PATERSON GROUP

Phase II – Environmental Site Assessment

2865 F Walkley Road

Ottawa, Ontario

Prepared for Richcraft Properties Ltd.

Report: PE5930-2
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TABLE OF CONTENTS

PAGE

List of Figures

List of Appendices

EXECUTIVE SUMMARY

Assessment

Paterson Group was retained by Richcraft Properties Ltd. to conduct a Phase II – Environmental Site Assessment (Phase II-ESA) for the property addressed 2865 F Walkley Road, Ottawa, Ontario. The purpose of the Phase II-ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I-ESA and were considered to result in areas of potential environmental concern (APECs) on the subject site (Phase II Property).

The subsurface investigation for this assessment was conducted on January 10 and January 11, 2023 and consisted of drilling nine boreholes (BH1-23 to BH9-23) across the Phase II Property, of which three were equipped with groundwater monitoring wells (BH4-23, BH8-23 and BH9-23). The boreholes were advanced to depths ranging from approximately 3.66 m to 7.32 m below the existing ground surface and terminated within an overburden layer of very stiff to stiff brown silty sand.

In general, the subsurface soil profile encountered at the borehole locations consists of fill material underlain by brown silty clay, turning grey at deeper depths (approximately 3.7 m below ground surface). Bedrock was not confirmed in any of the boreholes at the time of the field drilling program.

Eight soil samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), VOCs, metals, PAHs, mercury, chromium and/or pH parameters. Based on the analytical test results, the surficial soil/fill in the vicinity of BH7-23 contains concentrations of multiple PAH parameters in excess of the selected MECP Table 3 Fine-Grained Commercial Soil Standards. The presence of these contaminants is suspected to have been the result of the past use of the land as a railway line.

Three groundwater samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), VOCs, and/or PAHs parameters. All parameter concentrations were in compliance with the selected MECP Table 3 Fine-Grained Non-Potable Groundwater Standards.

Recommendations

Soil

Based on the findings of this assessment, PAH impacted fill was identified in the north-central portion of the Phase II Property, within the former on-site railway lines. Given the low solubility of PAH parameters, in combination with visual observations made during the field program, the impacts are expected to be confined to the fill layer.

It is our understanding that the Phase II Property will be redeveloped in the future. As such, it is recommended the contaminated soil be full delineated and remediated in conjunction with site redevelopment. This contaminated soil will require disposal at a licensed waste disposal facility. Prior to off-site disposal of impacted soil at a licensed waste disposal facility, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

It is recommended that Paterson personnel be present on-site during remediation activities to direct the excavation and segregation of impacted soil, as well as to conduct confirmatory sampling as required.

Excess soil must be handled in accordance with O.Reg. 406/19: On-Site and Excess Soil Management. With the exception of PAH impacts identified in the soil at BH7-23, the analytical test results comply with the MECP Table 2.1 Commercial Excess Soil Quality Standards (Ontario Regulation 406/19), for off-site disposal. Additional excess soil testing and reporting requirements may be required prior to future site excavation activities, in accordance with O.Reg.406/19, depending upon the volume of excess soil generated by the development.

Monitoring Wells

It is recommended that the monitoring wells be maintained for future sampling purposes. The monitoring wells will be registered with the MECP under Ontario Regulation 903 (Ontario Water Resources Act). At such a time that the monitoring wells are no longer required, they must be decommissioned in accordance with O.Reg. 903.

1.0 INTRODUCTION

At the request of Richcraft Properties Ltd., Paterson Group (Paterson) conducted a Phase II – Environmental Site Assessment (Phase II-ESA) for the property addressed 2865 F Walkley Road, in the City of Ottawa, Ontario (the Phase II Property).

The purpose of this Phase II-ESA has been to address the areas of potential environmental concern (APECs) identified on the Phase II Property as a result of the findings of the Phase I-ESA.

1.1 Site Description

Address:	2865 F Walkley Road and the western parts of 2750, 2760 and 2770 Sheffield Road, in the City of Ottawa, Ontario.
Location:	The Phase I Property is located between Sheffield Road and Lancaster Road, approximately 410m north of Walkley Road, in the City of Ottawa, Ontario. Refer to Figure 1 - Key Plan in the Figures section following the text.
Latitude and Longitude:	45° 23' 52.0008" N, 75° 36' 22.1292" W

Site Description:

Configuration:	Irregular.
Area:	3.41 ha (approximately).
Zoning:	IG & IH – General and Heavy Industrial Zones.
Current Use:	The western part of the Phase I ESA Property is currently vacant land with light vegetation covering the site while the eastern portion of the site is being used as parking lots for commercial/light industrial purposes.
Services:	The Phase I Property is located within a municipally serviced area.

1.2 Property Ownership

The Phase II Property is currently owned by Richcraft Properties Ltd. Paterson was retained to complete this Phase II-ESA by Richcraft Properties Ltd. Richcraft Properties Ltd. can be reached at info@richcraft.com.

1.3 Applicable Site Condition Standard

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

- ❒ Full depth soil conditions;
- ❒ Fine-grained soil conditions;
- ❒ Non-potable groundwater conditions;
- ❒ Commercial land use.

The Fine-grained soil standards were selected.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The majority of the subject site is vacant with light vegetation covering parts of the subject property. The eastern portion of the subject site consists of a small portion of 2770 Sheffield Road while the rest is used as a parking lot for 2760 & 2770 Sheffield Road.

The site and regional topography appear to slope down to the east, in the direction of Green's Creek. Water drainage on the subject site occurs primarily via infiltration throughout the property. No ponded water, stressed vegetation, surficial staining, or any other indications of potential sub-surface contamination were observed on the subject site at time of the site inspection. The Phase II Property is situated within a municipally serviced area.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation for this assessment was conducted on January 10 and January 11, 2023 and consisted of drilling nine boreholes (BH1-23 to BH9-23) across the Phase II Property.

The boreholes were advanced to depths ranging from approximately 3.66 m to 7.32 m below the existing ground surface and terminated within an overburden layer of very stiff to stiff brown silty clay. Three boreholes (BH4-23, BH8-23 and BH9-23) were completed with groundwater monitoring well installations in order to access the groundwater table.

3.2 Media Investigated

During the course of this subsurface investigation, soil and groundwater samples were obtained from the Phase II Property 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/or groundwater on the Phase II Property include the following:

- Benzene, Ethylbenzene, Toluene, and Xylenes (BTEX);
- Volatile Organic Compounds (VOCs);
- Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F_1-F_4);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Metals (including Arsenic (As), Antimony (Sb), Selenium (Se))
- Mercury (Hg)
- Hexavalent Chromium (CrVI)

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the Phase I Property.

3.3 Phase I ESA Conceptual Site Model

Geological and Hydrogeological Setting

The Geological Survey of Canada website on the Urban Geology of the National Capital Area was consulted as part of this assessment. Based on this information, bedrock in the area of the site consists of Paleozoic shale of the Carlsbad

Formation. Based on the maps, the thickness of overburden ranges from 10 to 15 m and consists of erosional terraces of offshore marine sediments.

Groundwater is anticipated to flow in a northeastern direction towards Green's Creek.

Water Bodies and Areas of Natural and Scientific Interest

No water bodies are present on the subject site. The nearest named water body with respect to the subject site is Green's Creek, located approximately 0.55 km to the northeast.

Drinking Water Wells

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

Neighbouring Land Use

The neighbouring lands within the Phase I study area consist of commercial/light industrial properties. Current land use is shown on Drawing PE5930-2 – Surrounding Land Use Plan, in the Figures section of this report.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.1 of the Phase I ESA report, six potentially contaminating activities (PCAs) resulting in areas of potential environmental concern (APECs), were identified on the Phase I Property. These APECs include:

- ❑ Former railway line on the Phase I Property (APEC #1).
- ❑ Fill material of unknown quality on the Phase I Property (APEC #2).
- ❑ A former paint shop, immediately east of the Phase I Property (APEC #3)
- ❑ An existing metal shop, immediately east of the Phase I Property (APEC #4)
- ❑ A former chemical bulk storage, southeast of the Phase I Property (APEC #5).
- ❑ Former storage tanks, immediately west of the subject site (APEC #6).

Other off-site PCAs were identified within the Phase I Study Area but were deemed not to be of any environmental concern to the Phase I Property based on their separation distances as well as their inferred down-gradient or cross-gradient orientation with respect to anticipated groundwater flow to the north.

Contaminants of Potential Concern

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

- ❒ Benzene, Ethylbenzene, Toluene, and Xylenes (BTEX);
- ❒ Volatile Organic Compounds (VOCs);
- ❒ Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F_1-F_4);
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs);
- ❒ Metals (including Arsenic (As), Antimony (Sb), Selenium (Se))
- ❒ Mercury (Hg)
- ❒ Hexavalent Chromium (CrVI)

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the Phase I Property.

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 Phase II Property.

The presence of any PCAs was 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.

3.4 Deviations from the Sampling and Analysis Plan

No deviations from the Sampling and Analysis were made during the course of this Phase II-ESA.

3.5 Physical Impediments

Due to the location of certain aboveground/underground utility services the final placement of select boreholes were marginally adjusted during the field drilling program.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation for this assessment was conducted on January 10 and January 11, 2023 and consisted of drilling nine boreholes (BH1-23 to BH9-23) across the Phase II Property, of which three were equipped with groundwater monitoring wells (BH4-23, BH8-23 and BH9-23).

The boreholes were advanced to depths ranging from approximately 3.66 m to 7.32 m below the existing ground surface and terminated within an overburden layer of very stiff to stiff brown silty sand. Bedrock was not encountered/confirmed in any of the boreholes at the time of the field drilling program. A Dynamic Core Penetration Test was carried out, a practical refusal on possible bedrock was encountered in BH1-23.

Under the full-time supervision of Paterson personnel, the boreholes were drilled using a low-clearance drill rig provided by George Downing Estate Drilling of Hawkesbury, Ontario. The locations of the boreholes are illustrated on "Drawing PE5930-3 – Test Hole Location Plan", appended to this report.

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.

A total of 73 soil samples were obtained from the boreholes by means of auger and split spoon sampling. The depths at which auger and split spoon samples were obtained from the boreholes are shown as "**AU**" and "**SS**", respectively, on the Soil Profile and Test Data Sheets, appended to this report.

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 groundwater monitoring wells were installed on the Phase II Property as part of this assessment. These monitoring wells were constructed using 50 mm diameter Schedule 40 threaded PVC risers and screens. A sand pack consisting of silica sand was placed around the screen with a bentonite seal placed above to minimize cross-contamination.

The ground surface elevations of each borehole were subsequently surveyed with respect to a known geodetic elevation.

A summary of the monitoring well construction details are listed below in Table 1 as well as on the Soil Profile and Test Data Sheets provided in Appendix 1.

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
BH4-23	67.73	5.52	3.96 – 5.52	3.60 – 4.02	0.00 – 3.60	Stickup
BH8-23	66.80	5.46	3.96 – 5.46	3.60 – 5.46	0.00 – 3.60	Stickup
BH9-23	66.74	5.49	3.96 – 5.49	3.60 – 5.49	0.00 – 3.60	Stickup

4.5 Groundwater Sampling

Groundwater sampling protocols were followed using the MECP document entitled, *"Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario"*, dated May 1996.

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.

4.6 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	VOCs	PHCs (F_1-F_4)	PAHs	Metals	Hg	CrVI	pH	
BH2-23-AU1	0.30 m – 0.60 m Fill Material				X	X	X	X	X	To assess for potential impacts resulting from the former presence of on-site railway lines and fill material of unknown quality.
BH3-23-AU1	0.15 m – 0.48 m Fill Material				X					To assess for potential impacts resulting from the former presence of on-site railway lines and fill material of unknown quality
BH4-23-SS5	3.04 m – 3.65 m Silty Clay	X		X					X	To assess for potential impacts resulting from the former presence of off-site fuel oil storage tanks.
BH6-23-AU1	0.30 m – 0.60 m Fill Material					X	X	X		To assess for potential impacts resulting from the presence of former on-site railway lines and the presence of fill material of unknown quality.
BH7-23-AU1	0.48 m – 0.60 m Fill Material				X	X	X	X		To assess for potential impacts resulting from the presence of former on-site railway lines and fill material of unknown quality.
BH8-23-AU1	3.04 m – 3.65 m Fill Material	X	X	X						To assess for potential impacts resulting from the former off-site presence of a paint shop and the existing off-site presence of a metal shop.
BH9-23-AU1	3.04 m – 3.65 m Fill Material	X	X	X						To assess for potential impacts resulting from the former off-site presence of a chemical bulk storage.
DUP-1[1]	3.04 m – 3.65 m Silty Clay	X		X						For laboratory QA/QC purposes.

1 – Duplicate sample of BH4-23-SS5

Table 3
Testing Parameters for Submitted Groundwater Samples

Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed				Rationale
		BTEX	VOCs	PHCs (F_1-F_4)	PAHs	
BH4-23-GW1	3.96 m – 5.52 m Silty Clay	X		X	X	To assess for potential impacts resulting from the presence of former on-site railway lines, the presence of fill material of unknown quality and the former presence of former off-site storage tanks.
BH8-23-GW1	3.96 m –5.46 m Silty Clay	X	X	X		To assess for potential impacts resulting from the former off-site presence of a paint shop and the existing off-site presence of a metal shop.
BH9-23-GW1	3.96 m – 5.49 m Silty Clay	X	X	X		To assess for potential impacts resulting from the former off-site presence of a chemical bulk storage.
DUP-1[1]	3.96 m –5.46 m Silty Clay		X			For laboratory QA/QC purposes.

1 – Duplicate sample of BH8-23-GW1

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.

4.7 Residue Management

All soil cuttings were retained on-site from the site following the field program, while all purge water and equipment cleaning fluids were retained on-site.

4.8 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.

4.9 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

In general, the subsurface soil profile encountered at the borehole locations consists of fill material (peat, topsoil, brown silty sand, trace clay, occasional cobbles and gravel) underlain by brown silty clay, turning grey at deeper depths (approximately 3.7 m below ground surface).

Bedrock was not encountered/confirmed in any of the boreholes at the time of the field drilling program. A Dynamic Core Penetration Test was carried out, a practical refusal on possible bedrock was encountered in BH1-23. 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 BH4-23, BH8-23 and BH9-23 on January 17, 2023. 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
BH4-23	67.73	1.04	67.73	January 17, 2023
BH8-23	66.80	1.20	65.60	
BH9-23	66.74	0.48	66.24	

The groundwater at the Phase II Property was encountered within the overburden at depths ranging from approximately 0.48 m to 1.04 m below the existing ground surface. No unusual visual observations were identified within the recovered groundwater samples. Using the groundwater elevations recorded during the sampling event, groundwater contour mapping was completed as part of this assessment.

According to the mapped contour data, illustrated on Drawing PE5930-3 – Test Hole Location Plan in the appendix, the groundwater flow on the subject site was calculated to be in a northernly direction. A horizontal hydraulic gradient of approximately 0.01 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

The fine-grained soil standards were selected.

5.4 Field Screening

Field screening of the soil samples collected during the drilling program resulted in organic vapour readings ranging from 0 ppm to 2.3 ppm, indicating 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

Eight soil samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), VOCs, metals, PAHs, mercury, chromium and/or pH parameters. The results of the analytical testing are presented below in Tables 5 to 9, as well as on the laboratory Certificates of Analysis included in Appendix 1.

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

Parameter	MDL (µg/g)	Soil Samples (ug/g)			MECP Table 3 Fine-Grained Commercial Soil Standards (µg/g)
		January 10, 2023		January 11, 2023	
		BH4-23-SS5	BH8-23-SS5	BH9-23-SS5	
		Sample Depth (m bgs)			
		3.04 – 3.65	3.04 – 3.65	3.04 – 3.65	
Benzene	0.02	nd	nd	nd	0.4
Ethylbenzene	0.05	nd	nd	nd	19
Toluene	0.05	nd	nd	nd	78
Xylenes	0.05	nd	nd	nd	30
PHCs F_1	7	nd	nd	nd	65
PHCs F_2	4	nd	nd	nd	250
PHCs F_3	8	nd	nd	nd	2500
PHCs F_4	6	nd	nd	nd	6600

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

No BTEX or PHCs parameter concentrations were detected above the laboratory method detection limits in the soil samples analyzed. All concentrations comply with the selected MECP Table 3 Fine-Grained Commercial Soil Standards.

Table 6
Analytical Test Results – Soil
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/g)	Soil Samples (ug/g)		MECP Table 3 Fine-Grained Commercial Soil Standards (µg/g)
		January 11, 2023		
		BH8-23-SS5	BH9-23-SS5	
		Sample Depth (m bgs)		
		3.04 – 3.65	3.04 – 3.65	
Acetone	0.50	nd	nd	28
Benzene	0.02	nd	nd	0.4
Bromodichloromethane	0.05	nd	nd	18
Bromoform	0.05	nd	nd	1.7
Bromomethane	0.05	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	1.5
Chlorobenzene	0.05	nd	nd	2.7
Chloroform	0.05	nd	nd	0.18
Dibromochloromethane	0.05	nd	nd	13
Dichlorodifluoromethane	0.05	nd	nd	25
1,2-Dichlorobenzene	0.05	nd	nd	8.5
1,3-Dichlorobenzene	0.05	nd	nd	12
1,4-Dichlorobenzene	0.05	nd	nd	0.84
1,1-Dichloroethane	0.05	nd	nd	21
1,2-Dichloroethane	0.05	nd	nd	0.05
1,1-Dichloroethylene	0.05	nd	nd	0.48
cis-1,2-Dichloroethylene	0.05	nd	nd	37
trans-1,2-Dichloroethylene	0.05	nd	nd	9.3
1,2-Dichloropropane	0.05	nd	nd	0.68
1,3-Dichloropropene	0.05	nd	nd	0.21
Ethylbenzene	0.05	nd	nd	19 u
Ethylene Dibromide	0.05	nd	nd	0.05
Hexane	0.05	nd	nd	88
Methyl Ethyl Ketone	0.50	nd	nd	88
Methyl Isobutyl Ketone	0.50	nd	nd	210
Methyl tert-butyl ether	0.05	nd	nd	3.2
Methylene Chloride	0.05	nd	nd	2
Styrene	0.05	nd	nd	43
1,1,1,2-Tetrachloroethane	0.05	nd	nd	0.11
1,1,2,2-Tetrachloroethane	0.05	nd	nd	0.094
Tetrachloroethylene	0.05	nd	nd	21
Toluene	0.05	nd	nd	78
1,1,1-Trichloroethane	0.05	nd	nd	12
1,1,2-Trichloroethane	0.05	nd	nd	0.11
Trichloroethylene	0.05	nd	nd	0.61
Trichlorofluoromethane	0.05	nd	nd	5.8
Vinyl Chloride	0.02	nd	nd	0.25
Xylenes	0.05	nd	nd	30

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

No VOC parameters were detected above the laboratory method detection limits in any of the soil samples analyzed. The results are in compliance with the selected MECP Table 3 Fine-Grained Residential Soil Standards.

Table 7
Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (ug/g)			MECP Table 3 Fine-Grained Commercial Soil Standards (µg/g)
		January 10, 2023	January 11, 2023		
		BH2-23-AU1	BH6-23-AU1	BH7-23-AU1	
		Sample Depth (m bgs)			
		0.30 – 0.60	0.30 – 0.60	0.48 – 0.60	
Antimony	1.0	nd	nd	nd	50
Arsenic	1.0	4.9	5.0	5.4	18
Barium	1.0	135	80.0	81.3	670
Beryllium	0.5	0.6	0.5	nd	10
Boron	5.0	6.2	7.1	6.2	120
Cadmium	0.5	nd	nd	nd	1.9
Chromium	5.0	36.7	22.9	26.4	160
Chromium VI	0.2	nd	nd	nd	10
Cobalt	1.0	10.4	10.8	6.0	100
Copper	5.0	21.2	22.6	22.1	300
Lead	1.0	14.3	32.7	20.3	120
Mercury	0.1	nd	nd	nd	20
Molybdenum	1.0	nd	1.6	nd	40
Nickel	5.0	20.9	22.9	16.3	340
Selenium	1.0	nd	nd	nd	5.5
Silver	0.3	nd	nd	nd	50
Thallium	1.0	nd	nd	nd	3.3
Uranium	1.0	nd	nd	nd	33
Vanadium	10.0	43.9	30.1	28.6	86
Zinc	20.0	85.0	55.4	56.2	340

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

All metal parameter concentrations identified in the soil samples analysed comply with the MECP Table 3 standards.

Table 8
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (ug/g)			MECP Table 3 Fine-Grained Commercial Soil Standards (µg/g)
		January 10, 2023		January 11, 2023	
		BH2-23-AU1	BH3-23-AU1	BH7-23-AU1	
		Sample Depth (m bgs)			
		0.30 – 0.60	0.15 – 0.48	0.48 – 0.60	
Acenaphthene	0.02	nd	nd	0.03	96
Acenaphthylene	0.02	0.08	0.03	**0.27**	0.17
Anthracene	0.02	0.05	0.03	0.26	0.74
Benzo[a]anthracene	0.02	0.16	0.09	0.70	0.96
Benzo[a]pyrene	0.02	0.16	0.09	**0.64**	0.3
Benzo[b]fluoranthene	0.02	0.28	0.15	**1.21**	0.96
Benzo[g,h,i]perylene	0.02	0.10	0.07	0.44	9.6
Benzo[k]fluoranthene	0.02	0.13	0.08	0.58	0.96
Chrysene	0.02	0.17	0.10	0.89	9.6
Dibenzo[a,h]anthracene	0.02	0.03	nd	**0.12**	0.1
Fluoranthene	0.02	0.22	0.13	1.61	9.6
Fluorene	0.02	nd	nd	0.03	69
Indeno [1,2,3-cd] pyrene	0.02	0.11	0.06	0.42	0.95
1-Methylnaphthalene	0.02	0.08	0.05	0.37	85
2-Methylnaphthalene	0.02	0.10	0.06	0.46	85
Methylnaphthalene (1&2)	0.04	0.19	0.10	0.83	85
Naphthalene	0.01	0.07	0.04	0.34	28
Phenanthrene	0.02	0.11	0.04	0.71	16
Pyrene	0.02	0.20	0.14	1.35	96

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

The concentrations of Acenaphthylene, Benzo[a]pyrene, Benzo[b]fluoranthene and Dibenzo[a,h]anthracene in Soil Sample BH7-23-AU1 exceed the selected MECP Table 3 Fine-Grained Commercial Soil Standards. All other concentrations comply with the selected MECP Table 3 Fine-Grained Commercial Soil Standards.

Table 9
Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
Arsenic	5.4	BH7-23-AU1	0.48 – 0.60
Barium	135	BH2-23-AU1	0.30 – 0.60
Beryllium	0.6	BH2-23-AU1	0.30 – 0.60
Boron	7.1	BH6-23-AU1	0.30 – 0.60
Chromium	36.7	BH2-23-AU1	0.30 – 0.60
Cobalt	10.8	BH2-23-AU1	0.30 – 0.60
Copper	22.6	BH6-23-AU1	0.30 – 0.60
Lead	32.7	BH6-23-AU1	0.30 – 0.60
Molybdenum	1.6	BH6-23-AU1	0.30 – 0.60
Nickel	22.9	BH6-23-AU1	0.30 – 0.60
Vanadium	43.9	BH2-23-AU1	0.30 – 0.60
Zinc	85.0	BH2-23-AU1	0.30 – 0.60
Acenaphthene	0.03	BH7-23-AU1	0.48 – 0.60
Acenaphthylene	**0.27**	BH7-23-AU1	0.48 – 0.60
Anthracene	0.26	BH7-23-AU1	0.48 – 0.60
Benzo[a]anthracene	0.70	BH7-23-AU1	0.48 – 0.60
Benzo[a]pyrene	**0.64**	BH7-23-AU1	0.48 – 0.60
Benzo[b]fluoranthene	**1.21**	BH7-23-AU1	0.48 – 0.60
Benzo[g,h,i]perylene	0.44	BH7-23-AU1	0.48 – 0.60
Benzo[k]fluoranthene	0.58	BH7-23-AU1	0.48 – 0.60
Chrysene	0.89	BH7-23-AU1	0.48 – 0.60
Dibenzo[a,h]anthracene	**0.12**	BH7-23-AU1	0.48 – 0.60
Fluoranthene	1.61	BH7-23-AU1	0.48 – 0.60
Fluorene	0.03	BH7-23-AU1	0.48 – 0.60
Indeno [1,2,3-cd] pyrene	0.42	BH7-23-AU1	0.48 – 0.60
1-Methylnaphthalene	0.37	BH7-23-AU1	0.48 – 0.60
2-Methylnaphthalene	0.46	BH7-23-AU1	0.48 – 0.60
Methylnaphthalene (1&2)	0.83	BH7-23-AU1	0.48 – 0.60
Naphthalene	0.34	BH7-23-AU1	0.48 – 0.60
Phenanthrene	0.71	BH7-23-AU1	0.48 – 0.60
Pyrene	1.35	BH7-23-AU1	0.48 – 0.60

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

All other parameter concentrations analyzed were below the laboratory detection limits.

5.6 Groundwater Quality

Three groundwater samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), VOCs, and/or PAHs parameters. The results of the analytical testing are presented below in Tables 10 to 13, as well as on the laboratory Certificates of Analysis included in Appendix 1.

Table 10
Analytical Test Results – Groundwater
BTEX and PHCs (F_1-F_4)

Parameter	MDL (µg/L)	Groundwater Samples (ug/L)			MECP Table 3 Fine-Grained Non-Potable Groundwater Standards (µg/L)
		January 17, 2023			
		BH4-23-GW1	BH8-23-GW1	BH9-23-GW1	
		Screening Interval (m bgs)			
		3.96 – 5.52	3.96 – 5.46	3.96 – 5.49	
Benzene	0.5	nd	nd	nd	430
Ethylbenzene	0.5	nd	nd	nd	2,300
Toluene	0.5	nd	nd	nd	18,000
Xylenes	0.5	nd	nd	nd	4,200
PHCs F_1	25	nd	nd	nd	750
PHCs F_2	100	nd	nd	nd	150
PHCs F_3	100	nd	nd	nd	500
PHCs 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 parameter concentrations were detected above the laboratory method detection limits in the groundwater samples analyzed. The results are in compliance with the selected MECP Table 3 Fine-Grained Non-Potable Groundwater Standards.

Table 11
Analytical Test Results – Groundwater
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (ug/L)		MECP Table 3 Fine-Grained Non-Potable Groundwater Standards (µg/L)
		January 17, 2023		
		BH8-23-GW1	BH9-23-GW1	
		Screening Interval (m bgs)		
		3.96 – 5.46	3.96 – 5.49	
Acetone	5.0	nd	nd	130,000
Benzene	0.5	nd	nd	430
Bromodichloromethane	0.5	nd	nd	85,000
Bromoform	0.5	nd	nd	770
Bromomethane	0.5	nd	nd	56
Carbon Tetrachloride	0.2	nd	nd	8.4
Chlorobenzene	0.5	nd	nd	630
Chloroform	0.5	nd	nd	22
Dibromochloromethane	0.5	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	4,400
1,2-Dichlorobenzene	0.5	nd	nd	9,600
1,3-Dichlorobenzene	0.5	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	67
1,1-Dichloroethane	0.5	nd	nd	3,100
1,2-Dichloroethane	0.5	nd	nd	12
1,1-Dichloroethylene	0.5	nd	nd	17
cis-1,2-Dichloroethylene	0.5	nd	nd	17
trans-1,2-Dichloroethylene	0.5	nd	nd	17
1,2-Dichloropropane	0.5	nd	nd	140
1,3-Dichloropropene	0.5	nd	nd	45
Ethylbenzene	0.5	nd	nd	2,300
Ethylene Dibromide	0.2	nd	nd	0.83
Hexane	1.0	nd	nd	520
Methyl Ethyl Ketone	5.0	nd	nd	1,500,000
Methyl Isobutyl Ketone	5.0	nd	nd	580,000
Methyl tert-butyl ether	2.0	nd	nd	1,400
Methylene Chloride	5.0	nd	nd	5500
Styrene	0.5	nd	nd	9100
1,1,1,2-Tetrachloroethane	0.5	nd	nd	28
1,1,2,2-Tetrachloroethane	0.5	nd	nd	15
Tetrachloroethylene	0.5	nd	nd	17
Toluene	0.5	nd	nd	18000
1,1,1-Trichloroethane	0.5	nd	nd	6700
1,1,2-Trichloroethane	0.5	nd	nd	30
Trichloroethylene	0.5	nd	nd	17
Trichlorofluoromethane	1.0	nd	nd	2500
Vinyl Chloride	0.5	nd	nd	1.7
Xylenes	0.5	nd	nd	4,200

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

No VOC parameter concentrations were detected above the laboratory method detection limits in the groundwater samples analyzed. The results are in compliance with the selected MECP Table 3 Fine-Grained Non-Potable Groundwater Standards.

Table 12
Analytical Test Results – Groundwater
PAHs

Parameter	MDL (µg/L)	Groundwater Samples (ug/L)	MECP Table 3 Fine-Grained Non-Potable Groundwater Standards (µg/L)
		January 17, 20231	
		BH4-23-GW1	
		Sample Depth (m bgs)	
		4.02 – 5.52	
Acenaphthene	0.05	nd	1700
Acenaphthylene	0.05	nd	1.8
Anthracene	0.01	nd	2.4
Benzo[a]anthracene	0.01	nd	4.7
Benzo[a]pyrene	0.01	nd	0.81
Benzo[b]fluoranthene	0.05	nd	0.75
Benzo[g,h,i]perylene	0.05	nd	0.2
Benzo[k]fluoranthene	0.05	nd	0.4
Chrysene	0.05	nd	1
Dibenzo[a,h]anthracene	0.05	nd	0.52
Fluoranthene	0.01	0.04	130
Fluorene	0.05	nd	400
Indeno [1,2,3-cd] pyrene	0.05	nd	0.2
1-Methylnaphthalene	0.05	nd	1800
2-Methylnaphthalene	0.05	nd	1800
Methylnaphthalene (1&2)	0.10	nd	1800
Naphthalene	0.05	nd	6400
Phenanthrene	0.05	0.07	580
Pyrene	0.01	0.02	68

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

All PAH parameter concentrations are in compliance with the selected MECP Table 3 Fine-Grained Non-Potable Groundwater Standards.

Table 13
Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Sample ID	Depth Interval (m BGS)
Fluoranthene	0.04	BH4-23-GW1	4.02 – 5.52
Phenanthrene	0.07	BH4-23-GW1	4.02 – 5.52
Pyrene	0.02	BH4-23-GW1	4.02 – 5.52

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 soil sample was obtained from sample BH4-23-SS5 and submitted for laboratory analysis of BTEX and PHCs (F_1-F_4). The relative percent difference (RPD) calculations for the original and duplicate samples are provided below in Table 14.

Table 14
QA/QC Calculations – Soil

Parameter	MDL (µg/g)	BH4-23-SS5	DUP-1	RPD (%)	QA/QC Result (Target: <20% RPD)
Benzene	0.50	nd	nd	0	Meets Target
Ethylbenzene	0.02	nd	nd	0	Meets Target
Toluene	0.05	nd	nd	0	Meets Target
Xylenes	0.05	nd	nd	0	Meets Target
PHCs F_1	0.05	nd	nd	0	Meets Target
PHCs F_2	0.05	nd	nd	0	Meets Target
PHCs F_3	0.05	nd	nd	0	Meets Target
PHCs F_4	0.05	nd	nd	0	Meets Target

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

All non-detected concentrations are considered to meet the data quality objectives outlined in the Sampling and Analysis Plan, appended to this report.

A duplicate groundwater sample was obtained from sample BH8-23-GW1 and submitted for laboratory analysis of VOCs parameter. The relative percent difference (RPD) calculations for the original and duplicate samples are provided below in Table 15.

Table 15
QA/QC Calculations – Groundwater

Parameter	MDL (µg/L)	BH8-23-GW1	DUP-2	RPD (%)	QA/QC Result (Target: <20% RPD)
Acetone	5.0	nd	nd	0	Meets Target
Benzene	0.5	nd	nd	0	Meets Target
Bromodichloromethane	0.5	nd	nd	0	Meets Target
Bromoform	0.5	nd	nd	0	Meets Target
Bromomethane	0.5	nd	nd	0	Meets Target
Carbon Tetrachloride	0.2	nd	nd	0	Meets Target
Chlorobenzene	0.5	nd	nd	0	Meets Target
Chloroform	0.5	nd	nd	0	Meets Target
Dibromochloromethane	0.5	nd	nd	0	Meets Target
Dichlorodifluoromethane	1.0	nd	nd	0	Meets Target
1,2-Dichlorobenzene	0.5	nd	nd	0	Meets Target
1,3-Dichlorobenzene	0.5	nd	nd	0	Meets Target
1,4-Dichlorobenzene	0.5	nd	nd	0	Meets Target
1,1-Dichloroethane	0.5	nd	nd	0	Meets Target
1,2-Dichloroethane	0.5	nd	nd	0	Meets Target
1,1-Dichloroethylene	0.5	nd	nd	0	Meets Target
cis-1,2-Dichloroethylene	0.5	nd	nd	0	Meets Target
trans-1,2-Dichloroethylene	0.5	nd	nd	0	Meets Target
1,2-Dichloropropane	0.5	nd	nd	0	Meets Target
1,3-Dichloropropene	0.5	nd	nd	0	Meets Target
Ethylbenzene	0.5	nd	nd	0	Meets Target
Ethylene Dibromide	0.2	nd	nd	0	Meets Target
Hexane	1.0	nd	nd	0	Meets Target
Methyl Ethyl Ketone	5.0	nd	nd	0	Meets Target
Methyl Isobutyl Ketone	5.0	nd	nd	0	Meets Target
Methyl tert-butyl ether	2.0	nd	nd	0	Meets Target
Methylene Chloride	5.0	nd	nd	0	Meets Target
Styrene	0.5	nd	nd	0	Meets Target
1,1,1,2-Tetrachloroethane	0.5	nd	nd	0	Meets Target
1,1,2,2-Tetrachloroethane	0.5	nd	nd	0	Meets Target
Tetrachloroethylene	0.5	nd	nd	0	Meets Target
Toluene	0.5	nd	nd	0	Meets Target
1,1,1-Trichloroethane	0.5	nd	nd	0	Meets Target
1,1,2-Trichloroethane	0.5	nd	nd	0	Meets Target
Trichloroethylene	0.5	nd	nd	0	Meets Target
Trichlorofluoromethane	1.0	nd	nd	0	Meets Target
Vinyl Chloride	0.5	nd	nd	0	Meets Target
Xylenes	0.5	nd	nd	0	Meets Target

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

All non-detected concentrations are considered to meet the data quality objectives outlined in the Sampling and Analysis Plan, appended to this report.

Based on the results of the QA/QC analysis, the quality of the field data collected during this Phase II ESA is considered to be sufficient to meet the overall objectives of this assessment.

5.8 Phase II Conceptual Site Model

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

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

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

Table 16
Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of APEC on Phase I Property	Potentially Contaminating Activity (Table 2 – O. Reg. 153/04)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC #1 Former railway lines	Western portion of the Phase I Property	*"Item 46: Rail Yards, Tracks and Spurs"*	On-Site	Metals PAHs	Soil
APEC #2 Fill Material of Unknown Quality	Western portion of Phase I Property	*"Item 30: Importation of Fill Material of Unknown Quality"*	On-Site	PAHs Metals	Soil
APEC #3 Former paint shop	Northeastern half of Phase I Property	*"Item 39: Paints Manufacturing, Processing and Bulk Storage"*	Off-site	BTEX PHCs (F_1-F_4) VOCs	Soil and Groundwater
APEC #4 Existing metal shop	Eastern Half of Phase I Property	*"Item 34: Metal Fabrication"*	Off-Site	VOCs PHCs (F_1-F_4)	Soil and Groundwater

Table 16 (Continued)
Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of APEC on Phase I Property	Potentially Contaminating Activity (Table 2 – O. Reg. 153/04)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC #5 Former chemical bulk storage	southeastern Portion of Phase I Property	*"Item 8: Chemical Manufacturing, Processing and Bulk Storage"*	Off-Site	BTEX PHCs (F_1-F_4) VOCs	Soil and Groundwater
APEC #6 Former storage tanks	Northwestern Portion of Phase I Property	*"Item 28: Gasoline and Associated Products Storage in Fixed Tanks"*	Off-Site	BTEX PHCs (F_1-F_4)	Soil and Groundwater

Contaminants of Potential Concern (CPCs)

The contaminants of potential concern for the soil and/or groundwater on the Phase II Property include the following:

- Benzene, Ethylbenzene, Toluene, and Xylenes (BTEX);
- Volatile Organic Compounds (VOCs);
- Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F_1-F_4);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Metals (including Arsenic (As), Antimony (Sb), Selenium (Se))
- Mercury (Hg)
- Hexavalent Chromium (CrVI)

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the Phase I Property.

Physical Setting

Site Stratigraphy

The stratigraphy of the Phase II Property generally consists of:

- Fill material (peat, topsoil, brown silty sand, trace clay, occasional cobbles and trace gravel); extending to depths ranging from approximately 0.41 m to 1.83 m below ground surface.

- Native brown silty clay; extending to depths ranging from approximately 3.15 m to 3.7 m below ground surface.

- ❒ Grey silty clay; extending to depths ranging from approximately 3.66 m to 7.32 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 at the Phase II Property was encountered within an overburden layer of silty clay at depths ranging from approximately 0.48 m to 1.04 m below the existing ground surface.

Based on the measured groundwater levels, the groundwater was calculated to flow in a northeasternly direction.

Approximate Depth to Bedrock

B Bedrock was not encountered/confirmed in any of the boreholes at the time of the field drilling program. A Dynamic Core Penetration Test was carried out, a practical refusal on possible bedrock was encountered in BH1-23.

Approximate Depth to Water Table

The depth to the water table is approximately 0.48 m to 1.04 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 Phase II Property, as the Phase II Property is not within 30 m of an environmentally sensitive area and the pH of the subsurface soil is between 5 and 9.

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

Environmental Condition

Areas Where Contaminants are Present

Based on the analytical test results, PAH impacted soil (fill material) was identified in BH7-23. This borehole is located in the north-central portion of the Phase II Property, along the former railway line.

Types of Contaminants

Fill material at BH7-23 contains concentrations of PAHs in excess of the selected MECP Table 3 Fine-Grained Commercial Soil Standards.

Contaminated Media

Contaminated media at the Phase II Property includes soil (fill material).

What Is Known About Areas Where Contaminants Are Present

The fill material at BH7-23 contains concentrations of PAHs exceeding the selected MECP Table 3 Fine-Grained Commercial Soil Standards. The source of these contaminants is suspected to have been the result of the past use of the land as a railway line.

Distribution and Migration of Contaminants

The surficial soil/fill in the vicinity of BH7-23 contains concentrations of PAHs in excess of the selected MECP Table 3 Fine-Grained Commercial Soil Standards. No PAH exceedances were identified in the other analyzed fill samples or the groundwater. Given their low mobility, these contaminants are anticipated to be limited to fill material and are not considered to extend into the underlying native soils or the groundwater.

Discharge of Contaminants

The surficial soil/fill in the vicinity of BH7-23 contains elevated concentrations of PAHs in excess of the selected MECP Table 3 -Grained Commercial Soil Standards. Based on the sample depths, the source of these contaminants is suspected to have been the result of the past use of the land as a railway line.

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.

The downward migration of PAHs contaminants in the vicinity of BH7-23 is not suspected to have occurred, due to their relatively low mobility and the groundwater results.

Potential for Vapour Intrusion

Given the low volatility of PAH parameters, in combination with the location of the identified soil contamination outside of any building footprints, the potential for vapour intrusion resulting from soil contamination is low.

6.0 CONCLUSIONS

Assessment

Paterson Group was retained by Richcraft Properties Ltd. to conduct a Phase II – Environmental Site Assessment (Phase II-ESA) for the property addressed 2865 F Walkley Road, Ottawa, Ontario. The purpose of the Phase II-ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I-ESA and were considered to result in areas of potential environmental concern (APECs) on the subject site (Phase II Property).

The subsurface investigation for this assessment was conducted on January 10 and January 11, 2023 and consisted of drilling nine boreholes (BH1-23 to BH9-23) across the Phase II Property, of which three were equipped with groundwater monitoring wells (BH4-23, BH8-23 and BH9-23). The boreholes were advanced to depths ranging from approximately 3.66 m to 7.32 m below the existing ground surface and terminated within an overburden layer of very stiff to stiff brown silty sand.

In general, the subsurface soil profile encountered at the borehole locations consists of fill material underlain by brown silty clay, turning grey at deeper depths (approximately 3.7 m below ground surface). Bedrock was not confirmed in any of the boreholes at the time of the field drilling program.

Eight soil samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), VOCs, metals, PAHs, mercury, chromium and/or pH parameters. Based on the analytical test results, the surficial soil/fill in the vicinity of BH7-23 contains concentrations of multiple PAH parameters in excess of the selected MECP Table 3 Fine-Grained Commercial Soil Standards. The presence of these contaminants is suspected to have been the result of the past use of the land as a railway line.

Three groundwater samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), VOCs, and/or PAHs parameters. All parameter concentrations were in compliance with the selected MECP Table 3 Fine-Grained Non-Potable Groundwater Standards.

Recommendations

Soil

Based on the findings of this assessment, PAH impacted fill was identified in the north-central portion of the Phase II Property, within the former on-site railway lines. Given the low solubility of PAH parameters, in combination with visual observations made during the field program, the impacts are expected to be confined to the fill layer.

It is our understanding that the Phase II Property will be redeveloped in the future. As such, it is recommended the contaminated soil be full delineated and remediated in conjunction with site redevelopment. This contaminated soil will require disposal at a licensed waste disposal facility. Prior to off-site disposal of impacted soil at a licensed waste disposal facility, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

It is recommended that Paterson personnel be present on-site during remediation activities to direct the excavation and segregation of impacted soil, as well as to conduct confirmatory sampling as required.

Excess soil must be handled in accordance with O.Reg. 406/19: On-Site and Excess Soil Management. With the exception of PAH impacts identified in the soil at BH7-23, the analytical test results comply with the MECP Table 2.1 Commercial Excess Soil Quality Standards (Ontario Regulation 406/19), for off-site disposal. Additional excess soil testing and reporting requirements may be required prior to future site excavation activities, in accordance with O.Reg.406/19, depending upon the volume of excess soil generated by the development.

Monitoring Wells

It is recommended that the monitoring wells be maintained for future sampling purposes. The monitoring wells will be registered with the MECP under Ontario Regulation 903 (Ontario Water Resources Act). At such a time that the monitoring wells are no longer required, they must be decommissioned in accordance with O.Reg. 903.

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 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 Phase II Property 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 Properties Ltd. Permission and notification from Richcraft Properties Ltd. and Paterson Group will be required prior to the release of this report to any other party.

Paterson Group Inc.

Mohammed Ramadan, B.Sc.

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

Report Distribution:

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FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE5930-1 – SITE PLAN

DRAWING PE5930-2 – SURROUNDING LAND USE PLAN

DRAWING PE5930-3 – TEST HOLE LOCATION PLAN

DRAWING PE5930-4 – ANALYTICAL TESTING PLAN – SOIL & GROUNDWATER

DRAWING PE5930-4A – CROSS SECTION A-A' – SOIL & GROUNDWATER

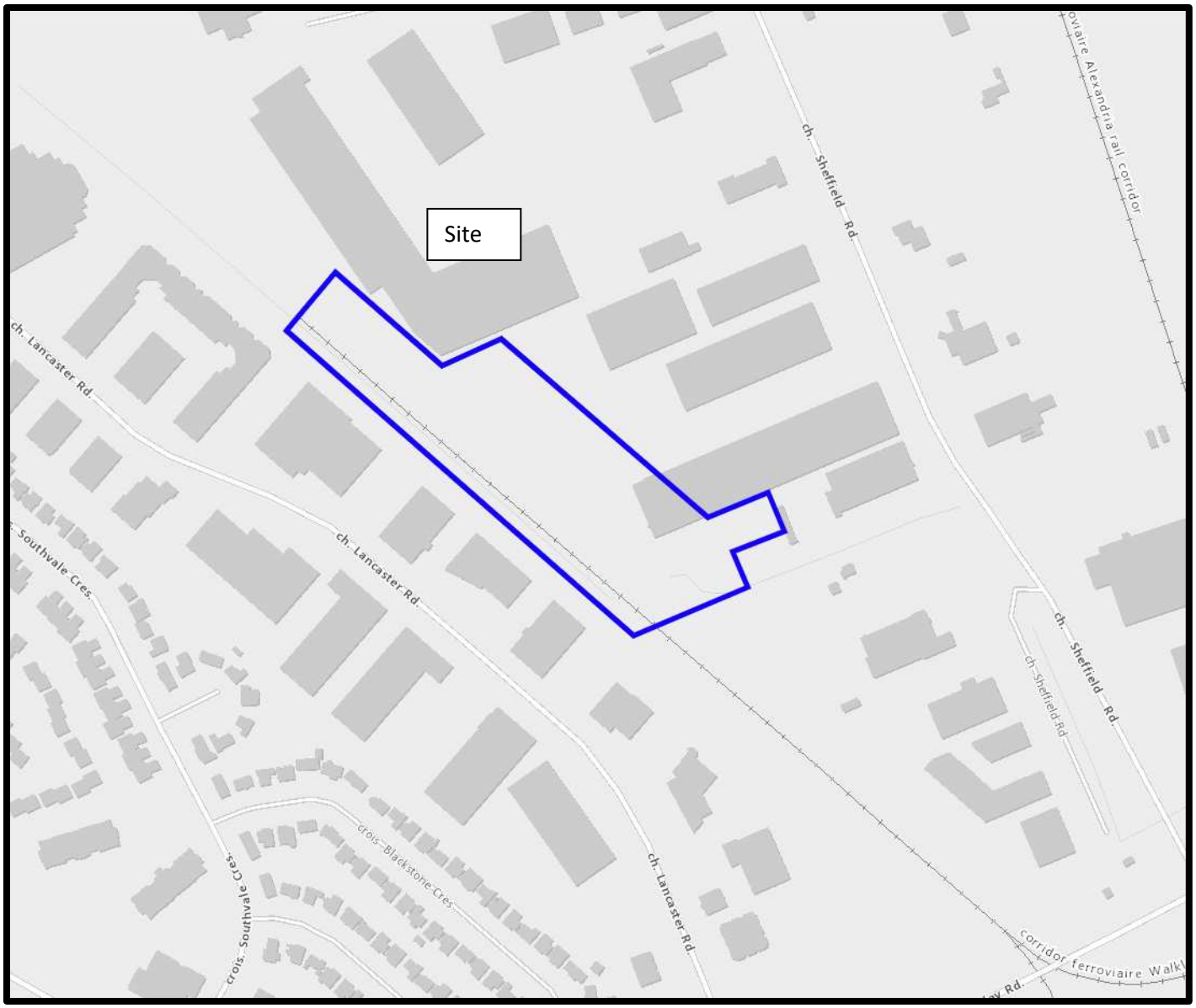
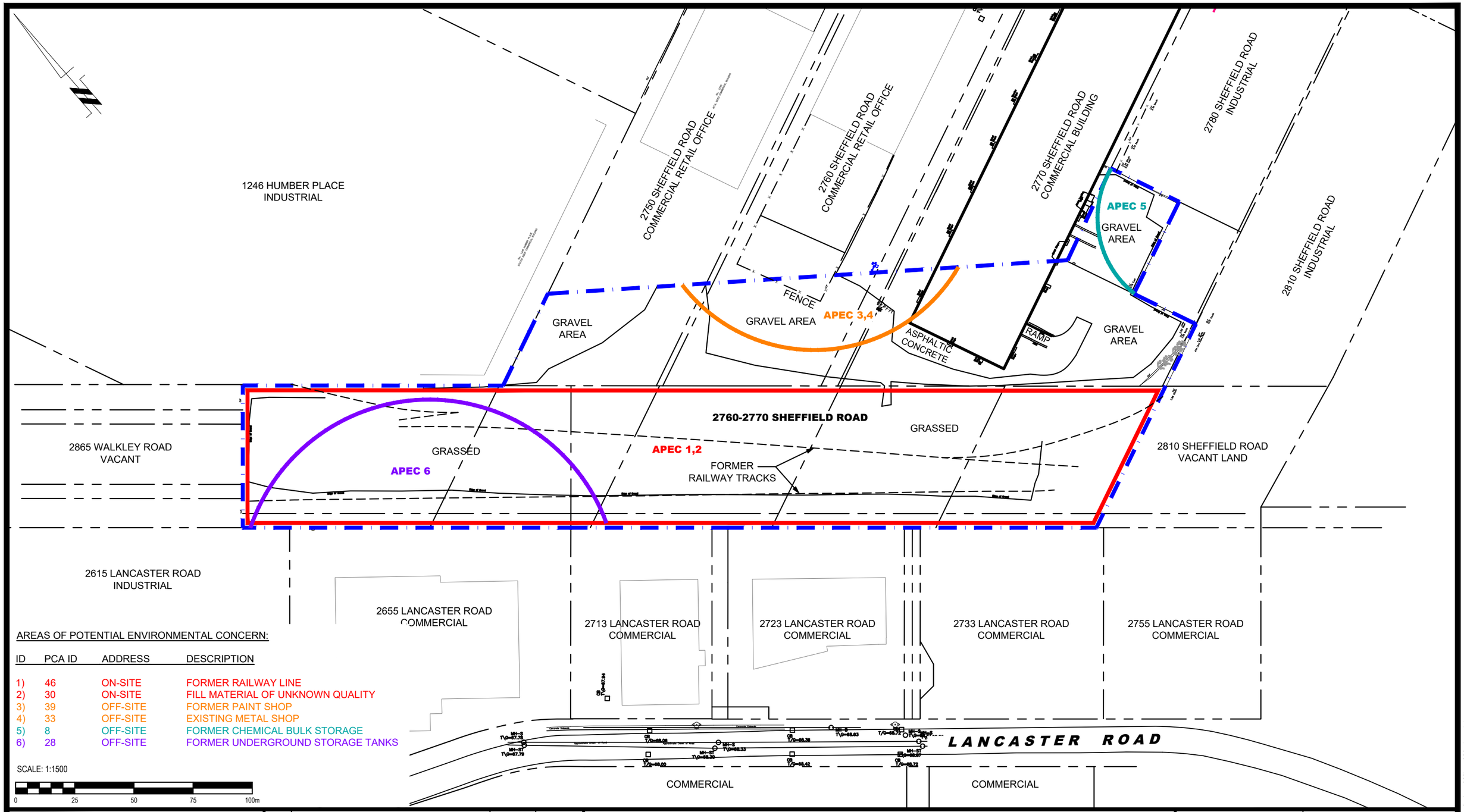


FIGURE 1

KEY PLAN



AREAS OF POTENTIAL ENVIRONMENTAL CONCERN:

ID	PCA ID	ADDRESS	DESCRIPTION
1)	46	ON-SITE	FORMER RAILWAY LINE
2)	30	ON-SITE	FILL MATERIAL OF UNKNOWN QUALITY
3)	39	OFF-SITE	FORMER PAINT SHOP
4)	33	OFF-SITE	EXISTING METAL SHOP
5)	8	OFF-SITE	FORMER CHEMICAL BULK STORAGE
6)	28	OFF-SITE	FORMER UNDERGROUND STORAGE TANKS

SCALE: 1:1500

0 25 50 75 100m

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

RICHCRAFT PROPERTIES LTD.

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
2865 F WALKLEY ROAD
OTTAWA, ONTARIO

Title:

SITE PLAN

Scale: 1:1500	Date: 01/2023
Drawn by: JM	Report No.: PE5930-1
Checked by: MR	Dwg. No.: PE5930-1
Approved by: MSD	Revision No.:

11x17

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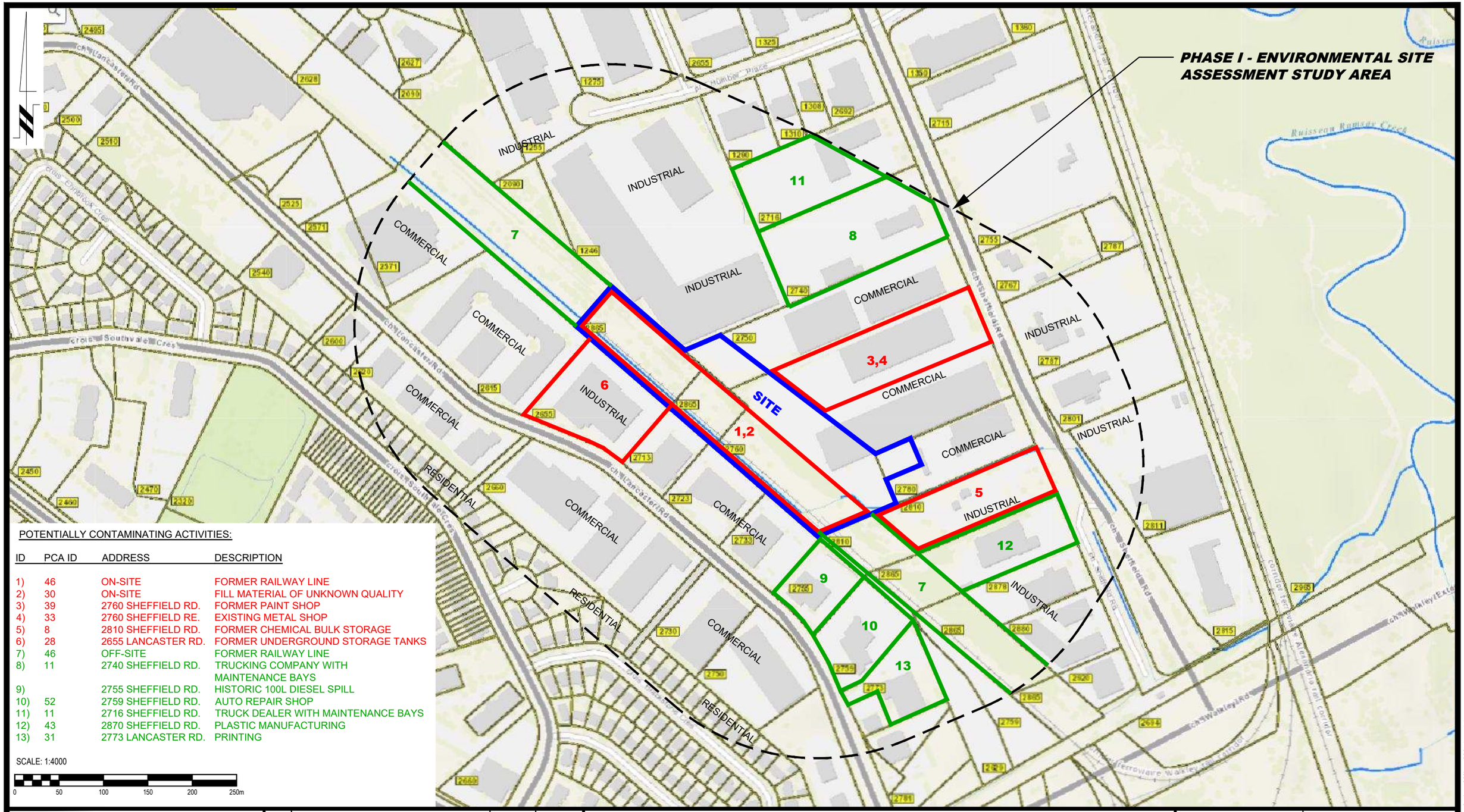

POTENTIALLY CONTAMINATING ACTIVITIES:

ID	PCA ID	ADDRESS	DESCRIPTION
1)	46	ON-SITE	FORMER RAILWAY LINE
2)	30	ON-SITE	FILL MATERIAL OF UNKNOWN QUALITY
3)	39	2760 SHEFFIELD RD.	FORMER PAINT SHOP
4)	33	2760 SHEFFIELD RE.	EXISTING METAL SHOP
5)	8	2810 SHEFFIELD RD.	FORMER CHEMICAL BULK STORAGE
6)	28	2655 LANCASTER RD.	FORMER UNDERGROUND STORAGE TANKS
7)	46	OFF-SITE	FORMER RAILWAY LINE
8)	11	2740 SHEFFIELD RD.	TRUCKING COMPANY WITH MAINTENANCE BAYS
9)		2755 SHEFFIELD RD.	HISTORIC 100L DIESEL SPILL
10)	52	2759 SHEFFIELD RD.	AUTO REPAIR SHOP
11)	11	2716 SHEFFIELD RD.	TRUCK DEALER WITH MAINTENANCE BAYS
12)	43	2870 SHEFFIELD RD.	PLASTIC MANUFACTURING
13)	31	2773 LANCASTER RD.	PRINTING

SCALE: 1:4000

0 50 100 150 200 250m

PATERSON GROUP
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TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

RICHCRAFT PROPERTIES LTD.

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
2865 F WALKLEY ROAD

OTTAWA, ONTARIO

Title:

SURROUNDING LAND USE PLAN

Scale: 1:4000	Date: 01/2023
Drawn by: JM	Report No.: PE5930-1
Checked by: MR	Dwg. No.: PE5930-2
Approved by: MSD	Revision No.:

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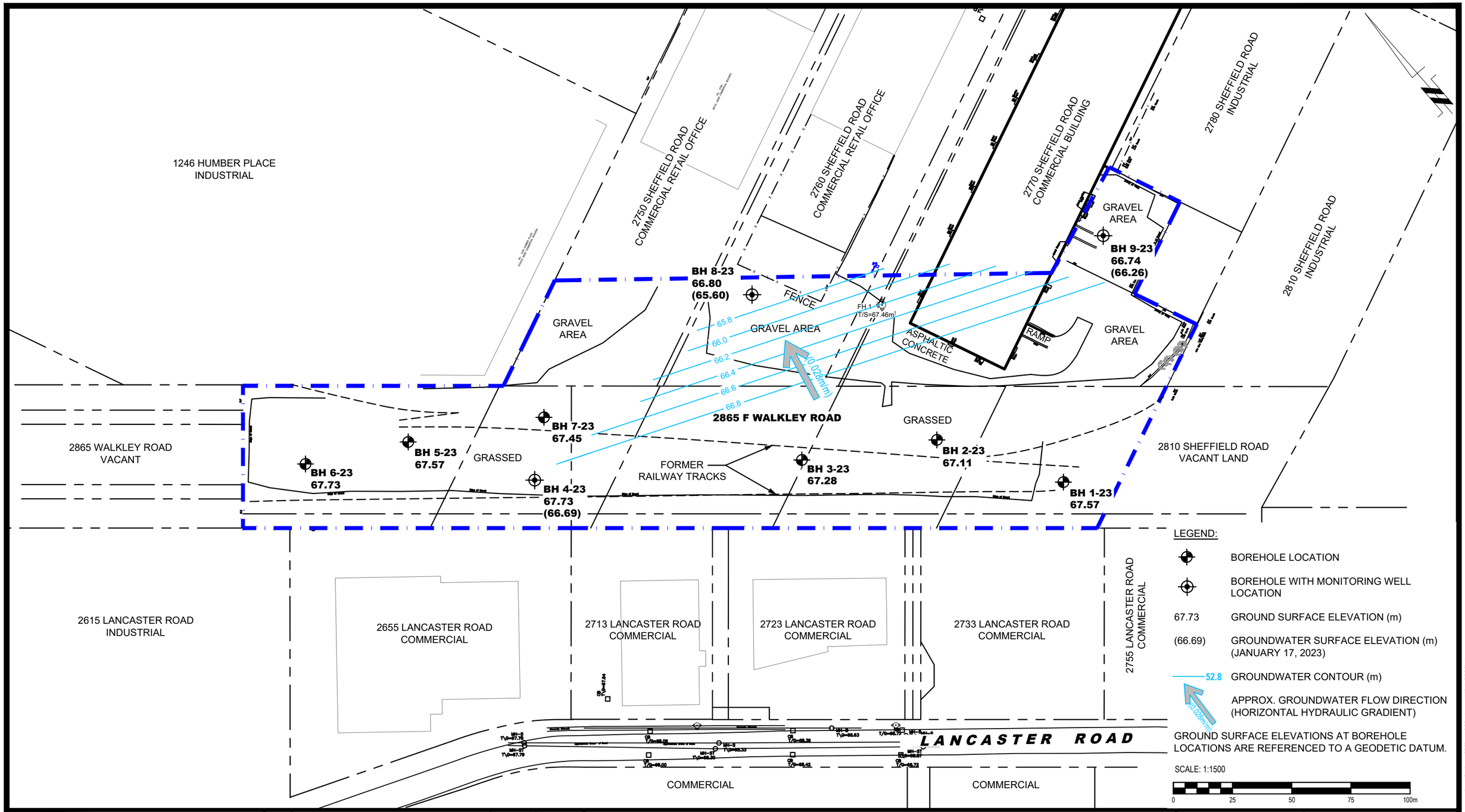

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 67.73 GROUND SURFACE ELEVATION (m)
- (66.69) GROUNDWATER SURFACE ELEVATION (m) (JANUARY 17, 2023)
- 52.8 GROUNDWATER CONTOUR (m)
- APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

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

SCALE: 1:1500

0 25 50 75 100m

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9 AURIGA DRIVE
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TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

RICHCRAFT PROPERTIES LTD.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
2865 F WALKLEY ROAD
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:1500	Date: 02/2023
Drawn by: YA	Report No.: PE5930-2
Checked by: MR	Dwg. No.: PE5930-3
Approved by: MSD	Revision No.:

11x17

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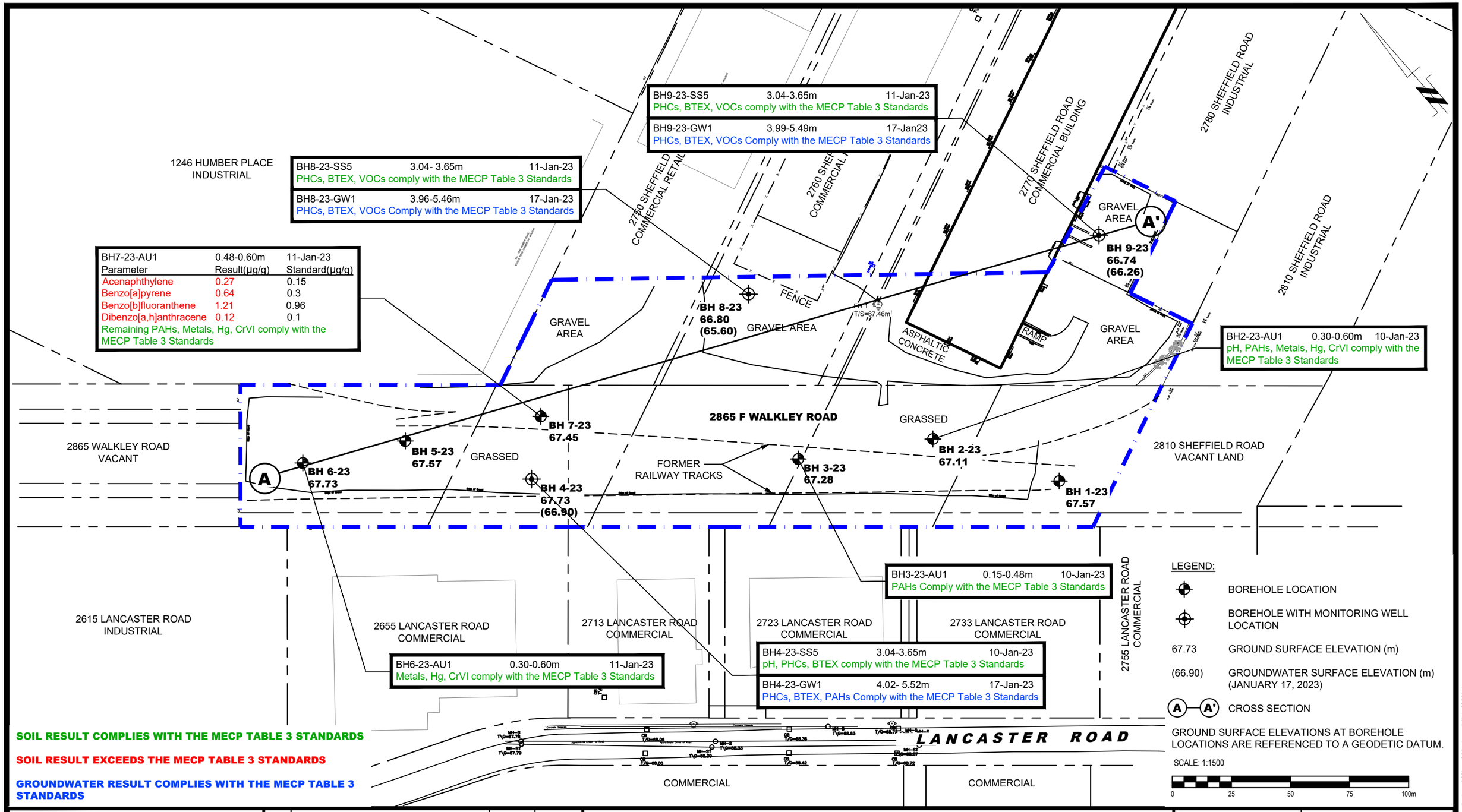

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NO.	REVISIONS	DATE	INITIAL

RICHCRAFT PROPERTIES LTD.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
2865 F WALKLEY ROAD
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN SOIL AND GROUNDWATER

Scale: 1:1500	Date: 02/2023
Drawn by: YA	Report No.: PE5930-2
Checked by: MR	Dwg. No.: PE5930-4
Approved by: MSD	Revision No.:

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11x17

BH6-23-AU1 0.30-0.60m 11-Jan-23
Metals, Hg, CrVI comply with the MECP Table 3 Standards

BH7-23-AU1 0.48-0.60m 11-Jan-23

Parameter	Result(µg/g)	Standard(µg/g)
Acenaphthylene	0.27	0.15
Benzo[a]pyrene	0.64	0.3
Benzo[b]fluoranthene	1.21	0.96
Dibenzo[a,h]anthracene	0.12	0.1

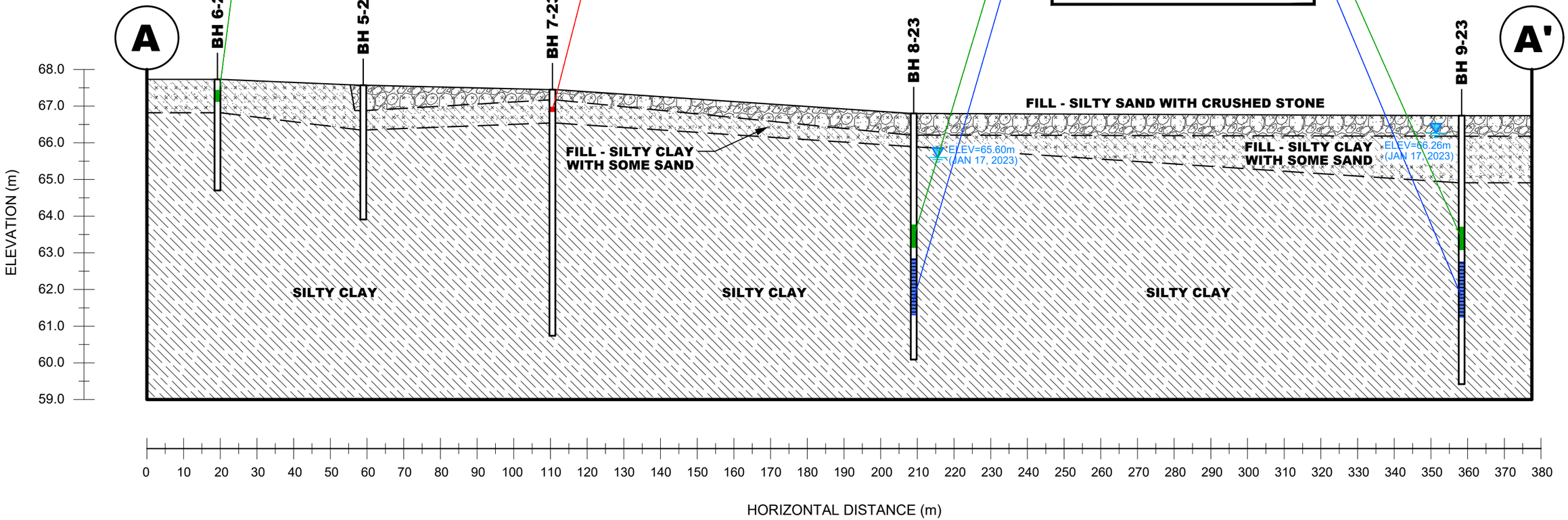
Remaining PAHs, Metals, Hg, CrVI comply with the MECP Table 3 Standards

BH8-23-SS5 3.04- 3.65m 11-Jan-23
PHCs, BTEX, VOCs comply with the MECP Table 3 Standards

BH8-23-GW1 3.96-5.46m 17-Jan-23
PHCs, BTEX, VOCs Comply with the MECP Table 3 Standards

BH9-23-SS5 3.04-3.65m 11-Jan-23
PHCs, BTEX, VOCs comply with the MECP Table 3 Standards

BH9-23-GW1 3.99-5.49m 17-Jan23
PHCs, BTEX, VOCs Comply with the MECP Table 3 Standards



SOIL RESULT COMPLIES WITH THE MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 3 STANDARDS

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 3 STANDARDS

PATERSON GROUP
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
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NO.	REVISIONS	DATE	INITIAL

RICHCRAFT PROPERTIES LTD.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
2865 F WALKLEY ROAD
OTTAWA, ONTARIO

Title: CROSS SECTION A-A'
SOIL AND GROUNDWATER

Scale: AS SHOWN	Date: 02/2023
Drawn by: YA	Report No.: PE5930-2
Checked by: MR	Dwg. No.: PE5930-4A
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

PATERSON GROUP

Sampling & Analysis Plan

2865 F Walkley Road

Ottawa, Ontario

Prepared for Richcraft Properties Ltd.

Report: PE5930-SAP
January 8, 2023

TABLE OF CONTENTS

PAGE

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Richcraft Properties Ltd., to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for the property addressed 2865 F Walkley Road, 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
BH1-23	Southwestern corner of the Phase I Property (as close to south and west property boundaries); to assess for potential impacts resulting from the former presence of railway lines and fill material of unknown quality.	4-6 m; for general coverage purposes.
BH2-23	South-central portion of the Phase I Property to assess for potential impacts resulting from the former presence of railway lines and fill material of unknown quality.	4-6 m; for general coverage purposes.
BH3-23	South-central portion of the Phase I Property to assess for potential impacts resulting from the former presence of railway lines and fill material of unknown quality.	4-6 m; for general coverage purposes.
BH4-23	western portion of the Phase I Property; to assess for potential impacts resulting from the former off-site presence of fuel oil storage tanks + railway.	4-6 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH5-23	northern portion of the Phase I Property to assess for potential impacts resulting from the former presence of railway lines and fill material of unknown quality.	4-6 m; for general coverage purposes.
BH6-23	Northern portion of the Phase I Property to assess for potential impacts resulting from the former presence of railway lines and fill material of unknown quality.	4-6 m; for general coverage purposes.
BH7-23	North-central portion of the Phase I Property to assess for potential impacts resulting from the former presence of railway lines and fill material of unknown quality.	4-6 m; for general coverage purposes.
BH8-23	Eastern portion of the Phase I Property to assess for potential impacts resulting from the former off-site presence of a paint shop and an existing metal shop.	4-6 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH9-23	Southeastern portion of the Phase I Property to assess for potential impacts resulting from the former off-site chemical bulk storage.	4-6 m; to intercept the groundwater table for the purpose of installing a monitoring well.

Borehole locations are shown on Drawing PE5930-3 – 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. 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 three boreholes to allow for the collection of groundwater samples.

2.0 ANALYTICAL TESTING PROGRAM

The analytical testing program for soil at the Phase I Property 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 Phase I Property is based on the following general considerations:

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

- ❒ At least one groundwater monitoring well should be installed in a stratigraphic unit below the suspected contamination, where said stratigraphic unit is water-bearing.

- ❒ Parameters analyzed should be consistent with the Contaminants of Concern identified in the Phase I ESA and with the contaminants identified in the soil samples.

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

After drilling is completed a plan with the borehole locations must be provided. Distances and orientations of boreholes with respect to site features (buildings, roadways, etc.) must be provided. Distances should be measured using a measuring tape or wheel rather than paced off. Ground surface elevations at each

borehole should be surveyed relative to a geodetic benchmark, if one is available, or a temporary site benchmark which can be tied in at a later date if necessary.

Drilling Procedure

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

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

Spoon Washing Procedure

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

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

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

Screening Procedure

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

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

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

3.2 Monitoring Well Installation Procedure

Equipment

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

Procedure

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

3.3 Monitoring Well Sampling Procedure

Equipment

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

Sampling Procedure

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

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

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

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

5.0 DATA QUALITY OBJECTIVES

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

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

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

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

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

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS

Physical impediments to the Sampling and Analysis plan may include:

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

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

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
2865 Walkley Road
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** January 10, 2023

FILE NO. PE5930

HOLE NO. BH 1-23

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
TOPSOIL 0.15						0	67.57		
FILL: Peat with brown silty sand, trace gravel 0.41		AU	1						
		SS	2	75	6	1	66.57		
		SS	3	83	P	2	65.57		
		SS	4	100	P				
Very stiff to stiff, brown **SILTY CLAY**		SS	5	100	P	3	64.57		
- grey by 3.7m depth		SS	6	100	P	4	63.57		
		SS	7	100	P	5	62.57		
		SS	8	100	P				
		SS	9	100	P	6	61.57		
6.71									
Dyamic Cone Penetration Test commenced at 6.71m depth. Practical DCPT refusal at 11.91m, borehole terminated.									

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

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
2865 Walkley Road
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** January 10, 2023

FILE NO. PE5930

HOLE NO. BH 2-23

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
TOPSOIL 0.20									
FILL: Brown silty clay with topsoil, some peat and gravel		AU	1						
1.07		SS	2	42	6				
		SS	3	58	P				
		SS	4	100	P				
Very stiff to stiff, brown **SILTY CLAY**									
- grey by 3.15m depth		SS	5	100	P				
		SS	6	100	P				
		SS	7	67	P				
		SS	8	100	P				
		SS	9	100	P				
6.71									
End of Borehole						0 1 2 3 4 5 6	67.11 66.11 65.11 64.11 63.11 62.11 61.11		

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

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
2865 Walkley Road
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** January 10, 2023

FILE NO. PE5930

HOLE NO. BH 3-23

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	67.28		
FILL: Brown silty sand with gravel, occasional cobbles		AU	1						
0.15									
FILL: Brown silty clay, some gravel, trace topsoil									
0.48		SS	2	58	7	1	66.28		
		SS	3	67		2	65.28		
		SS	4	100					
Very stiff to stiff, brown **SILTY CLAY**						3	64.28		
		SS	5	100					
- grey by 3.7m depth						4	63.28		
		SS	6	100					
		SS	7	100		5	62.28		
		SS	8	67					
		SS	9	4	P	6	61.28		
6.71									
End of Borehole									

Lower Explosive Limit % scale: 20 40 60 80

RKI Eagle Rdg. (ppm): 100 200 300 400 500

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
2865 Walkley Road
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** January 10, 2023

FILE NO. PE5930

HOLE NO. BH 4-23

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	67.73
FILL: Dark brown silty sand with gravel, some clay, trace organics		AU	1				
0.94							
		SS	2	62	7	1	66.73
		SS	3	58	P	2	65.73
		SS	4	83	P		
Very stiff to stiff, brown **SILTY CLAY**						3	64.73
		SS	5	83	P		
- grey by 3.7m depth						4	63.73
		SS	6	100	P		
		SS	7	100	P	5	62.73
		SS	8	100	P		
						6	61.73
		SS	9		P		
6.71							
End of Borehole							
(GWL @ 1.04m - Jan. 17, 2023)							

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
2865 Walkley Road
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** January 10, 2023

FILE NO. PE5930

HOLE NO. BH 5-23

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	67.57
FILL: Dark brown silty sand with gravel, trace clay, occasional cobbles		AU	1				
0.69							
FILL: Dark brown silty clay, some sand and gravel, trace organics		SS	2	75	3	1	66.57
1.22							
		SS	3	42	P	2	65.57
Very stiff to stiff, brown **SILTY CLAY**		SS	4	75	P	3	64.57
		SS	5	83	P		
3.66							
End of Borehole							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
2865 Walkley Road
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** January 11, 2023

FILE NO. PE5930

HOLE NO. BH 6-23

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	67.73		
FILL: Dark brown silty clay, some gravel, topsoil and organics		AU	1						
0.91									
		SS	2	29	6	1	66.73		
		SS	3	58	P				
Hard to stiff, brown **SILTY CLAY**						2	65.73		
		SS	4	83	P				
						3	64.73		
		SS	5	100	P				
3.66									
End of Borehole									

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

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
2865 Walkley Road
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** January 11, 2023

FILE NO. PE5930

HOLE NO. BH 7-23

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	67.45
FILL: Brown silty sand with gravel, occasional cobbles 0.28							
FILL: Dark brown silty clay, some gravel, topsoil, organics		AU	1				
0.91		SS	2	67	6	1	66.45
		SS	3	58	P	2	65.45
		SS	4	83	P		
Hard to stiff, brown **SILTY CLAY**		SS	5	100	P	3	64.45
- grey by 3.7m depth		SS	6	100	P	4	63.45
		SS	7	58	P	5	62.45
		SS	8	100	P		
		SS	9	67	P	6	61.45
6.71							
End of Borehole							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
2865 Walkley Road
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** January 11, 2023

FILE NO. PE5930

HOLE NO. BH 8-23

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.80
FILL: Crushed stone and gravel with sand		AU	1				
0.59							
		SS	2	58	8	1	65.80
		SS	3	75	P	2	64.80
		SS	4	75	P		
Very stiff to stiff, brown **SILTY CLAY**						3	63.80
- grey by 3.4m depth		SS	5	100	P		
		SS	6	100	P	4	62.80
		SS	7	100	P	5	61.80
		SS	8	100	P		
		SS	9	67	P	6	60.80
6.71							
End of Borehole							
(GWL @ 1.20m - Jan. 17, 2023)							

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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9 Auriga Drive, Ottawa, Ontario K2E 7T9

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
2865 Walkley Road
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill **DATE** January 11, 2023

FILE NO. PE5930

HOLE NO. BH 9-23

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.74
FILL: Crushed stone and gravel with sand		AU	1				
0.56							
FILL: Brown silty clay, some sand		SS	2	67	10	1	65.74
- trace gravel by 1.7m depth							
1.83		SS	3	75	P	2	64.74
		SS	4	92	P		
Very stiff to stiff, brown **SILTY CLAY**						3	63.74
		SS	5	58	P		
- grey by 3.7m depth		SS	6	100	P	4	62.74
		SS	7	100	P	5	61.74
		SS	8	100	P		
		SS	9	100	P	6	60.74
						7	59.74
7.32							
End of Borehole							
(GWL @ 0.48m - Jan. 17, 2023)							

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

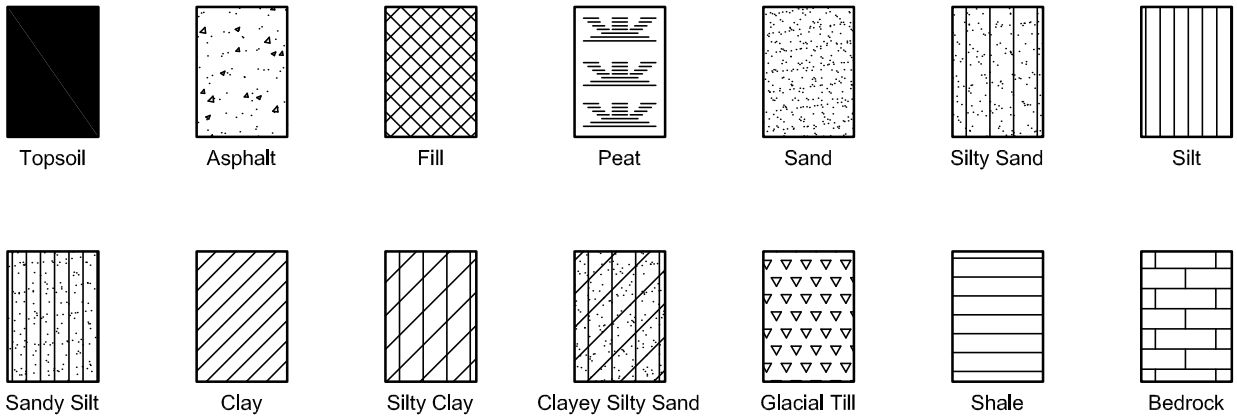
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

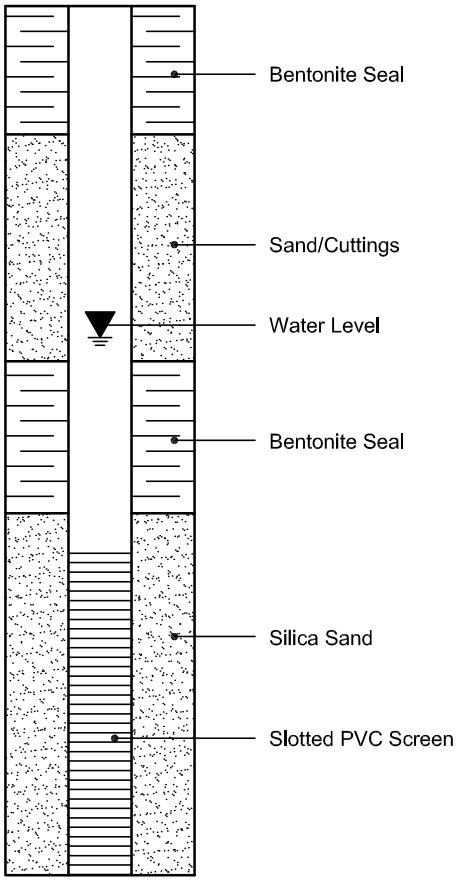
SYMBOLS AND TERMS (continued)

STRATA PLOT

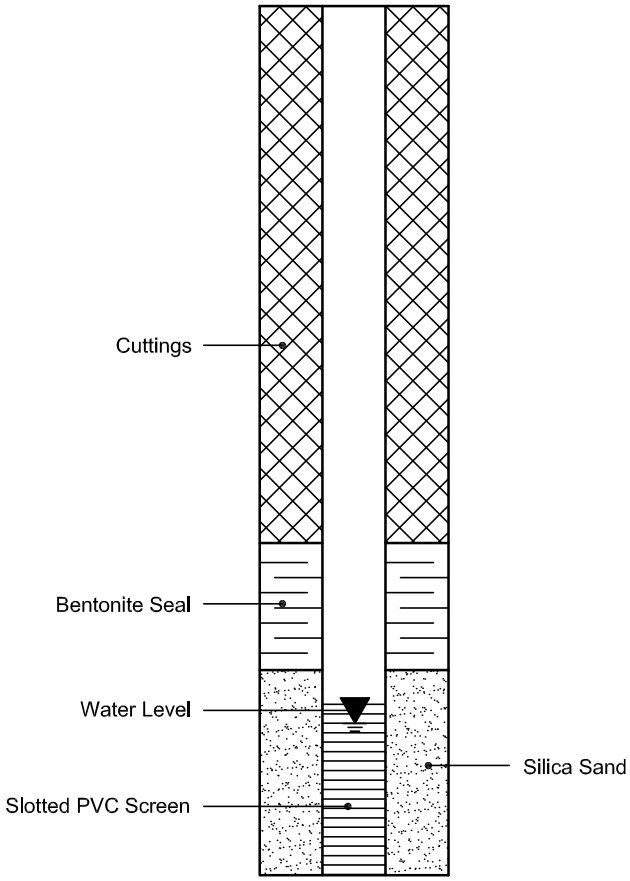


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Mark D'Arcy

Client PO: 56594
Project: PE5930
Custody:

Report Date: 18-Jan-2023
Order Date: 12-Jan-2023

Order #: 2302480

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

Paracel ID	Client ID
2302480-01	BH2-23-AU1
2302480-02	BH3-23-AU1
2302480-03	BH4-23-SS5
2302480-04	DUP1
2302480-05	BH6-23-AU1
2302480-06	BH7-23-AU1
2302480-07	BH8-23-SS5
2302480-08	BH9-23-SS5

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 18-Jan-2023

Client: Paterson Group Consulting Engineers

Order Date: 12-Jan-2023

Client PO: 56594

Project Description: PE5930

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	13-Jan-23	14-Jan-23
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	16-Jan-23	17-Jan-23
Mercury by CVAA	EPA 7471B - CVAA, digestion	16-Jan-23	16-Jan-23
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	16-Jan-23	16-Jan-23
PHC F1	CWS Tier 1 - P&T GC-FID	13-Jan-23	14-Jan-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	12-Jan-23	14-Jan-23
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	16-Jan-23	16-Jan-23
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	13-Jan-23	17-Jan-23
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	13-Jan-23	14-Jan-23
Solids, %	CWS Tier 1 - Gravimetric	13-Jan-23	13-Jan-23

Certificate of Analysis

Report Date: 18-Jan-2023

Client: Paterson Group Consulting Engineers

Order Date: 12-Jan-2023

Client PO: 56594

Project Description: PE5930

	Client ID:	BH2-23-AU1	BH3-23-AU1	BH4-23-SS5	DUP1
	Sample Date:	11-Jan-23 09:00	11-Jan-23 09:00	11-Jan-23 09:00	11-Jan-23 09:00
	Sample ID:	2302480-01	2302480-02	2302480-03	2302480-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	72.5	82.2	64.3	63.6
General Inorganics					
pH	0.05 pH Units	7.32	-	7.46	-
Metals					
Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	4.9	-	-	-
Barium	1.0 ug/g dry	135	-	-	-
Beryllium	0.5 ug/g dry	0.6	-	-	-
Boron	5.0 ug/g dry	6.2	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	5.0 ug/g dry	36.7	-	-	-
Chromium (VI)	0.2 ug/g dry	<0.2	-	-	-
Cobalt	1.0 ug/g dry	10.4	-	-	-
Copper	5.0 ug/g dry	21.2	-	-	-
Lead	1.0 ug/g dry	14.3	-	-	-
Mercury	0.1 ug/g dry	<0.1	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	5.0 ug/g dry	20.9	-	-	-
Selenium	1.0 ug/g dry	<1.0	-	-	-
Silver	0.3 ug/g dry	<0.3	-	-	-
Thallium	1.0 ug/g dry	<1.0	-	-	-
Uranium	1.0 ug/g dry	<1.0	-	-	-
Vanadium	10.0 ug/g dry	43.9	-	-	-
Zinc	20.0 ug/g dry	85.0	-	-	-
Volatiles					
Benzene	0.02 ug/g dry	-	-	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	<0.05
Toluene	0.05 ug/g dry	-	-	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	-	-	<0.05	<0.05
o-Xylene	0.05 ug/g dry	-	-	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	-	-	<0.05	<0.05
Toluene-d8	Surrogate	-	-	115%	111%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	-	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	-	-	<4	<4

Certificate of Analysis

Report Date: 18-Jan-2023

Client: Paterson Group Consulting Engineers

Order Date: 12-Jan-2023

Client PO: 56594

Project Description: PE5930

	Client ID:	BH2-23-AU1	BH3-23-AU1	BH4-23-SS5	DUP1
	Sample Date:	11-Jan-23 09:00	11-Jan-23 09:00	11-Jan-23 09:00	11-Jan-23 09:00
	Sample ID:	2302480-01	2302480-02	2302480-03	2302480-04
	MDL/Units	Soil	Soil	Soil	Soil
F3 PHCs (C16-C34)	8 ug/g dry	-	-	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	-	-	<6	<6
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	<0.02	<0.02	-	-
Acenaphthylene	0.02 ug/g dry	0.08	0.03	-	-
Anthracene	0.02 ug/g dry	0.05	0.03	-	-
Benzo [a] anthracene	0.02 ug/g dry	0.16	0.09	-	-
Benzo [a] pyrene	0.02 ug/g dry	0.16	0.09	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	0.28	0.15	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	0.10	0.07	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	0.13	0.08	-	-
Chrysene	0.02 ug/g dry	0.17	0.10	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	0.03	<0.02	-	-
Fluoranthene	0.02 ug/g dry	0.22	0.13	-	-
Fluorene	0.02 ug/g dry	<0.02	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	0.11	0.06	-	-
1-Methylnaphthalene	0.02 ug/g dry	0.08	0.05	-	-
2-Methylnaphthalene	0.02 ug/g dry	0.10	0.06	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	0.19	0.10	-	-
Naphthalene	0.01 ug/g dry	0.07	0.04	-	-
Phenanthrene	0.02 ug/g dry	0.11	0.04	-	-
Pyrene	0.02 ug/g dry	0.20	0.14	-	-
2-Fluorobiphenyl	Surrogate	85.3%	83.6%	-	-
Terphenyl-d14	Surrogate	90.9%	89.9%	-	-

Certificate of Analysis

Report Date: 18-Jan-2023

Client: **Paterson Group Consulting Engineers**

Order Date: 12-Jan-2023

Client PO: **56594**

Project Description: PE5930

	Client ID:	BH6-23-AU1	BH7-23-AU1	BH8-23-SS5	BH9-23-SS5
	Sample Date:	11-Jan-23 09:00	11-Jan-23 09:00	11-Jan-23 09:00	11-Jan-23 09:00
	Sample ID:	2302480-05	2302480-06	2302480-07	2302480-08
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	84.2	66.4	62.6	61.9
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	-	-
Arsenic	1.0 ug/g dry	5.0	5.4	-	-
Barium	1.0 ug/g dry	80.0	81.3	-	-
Beryllium	0.5 ug/g dry	0.5	<0.5	-	-
Boron	5.0 ug/g dry	7.1	6.2	-	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	-
Chromium	5.0 ug/g dry	22.9	26.4	-	-
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	-	-
Cobalt	1.0 ug/g dry	10.8	6.0	-	-
Copper	5.0 ug/g dry	22.6	22.1	-	-
Lead	1.0 ug/g dry	32.7	20.3	-	-
Mercury	0.1 ug/g dry	<0.1	<0.1	-	-
Molybdenum	1.0 ug/g dry	1.6	<1.0	-	-
Nickel	5.0 ug/g dry	22.9	16.3	-	-
Selenium	1.0 ug/g dry	<1.0	<1.0	-	-
Silver	0.3 ug/g dry	<0.3	<0.3	-	-
Thallium	1.0 ug/g dry	<1.0	<1.0	-	-
Uranium	1.0 ug/g dry	<1.0	<1.0	-	-
Vanadium	10.0 ug/g dry	30.1	28.6	-	-
Zinc	20.0 ug/g dry	55.4	56.2	-	-
Volatiles					
Acetone	0.50 ug/g dry	-	-	<0.50	<0.50
Benzene	0.02 ug/g dry	-	-	<0.02	<0.02
Bromodichloromethane	0.05 ug/g dry	-	-	<0.05	<0.05
Bromoform	0.05 ug/g dry	-	-	<0.05	<0.05
Bromomethane	0.05 ug/g dry	-	-	<0.05	<0.05
Carbon Tetrachloride	0.05 ug/g dry	-	-	<0.05	<0.05
Chlorobenzene	0.05 ug/g dry	-	-	<0.05	<0.05
Chloroform	0.05 ug/g dry	-	-	<0.05	<0.05
Dibromochloromethane	0.05 ug/g dry	-	-	<0.05	<0.05
Dichlorodifluoromethane	0.05 ug/g dry	-	-	<0.05	<0.05
1,2-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	<0.05
1,3-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	<0.05

Certificate of Analysis

Report Date: 18-Jan-2023

Client: Paterson Group Consulting Engineers

Order Date: 12-Jan-2023

Client PO: 56594

Project Description: PE5930

	Client ID:	BH6-23-AU1	BH7-23-AU1	BH8-23-SS5	BH9-23-SS5
	Sample Date:	11-Jan-23 09:00	11-Jan-23 09:00	11-Jan-23 09:00	11-Jan-23 09:00
	Sample ID:	2302480-05	2302480-06	2302480-07	2302480-08
	MDL/Units	Soil	Soil	Soil	Soil
1,4-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	<0.05
1,1-Dichloroethane	0.05 ug/g dry	-	-	<0.05	<0.05
1,2-Dichloroethane	0.05 ug/g dry	-	-	<0.05	<0.05
1,1-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	<0.05
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	<0.05
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	<0.05
1,2-Dichloropropane	0.05 ug/g dry	-	-	<0.05	<0.05
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	-	<0.05	<0.05
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	-	<0.05	<0.05
1,3-Dichloropropene, total	0.05 ug/g dry	-	-	<0.05	<0.05
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	<0.05
Ethylene dibromide (dibromoethane, 1	0.05 ug/g dry	-	-	<0.05	<0.05
Hexane	0.05 ug/g dry	-	-	<0.05	<0.05
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	-	<0.50	<0.50
Methyl Isobutyl Ketone	0.50 ug/g dry	-	-	<0.50	<0.50
Methyl tert-butyl ether	0.05 ug/g dry	-	-	<0.05	<0.05
Methylene Chloride	0.05 ug/g dry	-	-	<0.05	<0.05
Styrene	0.05 ug/g dry	-	-	<0.05	<0.05
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	-	<0.05	<0.05
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	-	<0.05	<0.05
Tetrachloroethylene	0.05 ug/g dry	-	-	<0.05	<0.05
Toluene	0.05 ug/g dry	-	-	<0.05	<0.05
1,1,1-Trichloroethane	0.05 ug/g dry	-	-	<0.05	<0.05
1,1,2-Trichloroethane	0.05 ug/g dry	-	-	<0.05	<0.05
Trichloroethylene	0.05 ug/g dry	-	-	<0.05	<0.05
Trichlorofluoromethane	0.05 ug/g dry	-	-	<0.05	<0.05
Vinyl chloride	0.02 ug/g dry	-	-	<0.02	<0.02
m,p-Xylenes	0.05 ug/g dry	-	-	<0.05	<0.05
o-Xylene	0.05 ug/g dry	-	-	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	-	-	<0.05	<0.05
4-Bromofluorobenzene	Surrogate	-	-	114%	116%
Dibromofluoromethane	Surrogate	-	-	136%	137%
Toluene-d8	Surrogate	-	-	112%	113%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	-	<7	<7

Certificate of Analysis

Report Date: 18-Jan-2023

Client: **Paterson Group Consulting Engineers**

Order Date: 12-Jan-2023

Client PO: **56594**

Project Description: PE5930

	Client ID:	BH6-23-AU1	BH7-23-AU1	BH8-23-SS5	BH9-23-SS5
	Sample Date:	11-Jan-23 09:00	11-Jan-23 09:00	11-Jan-23 09:00	11-Jan-23 09:00
	Sample ID:	2302480-05	2302480-06	2302480-07	2302480-08
	MDL/Units	Soil	Soil	Soil	Soil
F2 PHCs (C10-C16)	4 ug/g dry	-	-	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	-	-	<8	<8
F4 PHCs (C34-C50)	6 ug/g dry	-	-	<6	<6
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	0.03	-	-
Acenaphthylene	0.02 ug/g dry	-	0.27	-	-
Anthracene	0.02 ug/g dry	-	0.26	-	-
Benzo [a] anthracene	0.02 ug/g dry	-	0.70	-	-
Benzo [a] pyrene	0.02 ug/g dry	-	0.64	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	-	1.21	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	-	0.44	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	-	0.58	-	-
Chrysene	0.02 ug/g dry	-	0.89	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	0.12	-	-
Fluoranthene	0.02 ug/g dry	-	1.61	-	-
Fluorene	0.02 ug/g dry	-	0.03	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	0.42	-	-
1-Methylnaphthalene	0.02 ug/g dry	-	0.37	-	-
2-Methylnaphthalene	0.02 ug/g dry	-	0.46	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	-	0.83	-	-
Naphthalene	0.01 ug/g dry	-	0.34	-	-
Phenanthrene	0.02 ug/g dry	-	0.71	-	-
Pyrene	0.02 ug/g dry	-	1.35	-	-
2-Fluorobiphenyl	Surrogate	-	89.7%	-	-
Terphenyl-d14	Surrogate	-	94.7%	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	*1.24*		*ug/g*		*92.8*	*50-140*			
Surrogate: Terphenyl-d14	*1.48*		*ug/g*		*111*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*3.00*		*ug/g*		*93.6*	*50-140*			
Surrogate: Dibromofluoromethane	*3.69*		*ug/g*		*115*	*50-140*			
Surrogate: Toluene-d8	*3.27*		*ug/g*		*102*	*50-140*			
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*3.27*		*ug/g*		*102*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	7.07	0.05	pH Units	7.10			0.4	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g	ND			NC	30	
Metals									
Antimony	ND	1.0	ug/g	ND			NC	30	
Arsenic	2.1	1.0	ug/g	2.2			6.8	30	
Barium	33.3	1.0	ug/g	40.7			20.0	30	
Beryllium	ND	0.5	ug/g	ND			NC	30	
Boron	6.9	5.0	ug/g	7.6			9.9	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g	ND			NC	35	
Chromium	9.5	5.0	ug/g	10.4			8.8	30	
Cobalt	3.0	1.0	ug/g	3.2			5.8	30	
Copper	5.0	5.0	ug/g	6.9			NC	30	
Lead	7.5	1.0	ug/g	8.9			16.3	30	
Mercury	ND	0.1	ug/g	ND			NC	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	5.5	5.0	ug/g	6.1			10.5	30	
Selenium	ND	1.0	ug/g	ND			NC	30	
Silver	ND	0.3	ug/g	ND			NC	30	
Thallium	ND	1.0	ug/g	ND			NC	30	
Uranium	ND	1.0	ug/g	ND			NC	30	
Vanadium	12.8	10.0	ug/g	14.2			10.7	30	
Zinc	ND	20.0	ug/g	ND			NC	30	
Physical Characteristics									
% Solids	97.5	0.1	% by Wt.	97.5			0.1	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	0.088	0.02	ug/g	0.083			5.5	40	
Anthracene	0.055	0.02	ug/g	0.047			16.8	40	
Benzo [a] anthracene	0.180	0.02	ug/g	0.161			10.9	40	
Benzo [a] pyrene	0.198	0.02	ug/g	0.165			18.1	40	
Benzo [b] fluoranthene	0.299	0.02	ug/g	0.277			7.5	40	
Benzo [g,h,i] perylene	0.114	0.02	ug/g	0.101			12.4	40	
Benzo [k] fluoranthene	0.135	0.02	ug/g	0.126			7.2	40	
Chrysene	0.209	0.02	ug/g	0.171			19.9	40	
Dibenzo [a,h] anthracene	0.036	0.02	ug/g	0.033			9.9	40	
Fluoranthene	0.274	0.02	ug/g	0.222			21.0	40	
Fluorene	ND	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	0.119	0.02	ug/g	0.106			11.6	40	
1-Methylnaphthalene	0.034	0.02	ug/g	0.084			NC	40	
2-Methylnaphthalene	0.038	0.02	ug/g	0.102			NC	40	
Naphthalene	0.028	0.01	ug/g	0.071			NC	40	
Phenanthrene	0.101	0.02	ug/g	0.111			9.1	40	
Pyrene	0.261	0.02	ug/g	0.205			24.1	40	
Surrogate: 2-Fluorobiphenyl	*1.89*		*ug/g*		*103*	*50-140*			
Surrogate: Terphenyl-d14	*2.05*		*ug/g*		*112*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g	ND			NC	50	
Benzene	ND	0.02	ug/g	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g	ND			NC	50	
Bromoform	ND	0.05	ug/g	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromomethane	ND	0.05	ug/g	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g	ND			NC	50	
Chloroform	ND	0.05	ug/g	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g	ND			NC	50	
Hexane	ND	0.05	ug/g	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g	ND			NC	50	
Styrene	ND	0.05	ug/g	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	*3.34*		*ug/g*		*101*	*50-140*			
Surrogate: Dibromofluoromethane	*3.91*		*ug/g*		*118*	*50-140*			
Surrogate: Toluene-d8	*3.28*		*ug/g*		*98.8*	*50-140*			
Benzene	ND	0.02	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: Toluene-d8	*3.28*		*ug/g*		*98.8*	*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)	166	7	ug/g	ND	83.0	80-120			
F2 PHCs (C10-C16)	102	4	ug/g	ND	113	60-140			
F3 PHCs (C16-C34)	246	8	ug/g	ND	111	60-140			
F4 PHCs (C34-C50)	164	6	ug/g	ND	117	60-140			
Metals									
Arsenic	48.1	1.0	ug/g	ND	94.3	70-130			
Barium	58.8	1.0	ug/g	16.3	85.1	70-130			
Beryllium	46.9	0.5	ug/g	ND	93.5	70-130			
Boron	47.7	5.0	ug/g	ND	89.4	70-130			
Cadmium	45.8	0.5	ug/g	ND	91.5	70-130			
Chromium (VI)	0.1	0.2	ug/g	ND	57.5	70-130			QM-05
Chromium	54.4	5.0	ug/g	ND	101	70-130			
Cobalt	50.1	1.0	ug/g	1.3	97.6	70-130			
Copper	48.0	5.0	ug/g	ND	90.4	70-130			
Lead	45.7	1.0	ug/g	3.5	84.2	70-130			
Mercury	1.27	0.1	ug/g	ND	84.9	70-130			
Molybdenum	47.0	1.0	ug/g	ND	93.7	70-130			
Nickel	50.2	5.0	ug/g	ND	95.5	70-130			
Selenium	40.7	1.0	ug/g	ND	81.2	70-130			
Silver	40.8	0.3	ug/g	ND	81.6	70-130			
Thallium	44.6	1.0	ug/g	ND	89.1	70-130			
Uranium	46.3	1.0	ug/g	ND	92.2	70-130			
Vanadium	56.0	10.0	ug/g	ND	101	70-130			
Zinc	49.1	20.0	ug/g	ND	83.3	70-130			
Semi-Volatiles									
Acenaphthene	0.232	0.02	ug/g	ND	101	50-140			
Acenaphthylene	0.267	0.02	ug/g	0.083	80.0	50-140			
Anthracene	0.249	0.02	ug/g	0.047	87.8	50-140			
Benzo [a] anthracene	0.332	0.02	ug/g	0.161	74.0	50-140			
Benzo [a] pyrene	0.349	0.02	ug/g	0.165	80.1	50-140			
Benzo [b] fluoranthene	0.489	0.02	ug/g	0.277	92.3	50-140			
Benzo [g,h,i] perylene	0.259	0.02	ug/g	0.101	68.7	50-140			
Benzo [k] fluoranthene	0.370	0.02	ug/g	0.126	106	50-140			
Chrysene	0.406	0.02	ug/g	0.171	102	50-140			
Dibenzo [a,h] anthracene	0.206	0.02	ug/g	0.033	75.3	50-140			
Fluoranthene	0.373	0.02	ug/g	0.222	65.7	50-140			
Fluorene	0.211	0.02	ug/g	ND	91.8	50-140			
Indeno [1,2,3-cd] pyrene	0.272	0.02	ug/g	0.106	72.4	50-140			
1-Methylnaphthalene	0.276	0.02	ug/g	0.084	83.2	50-140			
2-Methylnaphthalene	0.297	0.02	ug/g	0.102	84.8	50-140			
Naphthalene	0.263	0.01	ug/g	0.071	83.7	50-140			
Phenanthrene	0.278	0.02	ug/g	0.111	72.7	50-140			
Pyrene	0.378	0.02	ug/g	0.205	75.4	50-140			
Surrogate: 2-Fluorobiphenyl	*1.55*		*ug/g*		*84.5*	*50-140*			
Surrogate: Terphenyl-d14	*1.87*		*ug/g*		*102*	*50-140*			
Volatiles									
Acetone	6.81	0.50	ug/g	ND	68.1	50-140			
Benzene	3.15	0.02	ug/g	ND	78.7	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromodichloromethane	3.87	0.05	ug/g	ND	96.8	60-130			
Bromoform	4.76	0.05	ug/g	ND	119	60-130			
Bromomethane	3.53	0.05	ug/g	ND	88.3	50-140			
Carbon Tetrachloride	3.29	0.05	ug/g	ND	82.2	60-130			
Chlorobenzene	4.45	0.05	ug/g	ND	111	60-130			
Chloroform	3.30	0.05	ug/g	ND	82.5	60-130			
Dibromochloromethane	4.22	0.05	ug/g	ND	105	60-130			
Dichlorodifluoromethane	2.38	0.05	ug/g	ND	59.5	50-140			
1,2-Dichlorobenzene	4.25	0.05	ug/g	ND	106	60-130			
1,3-Dichlorobenzene	4.18	0.05	ug/g	ND	105	60-130			
1,4-Dichlorobenzene	4.10	0.05	ug/g	ND	102	60-130			
1,1-Dichloroethane	3.28	0.05	ug/g	ND	82.0	60-130			
1,2-Dichloroethane	2.98	0.05	ug/g	ND	74.6	60-130			
1,1-Dichloroethylene	3.04	0.05	ug/g	ND	75.9	60-130			
cis-1,2-Dichloroethylene	3.08	0.05	ug/g	ND	77.0	60-130			
trans-1,2-Dichloroethylene	3.22	0.05	ug/g	ND	80.4	60-130			
1,2-Dichloropropane	2.94	0.05	ug/g	ND	73.4	60-130			
cis-1,3-Dichloropropylene	2.90	0.05	ug/g	ND	72.5	60-130			
trans-1,3-Dichloropropylene	2.97	0.05	ug/g	ND	74.2	60-130			
Ethylbenzene	4.10	0.05	ug/g	ND	103	60-130			
Ethylene dibromide (dibromoethane, 1,2	4.23	0.05	ug/g	ND	106	60-130			
Hexane	3.04	0.05	ug/g	ND	75.9	60-130			
Methyl Ethyl Ketone (2-Butanone)	6.59	0.50	ug/g	ND	65.9	50-140			
Methyl Isobutyl Ketone	6.50	0.50	ug/g	ND	65.0	50-140			
Methyl tert-butyl ether	7.42	0.05	ug/g	ND	74.2	50-140			
Methylene Chloride	2.81	0.05	ug/g	ND	70.2	60-130			
Styrene	4.28	0.05	ug/g	ND	107	60-130			
1,1,1,2-Tetrachloroethane	4.41	0.05	ug/g	ND	110	60-130			
1,1,2,2-Tetrachloroethane	4.72	0.05	ug/g	ND	118	60-130			
Tetrachloroethylene	4.24	0.05	ug/g	ND	106	60-130			
Toluene	4.10	0.05	ug/g	ND	102	60-130			
1,1,1-Trichloroethane	3.06	0.05	ug/g	ND	76.5	60-130			
1,1,2-Trichloroethane	3.12	0.05	ug/g	ND	78.1	60-130			
Trichloroethylene	3.02	0.05	ug/g	ND	75.6	60-130			
Trichlorofluoromethane	3.19	0.05	ug/g	ND	79.8	50-140			
Vinyl chloride	2.91	0.02	ug/g	ND	72.6	50-140			
m,p-Xylenes	8.86	0.05	ug/g	ND	111	60-130			
o-Xylene	4.60	0.05	ug/g	ND	115	60-130			
Surrogate: 4-Bromofluorobenzene	*1.99*		*ug/g*		*62.1*	*50-140*			
Surrogate: Dibromofluoromethane	*2.43*		*ug/g*		*76.0*	*50-140*			
Surrogate: Toluene-d8	*3.20*		*ug/g*		*100*	*50-140*			
Benzene	3.15	0.02	ug/g	ND	78.7	60-130			
Ethylbenzene	4.10	0.05	ug/g	ND	103	60-130			
Toluene	4.10	0.05	ug/g	ND	102	60-130			
m,p-Xylenes	8.86	0.05	ug/g	ND	111	60-130			
o-Xylene	4.60	0.05	ug/g	ND	115	60-130			
Surrogate: Toluene-d8	*3.20*		*ug/g*		*100*	*50-140*			

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: 2302480

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2302480	

Client Name: Paterson	Project Ref: PE 5930
Contact Name: Mark Darcy	Quote #:
Address: 9 Auriga Drive	PO #: 56594
Telephone: 613 226 7381	E-mail: mdarcy@patersongroup.ca; mramadan@patersongroup.ca

Page 1 of 1

Turnaround Time

☐ 1 day ☐ 3 day ☐ 2 day ☑ Regular

Date Required:

☑ REG 153/04 ☐ REG 406/19

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

Other Regulation

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	pH
1	BH2-23-AU1	S		2	Jan 11 2023				X	X	X	X		X
2	BH3-23-AU1	↓		2	↓				X					
3	BH4-23-SS5			2			X							X
4	DUP1			2			X							
5	BH6-23-AU1			2						X	X	X		
6	BH7-23-AU1			2					X	X	X	X		
7	BH8-23-SS5			2			X	X						
8	BH9-23-SS5	↓		2	↓		X	X						
9														
10														

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign):	Received By Driver/Depot: M. TENSE	Received at Lab: Jumeepam Dhawan	Verified By:
Relinquished By (Print): Bryce Lee	Date/Time: 12/01/23 1600	Date/Time: JAN 13 2023 04.45	Date/Time: Jan 13 2023 9:27
Date/Time: Jan 12, 2022	Temperature: °C	Temperature: 8.3 C	pH Verified: ☐ By: NA

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Certificate of Analysis

Paterson Group Consulting Engineers

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Mark D'Arcy

Client PO: 56629
Project: PE5930
Custody:

Report Date: 23-Jan-2023
Order Date: 18-Jan-2023

Order #: 2303314

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

Paracel ID	Client ID
2303314-01	BH4-23-GW1
2303314-02	BH8-23-GW1
2303314-03	BH9-23-GW1
2303314-04	DUP

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 23-Jan-2023

Client: Paterson Group Consulting Engineers

Order Date: 18-Jan-2023

Client PO: 56629

Project Description: PE5930

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	23-Jan-23	23-Jan-23
PHC F1	CWS Tier 1 - P&T GC-FID	20-Jan-23	23-Jan-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	19-Jan-23	19-Jan-23
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	19-Jan-23	20-Jan-23
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	20-Jan-23	23-Jan-23

Certificate of Analysis

Report Date: 23-Jan-2023

Client: Paterson Group Consulting Engineers

Order Date: 18-Jan-2023

Client PO: 56629

Project Description: PE5930

	Client ID:	BH4-23-GW1	BH8-23-GW1	BH9-23-GW1	DUP
	Sample Date:	17-Jan-23 09:00	17-Jan-23 09:00	17-Jan-23 09:00	17-Jan-23 09:00
	Sample ID:	2303314-01	2303314-02	2303314-03	2303314-04
	MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water
Volatiles					
Acetone	5.0 ug/L	-	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	-	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	-	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	-	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	-	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	-	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	-	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	-	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	-	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	-	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	-	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	-	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	-	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	-	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	-	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	-	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	-	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	-	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	-	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	-	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	-	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	-	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	-	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	-	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	-	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	-	<0.5	<0.5	<0.5

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 56629

Report Date: 23-Jan-2023

Order Date: 18-Jan-2023

Project Description: PE5930

	Client ID:	BH4-23-GW1	BH8-23-GW1	BH9-23-GW1	DUP
	Sample Date:	17-Jan-23 09:00	17-Jan-23 09:00	17-Jan-23 09:00	17-Jan-23 09:00
	Sample ID:	2303314-01	2303314-02	2303314-03	2303314-04
	MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water
1,1,2-Trichloroethane	0.5 ug/L	-	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	-	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	-	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	-	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	-	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	-	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	-	<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	-	103%	104%	104%
Dibromofluoromethane	Surrogate	-	97.8%	96.7%	98.6%
Toluene-d8	Surrogate	-	112%	113%	112%
Benzene	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
Toluene-d8	Surrogate	113%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	-
Semi-Volatiles					
Acenaphthene	0.05 ug/L	<0.05	-	-	-
Acenaphthylene	0.05 ug/L	<0.05	-	-	-
Anthracene	0.01 ug/L	<0.01	-	-	-
Benzo [a] anthracene	0.01 ug/L	<0.01	-	-	-
Benzo [a] pyrene	0.01 ug/L	<0.01	-	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05	-	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	-	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05	-	-	-
Chrysene	0.05 ug/L	<0.05	-	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	-	-	-
Fluoranthene	0.01 ug/L	0.04	-	-	-
Fluorene	0.05 ug/L	<0.05	-	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	-	-	-

Certificate of Analysis

Report Date: 23-Jan-2023

Client: Paterson Group Consulting Engineers

Order Date: 18-Jan-2023

Client PO: 56629

Project Description: PE5930

	Client ID:	BH4-23-GW1	BH8-23-GW1	BH9-23-GW1	DUP
	Sample Date:	17-Jan-23 09:00	17-Jan-23 09:00	17-Jan-23 09:00	17-Jan-23 09:00
	Sample ID:	2303314-01	2303314-02	2303314-03	2303314-04
	MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water
1-Methylnaphthalene	0.05 ug/L	<0.05	-	-	-
2-Methylnaphthalene	0.05 ug/L	<0.05	-	-	-
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	-	-	-
Naphthalene	0.05 ug/L	<0.05	-	-	-
Phenanthrene	0.05 ug/L	0.07	-	-	-
Pyrene	0.01 ug/L	0.02	-	-	-
2-Fluorobiphenyl	Surrogate	114%	-	-	-
Terphenyl-d14	Surrogate	125%	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	*21.7*		*ug/L*		*109*	*50-140*			
Surrogate: Terphenyl-d14	*23.5*		*ug/L*		*117*	*50-140*			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*81.2*		*ug/L*		*102*	*50-140*			
Surrogate: Dibromofluoromethane	*63.7*		*ug/L*		*79.6*	*50-140*			
Surrogate: Toluene-d8	*83.9*		*ug/L*		*105*	*50-140*			
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: Toluene-d8	*83.9*		*ug/L*		*105*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	2.65	0.5	ug/L	2.91			9.4	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	3.44	0.5	ug/L	4.72			31.4	30	QR-07
Dibromochloromethane	1.89	0.5	ug/L	1.63			14.8	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*81.2*		*ug/L*		*102*	*50-140*			
Surrogate: Dibromofluoromethane	*64.9*		*ug/L*		*81.2*	*50-140*			
Surrogate: Toluene-d8	*84.0*		*ug/L*		*105*	*50-140*			
Benzene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: Toluene-d8	*84.0*		*ug/L*		*105*	*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)	1860	25	ug/L	ND	93.0	68-117			
F2 PHCs (C10-C16)	1460	100	ug/L	ND	91.0	60-140			
F3 PHCs (C16-C34)	3960	100	ug/L	ND	101	60-140			
F4 PHCs (C34-C50)	2460	100	ug/L	ND	99.0	60-140			
Semi-Volatiles									
Acenaphthene	4.71	0.05	ug/L	ND	94.3	50-140			
Acenaphthylene	4.35	0.05	ug/L	ND	86.9	50-140			
Anthracene	4.51	0.01	ug/L	ND	90.2	50-140			
Benzo [a] anthracene	4.51	0.01	ug/L	ND	90.2	50-140			
Benzo [a] pyrene	4.36	0.01	ug/L	ND	87.3	50-140			
Benzo [b] fluoranthene	5.94	0.05	ug/L	ND	119	50-140			
Benzo [g,h,i] perylene	3.89	0.05	ug/L	ND	77.8	50-140			
Benzo [k] fluoranthene	5.84	0.05	ug/L	ND	117	50-140			
Chrysene	4.88	0.05	ug/L	ND	97.7	50-140			
Dibenzo [a,h] anthracene	4.33	0.05	ug/L	ND	86.6	50-140			
Fluoranthene	4.13	0.01	ug/L	ND	82.6	50-140			
Fluorene	4.62	0.05	ug/L	ND	92.4	50-140			
Indeno [1,2,3-cd] pyrene	4.44	0.05	ug/L	ND	88.8	50-140			
1-Methylnaphthalene	5.44	0.05	ug/L	ND	109	50-140			
2-Methylnaphthalene	5.99	0.05	ug/L	ND	120	50-140			
Naphthalene	5.32	0.05	ug/L	ND	106	50-140			
Phenanthrene	4.37	0.05	ug/L	ND	87.4	50-140			
Pyrene	4.21	0.01	ug/L	ND	84.1	50-140			
Surrogate: 2-Fluorobiphenyl	*15.2*		*ug/L*		*75.8*	*50-140*			
Surrogate: Terphenyl-d14	*15.7*		*ug/L*		*78.5*	*50-140*			
Volatiles									
Acetone	100	5.0	ug/L	ND	100	50-140			
Benzene	39.1	0.5	ug/L	ND	97.8	60-130			
Bromodichloromethane	37.2	0.5	ug/L	ND	92.9	60-130			
Bromoform	33.0	0.5	ug/L	ND	82.6	60-130			
Bromomethane	45.0	0.5	ug/L	ND	112	50-140			
Carbon Tetrachloride	37.5	0.2	ug/L	ND	93.7	60-130			
Chlorobenzene	41.4	0.5	ug/L	ND	103	60-130			
Chloroform	36.0	0.5	ug/L	ND	89.9	60-130			
Dibromochloromethane	34.2	0.5	ug/L	ND	85.6	60-130			
Dichlorodifluoromethane	48.1	1.0	ug/L	ND	120	50-140			
1,2-Dichlorobenzene	39.1	0.5	ug/L	ND	97.7	60-130			
1,3-Dichlorobenzene	39.1	0.5	ug/L	ND	97.8	60-130			
1,4-Dichlorobenzene	37.6	0.5	ug/L	ND	94.1	60-130			
1,1-Dichloroethane	37.5	0.5	ug/L	ND	93.7	60-130			
1,2-Dichloroethane	36.5	0.5	ug/L	ND	91.3	60-130			
1,1-Dichloroethylene	41.6	0.5	ug/L	ND	104	60-130			
cis-1,2-Dichloroethylene	42.9	0.5	ug/L	ND	107	60-130			
trans-1,2-Dichloroethylene	37.4	0.5	ug/L	ND	93.4	60-130			
1,2-Dichloropropane	35.5	0.5	ug/L	ND	88.7	60-130			
cis-1,3-Dichloropropylene	35.4	0.5	ug/L	ND	88.4	60-130			
trans-1,3-Dichloropropylene	37.0	0.5	ug/L	ND	92.4	60-130			
Ethylbenzene	40.6	0.5	ug/L	ND	102	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Ethylene dibromide (dibromoethane, 1,2-	35.5	0.2	ug/L	ND	88.8	60-130			
Hexane	39.1	1.0	ug/L	ND	97.8	60-130			
Methyl Ethyl Ketone (2-Butanone)	86.4	5.0	ug/L	ND	86.4	50-140			
Methyl Isobutyl Ketone	82.0	5.0	ug/L	ND	82.0	50-140			
Methyl tert-butyl ether	79.2	2.0	ug/L	ND	79.2	50-140			
Methylene Chloride	40.0	5.0	ug/L	ND	100	60-130			
Styrene	36.2	0.5	ug/L	ND	90.4	60-130			
1,1,1,2-Tetrachloroethane	35.1	0.5	ug/L	ND	87.8	60-130			
1,1,2,2-Tetrachloroethane	35.0	0.5	ug/L	ND	87.5	60-130			
Tetrachloroethylene	41.3	0.5	ug/L	ND	103	60-130			
Toluene	42.1	0.5	ug/L	ND	105	60-130			
1,1,1-Trichloroethane	36.2	0.5	ug/L	ND	90.6	60-130			
1,1,2-Trichloroethane	33.7	0.5	ug/L	ND	84.3	60-130			
Trichloroethylene	40.4	0.5	ug/L	ND	101	60-130			
Trichlorofluoromethane	48.0	1.0	ug/L	ND	120	60-130			
Vinyl chloride	45.3	0.5	ug/L	ND	113	50-140			
m,p-Xylenes	80.9	0.5	ug/L	ND	101	60-130			
o-Xylene	41.2	0.5	ug/L	ND	103	60-130			
Surrogate: 4-Bromofluorobenzene	*81.6*		*ug/L*		*102*	*50-140*			
Surrogate: Dibromofluoromethane	*78.9*		*ug/L*		*98.7*	*50-140*			
Surrogate: Toluene-d8	*80.5*		*ug/L*		*101*	*50-140*			
Benzene	39.1	0.5	ug/L	ND	97.8	60-130			
Ethylbenzene	40.6	0.5	ug/L	ND	102	60-130			
Toluene	42.1	0.5	ug/L	ND	105	60-130			
m,p-Xylenes	80.9	0.5	ug/L	ND	101	60-130			
o-Xylene	41.2	0.5	ug/L	ND	103	60-130			
Surrogate: Toluene-d8	*80.5*		*ug/L*		*101*	*50-140*			

Qualifier Notes:

QC Qualifiers :

QR-07 Duplicate result exceeds RPD limits due to non-homogeneity between multiple sample vials. Remainder of QA/QC is acceptable.

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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

PARACEL LABORATORIES LTD.

Paracel ID: 2303314

Paracel Order Number (Lab Use Only)	**Chain Of Custody** (Lab Use Only)

Client Name: Paterson	Project Ref: PE 5930	Page 1 of 1
Contact Name: Mark Darcy	Quote #:	**Turnaround Time**
Address: 9 Auriga Drive	PO #: 56629	☐ 1 day ☐ 3 day
	E-mail: mdarcy@patersongroup.ca	☐ 2 day ☑ Regular
Telephone: 613 226 7381		Date Required:

☑ REG 153/04 ☐ REG 406/19	Other Regulation	Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)	Required Analysis
☐ Table 1 ☐ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO		
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ CCME ☐ MISA		
☐ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm		
☐ Table ___	Mun: ___		
For RSC: ☐ Yes ☐ No	☐ Other:		

	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)					
1	BH4-23-GW1	GW		4	Jan 17, 2023		X		X									
2	BH 8-23-GW1	↓		3	↓		X	X										
3	BH 9-23-GW1			3			X	X										
4	DUP	↓		2	↓			X										
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Bryce Lee	Date/Time: 18/01/23 1520	Date/Time: JAN 18, 2023 14:04	Date/Time: Jan 19/23
Date/Time: Jan 18 2023	Temperature: °C	Temperature: 9.8	pH Verified: ☐ By: N/A