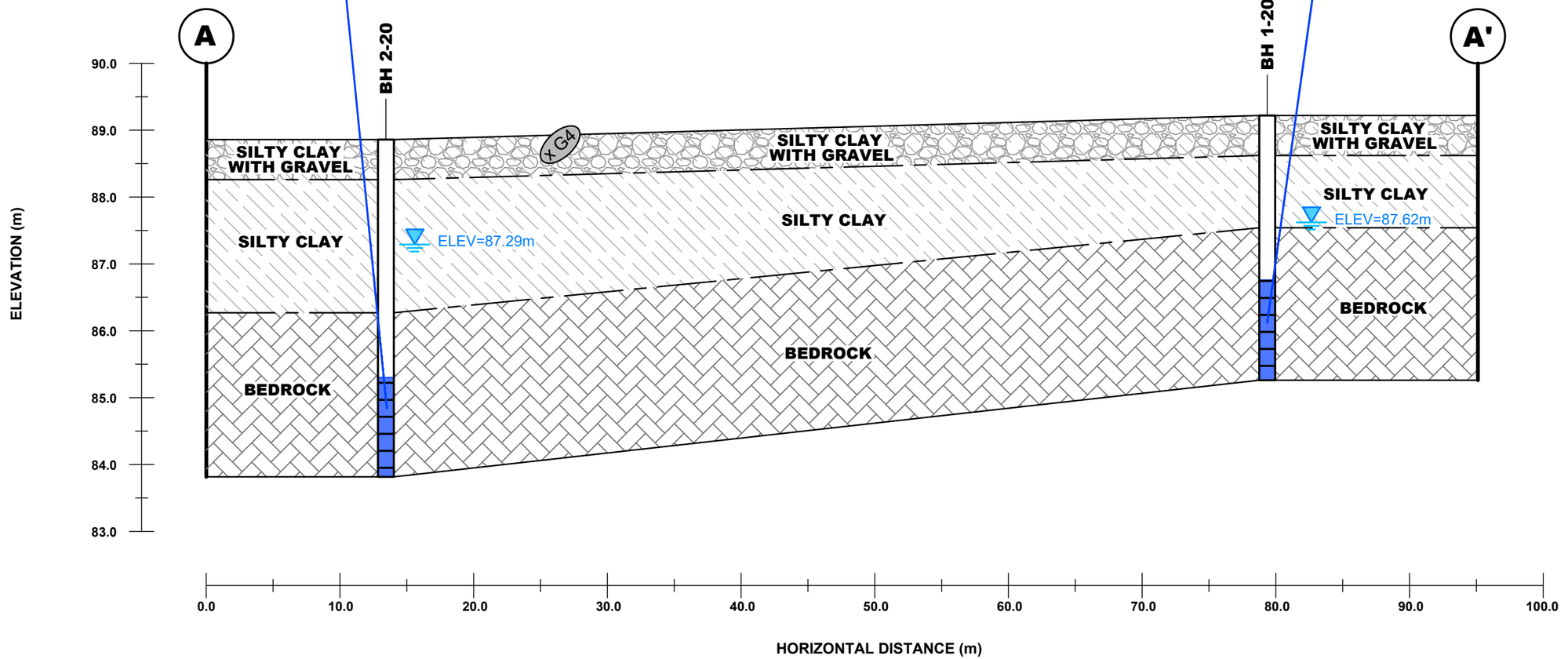
ANALYTICAL TESTING PLAN - GROUNDWATER

Scale: 1:1250	Date: 11/2020
Drawn by: YA	Report No.: PE5000-1
Checked by: NS	Dwg. No.: PE5000-6
Approved by: MSD	Revision No.:

p:\autocad drawings\environmental\pe50xx\pe5000\pe5000-phase II.dwg

BH2-20-GW1 (3.56-5.06m) October 5, 2020
BTEX, PHCs, Metals, Sodium, and Chloride comply with MECP Table 3 Standards

BH1-20-GW1 (2.46-3.96m) October 5, 2020
BTEX, PHCs, Metals, Sodium, and Chloride comply with MECP Table 3 Standards



GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

RICHCRAFT HOMES LTD.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
TRAILS EDGE - PHASE 5 (NORTH)

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - GROUNDWATER

Scale: AS SHOWN	Date: 11/2020
Drawn by: YA	Report No.: PE5000-1
Checked by: NS	Dwg. No.: PE5000-6A
Approved by: MSD	Revision No.:

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

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Sampling & Analysis Plan

Phase II – Environmental Site Assessment
Trail's Edge: Phase 5 (North)
Ottawa, Ontario

Prepared For

Richcraft Group of Companies

September 21, 2020

Report: PE5000-SAP

TABLE OF CONTENTS

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Richcraft Group of Companies to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for a portion of land within the proposed Trail's Edge: Phase 5 (North) residential subdivision development, 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
BH1-20	Central portion of Phase II study area; to assess for potential impacts resulting from the presence of a former on-site snow disposal site.	4-7 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH2-20	Southwestern portion of Phase II study area; to assess for potential impacts resulting from the presence of a former on-site snow disposal site.	4-7 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH3-20	Southeastern portion of Phase II study area; to assess for potential impacts resulting from the presence of a former on-site snow disposal site.	4-7 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
G1-G12[1]	Throughout the Phase II study area; to assess for potential impacts resulting from the presence of a former on-site snow disposal site.	0-0.3 m; for general coverage purposes.
1 – Surficial Grab Samples		

Borehole and grab sample locations are shown on Drawing PE5000-3 – Test Hole Location Plan, appended to the main report.

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

Following the borehole drilling, groundwater monitoring wells will be installed in all boreholes (BH1-20 to BH3-20) 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.

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
Trails Edge, Phase 3 North - Innes Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5000

REMARKS

HOLE NO. BH 1-20

BORINGS BY Track-Mount Power Auger **DATE** September 28, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	89.22
Brown **SILTY CLAY,** some organics, trace gravel		AU	1				
0.60							
Stiff, brown **SILTY CLAY**		SS	2	100	10	1	88.22
1.68		SS	3	67	50+		
BEDROCK: Excellent quality, grey limestone		RC	1	100	94	2	87.22
		RC	2	100	89	3	86.22
3.96							
End of Borehole							
(GWL @ 1.60m - Oct. 5, 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

Phase II - Environmental Site Assessment
Trails Edge, Phase 3 North - Innes Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5000

REMARKS

HOLE NO. BH 2-20

BORINGS BY Track-Mount Power Auger **DATE** September 28, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	88.86
Brown **SILTY CLAY,** some organics, trace gravel		AU	1				
0.60							
Stiff, brown **SILTY CLAY**		SS	2	79	7	1	87.86
		SS	3	100	8	2	86.86
- grey by 2.3m depth							
2.59		SS	4	100	50+		
		RC	1	96	69	3	85.86
BEDROCK: Fair to excellent quality, grey limestone						4	84.86
		RC	2	100	93		
5.05						5	83.86
End of Borehole							
(GWL @ 1.57m - Oct. 5, 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

Phase II - Environmental Site Assessment
Trails Edge, Phase 3 North - Innes Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5000

REMARKS

HOLE NO. BH 3-20

BORINGS BY Track-Mount Power Auger **DATE** September 28, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	88.90
Brown **SILTY CLAY,** some organics, trace gravel		AU	1				
0.60							
Stiff, brown **SILTY CLAY**		SS	2	100	9	1	87.90
		SS	3	100	7		
- grey by 2.0m depth						2	86.90
2.44		SS	4	100	50+		
		RC	1	100	93	3	85.90
BEDROCK: Excellent quality, grey limestone							
		RC	2	100	93	4	84.90
4.75							
End of Borehole							
(GWL @ 1.52m - Oct. 5, 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 = $(D30)^2 / (D10 \times D60)$
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

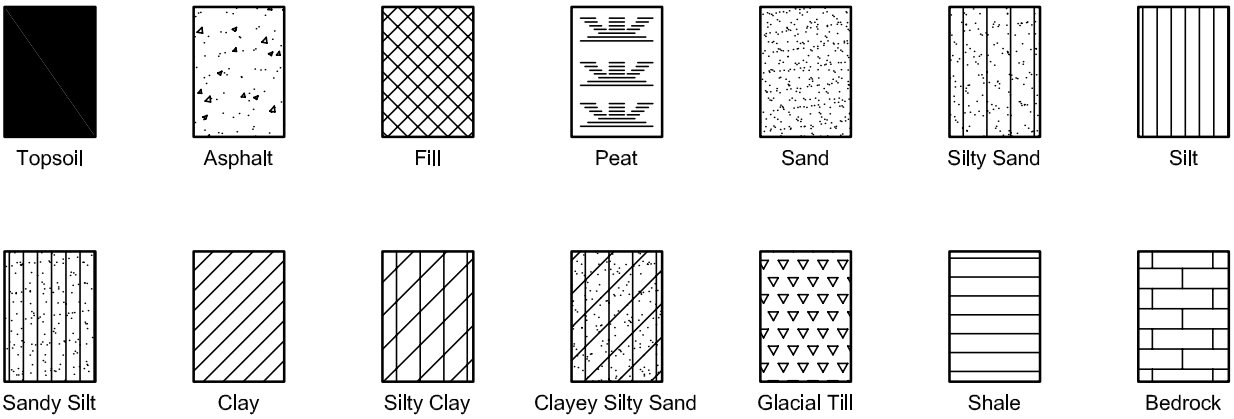
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

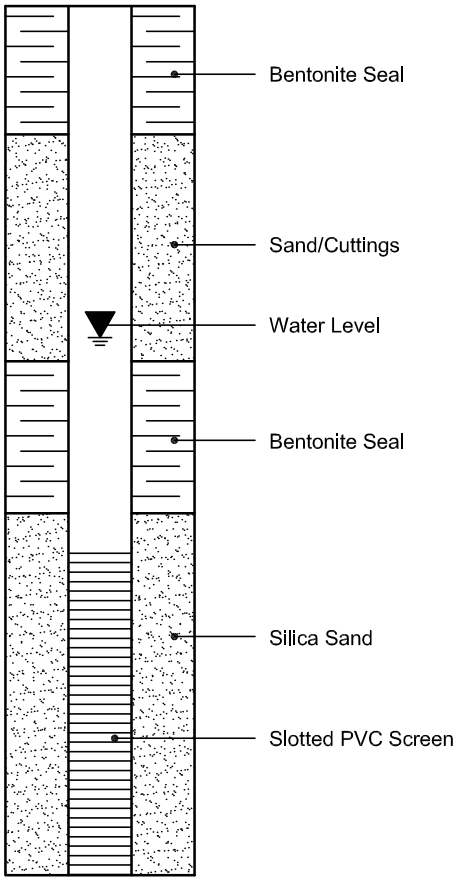
SYMBOLS AND TERMS (continued)

STRATA PLOT

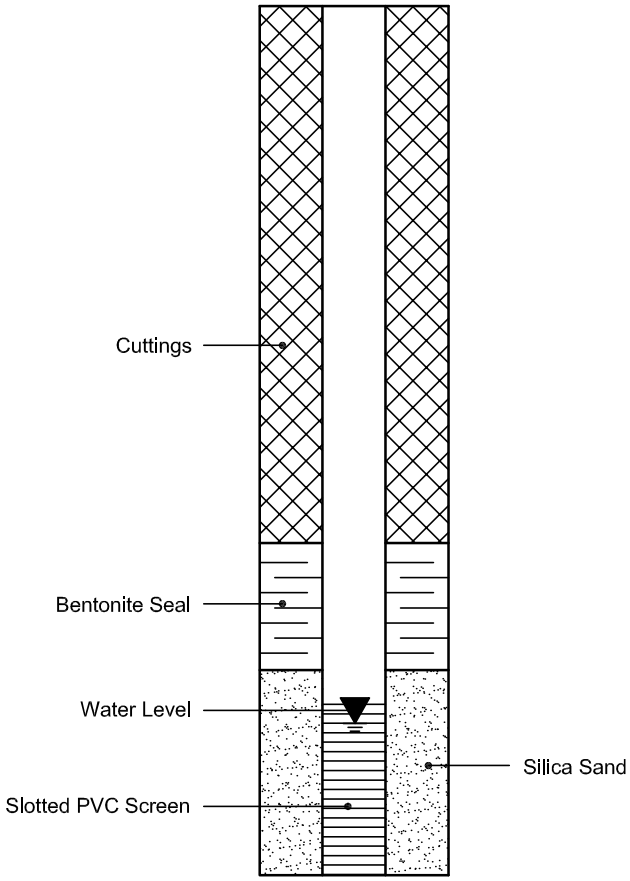


MONITORING WELL AND PIEZOMETER CONSTRUCTION

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: 30899
Project: PE5000
Custody: 128218

Report Date: 5-Oct-2020
Order Date: 29-Sep-2020

Order #: 2040278

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

Paracel ID	Client ID
2040278-01	BH1-20-SS2
2040278-02	BH2-20-SS4
2040278-03	BH3-20-SS4

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 05-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 29-Sep-2020

Client PO: 30899

Project Description: PE5000

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	30-Sep-20	1-Oct-20
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	30-Sep-20	2-Oct-20
Conductivity	MOE E3138 - probe @25 °C, water ext	2-Oct-20	2-Oct-20
Mercury by CVAA	EPA 7471B - CVAA, digestion	5-Oct-20	5-Oct-20
PHC F1	CWS Tier 1 - P&T GC-FID	30-Sep-20	1-Oct-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	29-Sep-20	30-Sep-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	2-Oct-20	2-Oct-20
SAR	Calculated	2-Oct-20	2-Oct-20
Solids, %	Gravimetric, calculation	30-Sep-20	1-Oct-20

Certificate of Analysis

Report Date: 05-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 29-Sep-2020

Client PO: 30899

Project Description: PE5000

	Client ID:	BH1-20-SS2	BH2-20-SS4	BH3-20-SS4	-
	Sample Date:	28-Sep-20 12:00	28-Sep-20 12:00	28-Sep-20 12:00	-
	Sample ID:	2040278-01	2040278-02	2040278-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	73.6	69.4	70.2	-
General Inorganics					
SAR	0.01 N/A	3.24	2.85	3.96	-
Conductivity	5 uS/cm	547	1690	865	-
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Arsenic	1.0 ug/g dry	3.9	3.5	2.8	-
Barium	1.0 ug/g dry	371	361	204	-
Beryllium	0.5 ug/g dry	1.0	1.0	0.7	-
Boron	5.0 ug/g dry	5.8	7.4	6.4	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	-
Chromium	5.0 ug/g dry	100	70.4	49.8	-
Chromium (VI)	0.2 ug/g dry	0.4	<0.2	<0.2	-
Cobalt	1.0 ug/g dry	21.2	18.1	12.4	-
Copper	5.0 ug/g dry	44.9	35.9	28.0	-
Lead	1.0 ug/g dry	7.9	8.2	7.6	-
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	-
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Nickel	5.0 ug/g dry	56.2	40.4	29.2	-
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	-
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Vanadium	10.0 ug/g dry	94.3	77.9	58.3	-
Zinc	20.0 ug/g dry	112	108	72.7	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene-d8	Surrogate	107%	108%	108%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	-

Certificate of Analysis

Report Date: 05-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 29-Sep-2020

Client PO: 30899

Project Description: PE5000

	Client ID:	BH1-20-SS2	BH2-20-SS4	BH3-20-SS4	-
	Sample Date:	28-Sep-20 12:00	28-Sep-20 12:00	28-Sep-20 12:00	-
	Sample ID:	2040278-01	2040278-02	2040278-03	-
	MDL/Units	Soil	Soil	Soil	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	63	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	66	<6	-

Certificate of Analysis

Report Date: 05-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 29-Sep-2020

Client PO: 30899

Project Description: PE5000

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 (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*8.56*		*ug/g*		*107*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.09	0.01	N/A	0.11			20.0	30	
Conductivity	30.5	5	uS/cm	31.5			3.3	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)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Metals									
Antimony	ND	1.0	ug/g dry	ND			NC	30	
Arsenic	4.7	1.0	ug/g dry	3.9			18.0	30	
Barium	410	1.0	ug/g dry	371			9.9	30	
Beryllium	1.0	0.5	ug/g dry	1.0			7.4	30	
Boron	6.0	5.0	ug/g dry	5.8			3.5	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	113	5.0	ug/g dry	100			12.2	30	
Cobalt	24.2	1.0	ug/g dry	21.2			13.2	30	
Copper	50.1	5.0	ug/g dry	44.9			10.9	30	
Lead	8.6	1.0	ug/g dry	7.9			8.3	30	
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	62.8	5.0	ug/g dry	56.2			11.0	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	106	10.0	ug/g dry	94.3			11.9	30	
Zinc	126	20.0	ug/g dry	112			11.8	30	
Physical Characteristics									
% Solids	74.4	0.1	% by Wt.	73.6			1.0	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*9.07*		*ug/g dry*		*107*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	179	7	ug/g	ND	89.6	80-120			
F2 PHCs (C10-C16)	114	4	ug/g	ND	128	60-140			
F3 PHCs (C16-C34)	287	8	ug/g	ND	131	60-140			
F4 PHCs (C34-C50)	181	6	ug/g	ND	131	60-140			
Metals									
Antimony	44.5	1.0	ug/g	ND	88.2	70-130			
Arsenic	53.3	1.0	ug/g	1.6	103	70-130			
Barium	202	1.0	ug/g	148	107	70-130			
Beryllium	47.3	0.5	ug/g	ND	93.8	70-130			
Boron	44.6	5.0	ug/g	ND	84.5	70-130			
Cadmium	47.5	0.5	ug/g	ND	95.0	70-130			
Chromium (VI)	0.1	0.2	ug/g	ND	56.5	70-130			QM-05
Chromium	94.0	5.0	ug/g	40.0	108	70-130			
Cobalt	59.5	1.0	ug/g	8.5	102	70-130			
Copper	67.2	5.0	ug/g	18.0	98.4	70-130			
Lead	50.1	1.0	ug/g	3.2	93.8	70-130			
Mercury	1.92	0.1	ug/g	ND	128	70-130			
Molybdenum	50.3	1.0	ug/g	ND	100	70-130			
Nickel	72.1	5.0	ug/g	22.5	99.2	70-130			
Selenium	48.2	1.0	ug/g	ND	96.2	70-130			
Silver	47.5	0.3	ug/g	ND	94.9	70-130			
Thallium	49.1	1.0	ug/g	ND	97.9	70-130			
Uranium	50.1	1.0	ug/g	ND	99.6	70-130			
Vanadium	91.7	10.0	ug/g	37.7	108	70-130			
Zinc	92.4	20.0	ug/g	44.8	95.3	70-130			
Volatiles									
Benzene	3.62	0.02	ug/g	ND	90.4	60-130			
Ethylbenzene	3.67	0.05	ug/g	ND	91.6	60-130			
Toluene	3.68	0.05	ug/g	ND	92.0	60-130			
m,p-Xylenes	7.29	0.05	ug/g	ND	91.2	60-130			
o-Xylene	3.61	0.05	ug/g	ND	90.2	60-130			
Surrogate: Toluene-d8	*8.28*		*ug/g*		*103*	*50-140*			

Certificate of Analysis

Report Date: 05-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 29-Sep-2020

Client PO: 30899

Project Description: PE5000

Qualifier Notes:

QC Qualifiers :

QM-05 : The spike recovery was outside acceptance limits for the matrix spike due to matrix interference.

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: 2040278

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2040278	Nº 128218

Client Name: Paterson Group
Contact Name: Nick Sullivan
Address: 154 Colonnade Rd. S.
Telephone: 613-226-7381

Project Ref: PE5000
Quote #:
PO #: 30899
E-mail: nsullivan@patersongroup.ca

Page 1 of 1

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

Regulation 153/04
☐ Table 1 ☒ Res/Park ☐ Med/Fine
☐ Table 2 ☐ Ind/Comm ☒ Coarse
☐ Table 3 ☐ Agri/Other
☒ Table 7
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)	Electrical Conductivity	Sodium Adsorption ratio				
1	BH1-20-SS2	S		2	Sept. 28/20	PM	X			X	X	X		X	X				
2	BH2-20-SS4	S		2	↓	↓	X			X	X	X		X	X				
3	BH3-20-SS4	S		2	↓	↓	X			X	X	X		X	X				
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: PARACEL COURIER

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Relinquished By (Print): Nick Sullivan	Date/Time: 29/09/20 4:01	Date/Time: Sep 29 2020 04.40	Date/Time: Sept 29, 2020 17:20
Date/Time: September 29, 2020	Temperature: °C FH	Temperature: 12.4 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 31401
Project: PE5000
Custody: 116612

Report Date: 13-Oct-2020
Order Date: 6-Oct-2020

Order #: 2041234

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

Paracel ID	Client ID
2041234-01	G2
2041234-02	G4
2041234-03	G7

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 13-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 6-Oct-2020

Client PO: 31401

Project Description: PE5000

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	7-Oct-20	8-Oct-20
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	6-Oct-20	8-Oct-20
Conductivity	MOE E3138 - probe @25 °C, water ext	8-Oct-20	8-Oct-20
Mercury by CVAA	EPA 7471B - CVAA, digestion	8-Oct-20	8-Oct-20
PHC F1	CWS Tier 1 - P&T GC-FID	7-Oct-20	8-Oct-20
PHC F4G (gravimetric)	CWS Tier 1 - Extraction Gravimetric	8-Oct-20	13-Oct-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	6-Oct-20	8-Oct-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	8-Oct-20	8-Oct-20
SAR	Calculated	8-Oct-20	9-Oct-20
Solids, %	Gravimetric, calculation	7-Oct-20	7-Oct-20

Certificate of Analysis

Report Date: 13-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 6-Oct-2020

Client PO: 31401

Project Description: PE5000

	Client ID:	G2	G4	G7	-
	Sample Date:	05-Oct-20 09:00	05-Oct-20 09:00	05-Oct-20 09:00	-
	Sample ID:	2041234-01	2041234-02	2041234-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	85.6	82.8	80.8	-
General Inorganics					
SAR	0.01 N/A	2.61	3.13	5.03	-
Conductivity	5 uS/cm	322	376	658	-
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Arsenic	1.0 ug/g dry	3.0	2.3	2.6	-
Barium	1.0 ug/g dry	96.6	137	150	-
Beryllium	0.5 ug/g dry	<0.5	0.6	0.6	-
Boron	5.0 ug/g dry	5.4	<5.0	<5.0	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	-
Chromium	5.0 ug/g dry	50.1	60.6	50.9	-
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	<0.2	-
Cobalt	1.0 ug/g dry	8.5	9.4	8.8	-
Copper	5.0 ug/g dry	24.1	19.4	26.8	-
Lead	1.0 ug/g dry	43.5	9.4	11.0	-
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	-
Molybdenum	1.0 ug/g dry	1.1	<1.0	<1.0	-
Nickel	5.0 ug/g dry	23.4	28.7	26.5	-
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	-
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	-
Vanadium	10.0 ug/g dry	37.3	51.7	47.1	-
Zinc	20.0 ug/g dry	92.8	64.6	68.5	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene-d8	Surrogate	108%	107%	107%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	-

Certificate of Analysis

Report Date: 13-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 6-Oct-2020

Client PO: 31401

Project Description: PE5000

	Client ID:	G2	G4	G7	-
	Sample Date:	05-Oct-20 09:00	05-Oct-20 09:00	05-Oct-20 09:00	-
	Sample ID:	2041234-01	2041234-02	2041234-03	-
	MDL/Units	Soil	Soil	Soil	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	-
F3 PHCs (C16-C34)	8 ug/g dry	62	<8	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	134 [1]	<6	<6	-
F4G PHCs (gravimetric)	50 ug/g dry	164	-	-	-

Certificate of Analysis

Report Date: 13-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 6-Oct-2020

Client PO: 31401

Project Description: PE5000

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						
F4G PHCs (gravimetric)	ND	50	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*8.40*		*ug/g*		*105*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.14	0.01	N/A	0.15			6.9	30	
Conductivity	651	5	uS/cm	658			1.1	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)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
F4G PHCs (gravimetric)	3190	100	ug/g dry	2880			10.4	30	
Metals									
Antimony	ND	1.0	ug/g dry	ND			NC	30	
Arsenic	2.4	1.0	ug/g dry	2.1			12.8	30	
Barium	35.2	1.0	ug/g dry	31.4			11.5	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 (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	24.9	5.0	ug/g dry	21.1			16.9	30	
Cobalt	6.6	1.0	ug/g dry	5.7			14.8	30	
Copper	16.3	5.0	ug/g dry	16.3			0.1	30	
Lead	6.0	1.0	ug/g dry	5.8			4.3	30	
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	1.4	1.0	ug/g dry	1.0			NC	30	
Nickel	9.6	5.0	ug/g dry	9.2			4.5	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	47.1	10.0	ug/g dry	40.8			14.3	30	
Zinc	52.7	20.0	ug/g dry	50.0			5.2	30	
Physical Characteristics									
% Solids	63.8	0.1	% by Wt.	62.3			2.4	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*10.0*		*ug/g dry*		*107*	*50-140*			

Certificate of Analysis

Report Date: 13-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 6-Oct-2020

Client PO: 31401

Project Description: PE5000

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	181	7	ug/g	ND	90.4	80-120			
F2 PHCs (C10-C16)	86	4	ug/g	ND	91.3	60-140			
F3 PHCs (C16-C34)	205	8	ug/g	ND	89.3	60-140			
F4 PHCs (C34-C50)	141	6	ug/g	ND	96.9	60-140			
F4G PHCs (gravimetric)	1010	50	ug/g	ND	101	80-120			
Metals									
Antimony	41.5	1.0	ug/g	ND	82.9	70-130			
Arsenic	46.0	1.0	ug/g	ND	90.4	70-130			
Barium	60.3	1.0	ug/g	12.5	95.6	70-130			
Beryllium	50.9	0.5	ug/g	ND	102	70-130			
Boron	45.2	5.0	ug/g	ND	89.0	70-130			
Cadmium	43.7	0.5	ug/g	ND	87.3	70-130			
Chromium (VI)	0.1	0.2	ug/g	ND	62.5	70-130			QM-05
Chromium	56.4	5.0	ug/g	8.4	96.0	70-130			
Cobalt	48.0	1.0	ug/g	2.3	91.4	70-130			
Copper	49.6	5.0	ug/g	6.5	86.1	70-130			
Lead	46.3	1.0	ug/g	2.3	88.1	70-130			
Mercury	1.51	0.1	ug/g	ND	101	70-130			
Molybdenum	44.9	1.0	ug/g	ND	88.9	70-130			
Nickel	49.9	5.0	ug/g	ND	92.5	70-130			
Selenium	43.0	1.0	ug/g	ND	85.9	70-130			
Silver	41.1	0.3	ug/g	ND	82.1	70-130			
Thallium	46.4	1.0	ug/g	ND	92.7	70-130			
Uranium	46.0	1.0	ug/g	ND	91.6	70-130			
Vanadium	66.8	10.0	ug/g	16.3	101	70-130			
Zinc	62.4	20.0	ug/g	20.0	84.7	70-130			
Volatiles									
Benzene	4.13	0.02	ug/g	ND	103	60-130			
Ethylbenzene	3.89	0.05	ug/g	ND	97.2	60-130			
Toluene	3.99	0.05	ug/g	ND	99.8	60-130			
m,p-Xylenes	7.84	0.05	ug/g	ND	97.9	60-130			
o-Xylene	3.91	0.05	ug/g	ND	97.8	60-130			
Surrogate: Toluene-d8	*8.01*		*ug/g*		*100*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

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

QC Qualifiers :

QM-05 : The spike recovery was outside acceptance limits for the matrix spike due to matrix interference.

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.

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Chain of Custody
(Lab Use Only)
№ 116612

Page 1 of 1

Client Name: Paterson Group	Project Reference: PE5000
Contact Name: Nick Sullivan	Quote #
Address: 154 Colonnade Rd. S.	PO # 31401
Telephone: 613-226-7381	Email Address: nSullivan@patersongroup.ca

Turnaround Time:
☐ 1 Day ☐ 3 Day
☐ 2 Day ☒ Regular
Date Required: _____

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: _____ ☐ Other: _____

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

Required Analyses

	Paracel Order Number: 2041234 / 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)	Electrical Conductivity	Sodium Adsorption Ratio					
1	G2	S		2	Oct. 5. 20	AM	X			X	X	X		X	X					
2	G4	↓		2	↓	↓	X			X	X	X		X	X					
3	G7	↓		2	↓	↓	X			X	X	X		X	X					
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: ~~PARACEL~~ COURIER

Relinquished By (Sign): N. Sullivan	Received by Driver/Depot: M. Tease	Received at Lab:	Verified By:
Relinquished By (Print): Nick Sullivan	Date/Time: 06/10/20 330	Date/Time: Oct 2020 16:05	Date/Time: 10-5-20 16:10
Date/Time: Oct. 6. 20	Temperature: ____ °C FH	Temperature: 12.9 °C	pH Verified [ ] By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 31402
Project: PE5000
Custody: 116613

Report Date: 9-Oct-2020
Order Date: 6-Oct-2020

Order #: 2041237

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

Paracel ID	Client ID
2041237-01	BH1-20-GW1
2041237-02	BH2-20-GW1
2041237-03	BH3-20-GW1
2041237-04	Dup 1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 09-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 6-Oct-2020

Client PO: 31402

Project Description: PE5000

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	8-Oct-20	8-Oct-20
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	7-Oct-20	7-Oct-20
Chromium, hexavalent - water	MOE E3056 - colourimetric	7-Oct-20	7-Oct-20
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	8-Oct-20	8-Oct-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	8-Oct-20	8-Oct-20
PHC F1	CWS Tier 1 - P&T GC-FID	7-Oct-20	7-Oct-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	7-Oct-20	7-Oct-20

Certificate of Analysis

Report Date: 09-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 6-Oct-2020

Client PO: 31402

Project Description: PE5000

	Client ID:	BH1-20-GW1	BH2-20-GW1	BH3-20-GW1	Dup 1
	Sample Date:	05-Oct-20 12:00	05-Oct-20 12:00	05-Oct-20 12:00	05-Oct-20 12:00
	Sample ID:	2041237-01	2041237-02	2041237-03	2041237-04
	MDL/Units	Water	Water	Water	Water
Anions					
Chloride	1 mg/L	410	1010	1050	-
Metals					
Mercury	0.1 ug/L	<0.1	<0.1	<0.1	-
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	-
Arsenic	1 ug/L	<1	<1	<1	-
Barium	1 ug/L	352	258	260	-
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	-
Boron	10 ug/L	32	<10	<10	-
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	-
Chromium	1 ug/L	<1	<1	<1	-
Chromium (VI)	10 ug/L	<10	<10	<10	-
Cobalt	0.5 ug/L	<0.5	<0.5	<0.5	-
Copper	0.5 ug/L	0.6	2.8	2.2	-
Lead	0.1 ug/L	<0.1	0.1	<0.1	-
Molybdenum	0.5 ug/L	3.8	<0.5	<0.5	-
Nickel	1 ug/L	3	3	2	-
Selenium	1 ug/L	<1	<1	<1	-
Silver	0.1 ug/L	<0.1	<0.1	<0.1	-
Sodium	200 ug/L	146000	302000	324000	-
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	-
Uranium	0.1 ug/L	1.9	1.0	1.0	-
Vanadium	0.5 ug/L	<0.5	3.7	3.1	-
Zinc	5 ug/L	<5	<5	<5	-
Volatiles					
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene-d8	Surrogate	109%	111%	111%	111%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	-

Certificate of Analysis

Report Date: 09-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 6-Oct-2020

Client PO: 31402

Project Description: PE5000

	Client ID:	BH1-20-GW1	BH2-20-GW1	BH3-20-GW1	Dup 1
	Sample Date:	05-Oct-20 12:00	05-Oct-20 12:00	05-Oct-20 12:00	05-Oct-20 12:00
	Sample ID:	2041237-01	2041237-02	2041237-03	2041237-04
	MDL/Units	Water	Water	Water	Water
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	-

Certificate of Analysis

Report Date: 09-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 6-Oct-2020

Client PO: 31402

Project Description: PE5000

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
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									
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
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									
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	*90.3*		*ug/L*		*113*	*50-140*			

Certificate of Analysis

Report Date: 09-Oct-2020

Client: Paterson Group Consulting Engineers

Order Date: 6-Oct-2020

Client PO: 31402

Project Description: PE5000

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	437	5	mg/L	451			3.1	10	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Metals									
Mercury	ND	0.1	ug/L	ND			NC	20	
Antimony	ND	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	37.1	1	ug/L	37.0			0.3	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	42	10	ug/L	44			3.7	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium (VI)	ND	10	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	2.99	0.5	ug/L	2.87			4.1	20	
Lead	0.62	0.1	ug/L	0.60			2.9	20	
Molybdenum	0.94	0.5	ug/L	1.00			6.2	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	5480	200	ug/L	5580			1.8	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	0.3	0.1	ug/L	0.3			5.0	20	
Vanadium	ND	0.5	ug/L	ND			NC	20	
Zinc	11	5	ug/L	11			1.4	20	
Volatiles									
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	*88.1*		*ug/L*		*110*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	9.87	1	mg/L	ND	98.7	85-115			
Hydrocarbons									
F1 PHCs (C6-C10)	1760	25	ug/L	ND	88.1	68-117			
F2 PHCs (C10-C16)	2030	100	ug/L	ND	127	60-140			
F3 PHCs (C16-C34)	4690	100	ug/L	ND	120	60-140			
F4 PHCs (C34-C50)	2820	100	ug/L	ND	114	60-140			
Metals									
Mercury	4.75	0.1	ug/L	ND	158	70-130			QM-07
Antimony	44.6	0.5	ug/L	ND	88.3	80-120			
Arsenic	49.0	1	ug/L	ND	97.7	80-120			
Barium	87.5	1	ug/L	37.0	101	80-120			
Beryllium	47.5	0.5	ug/L	ND	94.9	80-120			
Boron	84	10	ug/L	44	80.6	80-120			
Cadmium	49.6	0.1	ug/L	ND	99.2	80-120			
Chromium (VI)	182	10	ug/L	ND	91.0	70-130			
Chromium	50.0	1	ug/L	ND	99.9	80-120			
Cobalt	46.0	0.5	ug/L	ND	91.9	80-120			
Copper	45.4	0.5	ug/L	2.87	85.1	80-120			
Lead	43.8	0.1	ug/L	0.60	86.5	80-120			
Molybdenum	41.4	0.5	ug/L	1.00	80.9	80-120			
Nickel	45.9	1	ug/L	ND	91.2	80-120			
Selenium	47.9	1	ug/L	ND	95.7	80-120			
Silver	48.1	0.1	ug/L	ND	96.3	80-120			
Sodium	13900	200	ug/L	5580	83.2	80-120			
Thallium	45.5	0.1	ug/L	ND	91.0	80-120			
Uranium	42.1	0.1	ug/L	0.3	83.6	80-120			
Vanadium	51.5	0.5	ug/L	ND	103	80-120			
Zinc	53	5	ug/L	11	84.3	80-120			
Volatiles									
Benzene	45.4	0.5	ug/L	ND	113	60-130			
Ethylbenzene	39.1	0.5	ug/L	ND	97.8	60-130			
Toluene	40.6	0.5	ug/L	ND	102	60-130			
m,p-Xylenes	78.0	0.5	ug/L	ND	97.5	60-130			
o-Xylene	39.1	0.5	ug/L	ND	97.7	60-130			
Surrogate: Toluene-d8	*76.4*		*ug/L*		*95.5*	*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.

PARACE LABORATORIES

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Chain of Custody
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Page 1 of 1

Client Name: Paterson Group	Project Reference: PE5000	**Turnaround Time:**
Contact Name: Nick Sullivan	Quote #	☐ 1 Day ☐ 3 Day
Address: 154 Colonnade Rd. S.	PO # 31402	☐ 2 Day ☒ Regular
Telephone: 613-226-7381	Email Address: nsullivan@patersongroup.ca	Date Required:

Criteria: ☒ O. Reg. 153/04 (As Amended) Table 3 ☐ RSC Filing ☐ O. Reg. 558/00 ☐ PWQO ☐ CCME ☐ SUB (Storm) ☐ SUB (Sanitary) Municipality: ☐ Other:

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

Required Analyses

	Paracel Order Number: 2041237 / 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)	Chlorides	BTEX/F1	Sodium				
1	BH1-20-GW1	GW		7	Oct. 5. 20	PM	X			X	X	X		X		X				
2	BH2-20-GW1	↓		7	↓	↓	X			X	X	X		X		X				
3	BH3-20-GW1	↓		7	↓	↓	X			X	X	X		X		X				
4	DUP 1	↓		2	↓	↓									X					
5																				
6																				
7																				
8																				
9																				
10																				

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): N. Sullivan	Received by Driver/Depot: A. Plouffe	Received at Lab: DD	Verified By: DD
Relinquished By (Print): Nick Sullivan	Date/Time: 06/10/20 3:30	Date/Time: 6 Oct 2020 16:05	Date/Time: 6 Oct 2020 16:17
Date/Time: Oct. 6. 20	Temperature: °C FT	Temperature: 17.9°C	pH Verified ☐ By: DD