

Phase II – Environmental Site Investigation

Part of 1380 Howie Road
Ottawa, Ontario

Prepared for T.G. Carroll Cartage

Report: PE5276-2

Date: April 17, 2024

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the property addressed Part of 1380 Howie Road, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

The Phase II ESA subsurface investigation consisted of drilling four boreholes across the Phase II Property. All boreholes were constructed with groundwater monitoring wells. The general soil profile encountered during the field program consisted of a thin layer of topsoil, followed by fill material consisting of brown silty sand with gravel, and some organics (reworked native), followed by native brown silty sand, underlain by glacial till. Bedrock was encountered at depths ranging from 1.98-3.81 mbgs.

A total of five soil samples (plus one duplicate) were submitted for analysis of metals (including As, Sb, Se, Hg and CrVI), BTEX, PHCs, PAHs, EC, SAR and/or pH. All parameter concentrations analyzed in the soil samples comply with MECP Table 2 Residential Standards.

A total of four groundwater samples (plus one duplicate) from the installed monitoring wells were collected during the January 23, 2024 and January 25, 2024 sampling events and submitted for laboratory analysis of metals (including As, Sb, Se, Hg and CrVI), BTEX, VOCs, PHCs and/or PAHs. All groundwater results comply with the selected MECP Table 2 Standards.

Based on the findings of this Phase II ESA, no further environmental investigation is required.

Recommendations

Groundwater Monitoring Wells

It is our recommendation that the monitoring wells installed on the Phase II Property should remain viable for future monitoring. If they are not going to be used in the future, or will be entirely removed, they should be abandoned according to Ontario Regulation 903. The wells will be registered with the MECP under this regulation.

1.0 INTRODUCTION

At the request of T.G. Carroll Cartage, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the property addressed as Part of 1380 Howie Road, in the City of Ottawa, Ontario. The purpose of this Phase II ESA has been to address areas of potential environmental concern (APECs) identified on the Phase II Property, during the Phase I ESA conducted by Paterson Group in July of 2022.

1.1 Site Description

Address:	Part of 1380 Howie Road, Ottawa, Ontario
Legal Description:	Part of Lot 13, Concession 7, Geographic Township of Huntley, in the City of Ottawa, Ontario.
Location:	The Phase II Property is located on the north side of Howie Road, approximately 1.3 km southeast of March Road, in the City of Ottawa, Ontario. Refer to Figure 1 – Key Plan in the Figures section following the text.
Latitude and Longitude:	45° 17' 14" N, 76° 04' 14" W

Site Description:

Configuration:	Irregular
Site Area:	67.5 ha (approximate)
Zoning:	RU – Rural Countryside Zone.
Current Use:	The Phase II Property is primarily undeveloped, with an equipment storage area, a sand, aggregate and fill stockpile area, and vacant, treed and wetland areas.
Services:	The Phase I Property is located in a privately serviced area.

1.2 Property Ownership

Paterson was engaged to conduct this Phase II-ESA by Mr. Tom Carroll of T.G. Carroll Cartage. Mr. Carroll can be reached by telephone at (613) 836-7927.

1.3 Current and Proposed Future Uses

The Phase II Property is currently undeveloped, with an equipment storage area, a sand, aggregate and fill stockpile area, and vacant, treed areas. A treed and unused area of the property, in the northern corner of the Phase II Property, is proposed to be severed and used for residential purposes.

1.4 Applicable Site Condition Standard

The site condition standards for the property were obtained from Table 2 of the document entitled “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”, prepared by the Ontario Ministry of Environment, Conservation and Parks (MECP), April 2011. The MECP selected Table 2 Standards are based on the following considerations:

- ☐ Coarse-grained soil conditions
- ☐ Full depth generic site conditions
- ☐ Potable groundwater conditions
- ☐ Residential land use

Section 35 of O.Reg. 153/04 does not apply to the Phase II Property in that properties within the Phase I Study Area do not rely upon municipal drinking water.

Section 41 of O.Reg. 153/04 does not apply to the Phase II Property, as the property is not within 30 m of an environmentally sensitive area. Note that part of the Phase II Property is shown on some databases as a wetland, however, based on discussion with the landowner, the site is largely dry, and is in the process of being reassessed. For the purposes of this Phase II, the site is not being considered as a wetland.

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

The residential standards were selected based on the proposed future use of the Phase II Property. Coarse-grained soil standards were chosen as a conservative approach. Grain size analysis was not completed.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is located on the north side of Howie Road, approximately 1.3 km southeast of March Road, in the City of Ottawa, Ontario. According to the City of Ottawa website, the Phase II Property is situated in a rural countryside zone.

At the time of the Phase II ESA, the Phase II Property is mostly vacant land, with a mixture of trees, brush, and cleared land. Some fill piles of varying sizes were present across the front of the site, from clearing operations (peat and topsoil/organics) and aggregates (sand, crushed stone, pea gravel, etc.). Some demolition generated fill material (brick, asphalt, concrete, etc.) was also present in various stockpiles in the western portion of the site. A heavy equipment parking area is located in the west-central portion of the site, which contained vehicle storage related to seasonal road maintenance and excavation activities.

No ponded water, stressed vegetation, surficial staining, or any other indications of potential sub-surface contamination were observed on the Phase II Property at the time of the site inspection.

Site topography is relatively flat whereas the regional topography slopes downwards to the northwest.

Water drainage on the Phase II Property occurs primarily via infiltration. Hydrogeological conditions are considered to mimic the topographic setting, in which, groundwater is anticipated to flow in a westerly direction.

2.2 Past Investigations

- *“Phase I Environmental Site Assessment, Part of 1380 Howie Road, Ottawa, Ontario”, prepared by Paterson Group, dated July 31, 2022.*

Paterson Group completed a Phase I ESA in July of 2022 for the Phase II Property. Based on the findings of the Phase I ESA, two on-site Potentially Contaminating Activities (PCAs) were considered to result in APECs on the Phase II Property. One off-site PCA was considered to result in an APEC on the Phase II Property. The APECs consist of heavy equipment storage for seasonal road maintenance on the west-central portion of the property, fill material across the western portion of the property, and a

waste disposal site at the northwestern corner of the property. A Phase II ESA was recommended to address the aforementioned APECs.

- “*Preliminary Geotechnical Investigation, Proposed Lot Severances, 1380 Howie Road, Ottawa, Ontario*”, prepared by Paterson Group, dated June 30, 2021.

Paterson Group completed a Preliminary Geotechnical Investigation in June of 2021 for the property. Paterson conducted a test pit program consisting of twelve test pits across the property. The test pit locations were selected based on general coverage purposes, taking into consideration varying site features and underground services.

The general subsurface profile encountered throughout the eastern portion of the property consisted of topsoil or peat, extending to depths of 0.2 to 1.2 mbgs, underlain by compact silty sand.

The general subsurface profile encountered throughout the western portion of the property consisted of topsoil underlain by glacial till, which consisted of dense silty sand with gravel, cobbles, and boulders.

Practical refusal was encountered in test pit TP12-21, along the northwest portion of the property, at a depth of 2 mbgs.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted on January 15, 2024. The field program consisted of drilling four boreholes across the Phase II Property. All boreholes were instrumented with groundwater monitoring wells. Boreholes were drilled to a maximum depth of 6.15 m below the existing ground surface (mbgs).

3.2 Media Investigated

During the subsurface investigation, soil samples and groundwater samples were obtained and submitted for laboratory analysis. The rationale for sampling and analyzing these media is based on the Contaminants of Potential Concern identified during a review of the 2022 Phase I ESA.

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

- ☐ Petroleum Hydrocarbons, Fractions 1 – 4 (PHCs F₁-F₄);
- ☐ Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- ☐ Volatile Organic Compounds (VOCs)
- ☐ Metals (including As, Sb, Se, Hg and CrVI);
- ☐ Electrical conductivity (EC) and Sodium Adsorption Ratio (SAR).

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

Geological mapping information for the Phase I Property was obtained from The Geological Survey of Canada – Urban Geology of the National Capital Area and reviewed as part of this assessment. Based on the available mapping information, the bedrock beneath the eastern portion of the property consists of limestone of the Bobcaygeon formation, while the bedrock in the western portion of the property consists of limestone and dolomite of the Gull River formation. Surficial soils consist of till and marine deposits, with a drift thickness of 1 to 5 meters.

Groundwater is anticipated to be encountered within the overburden and flow in a westerly direction.

Buildings and Structures

No buildings are present on the Phase I Property.

Subsurface Structures and Utilities

No subsurface structures were identified on the Phase I Property.

Water Bodies and Areas of Natural Significance

No water bodies or areas of natural significance were identified on the property or in the Phase I Study Area. Man-made drainage channels are present, however do not represent water bodies.

Drinking Water Wells

Potable drinking water wells are located within the Phase I Study Area, along Howie Road to the south, and Rocky Creek Way to the north.

Monitoring Well Records

No monitoring well records were identified within the Phase I Study Area.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area consists of vacant and agricultural lands, residential properties, commercial pits/quarries, and a waste disposal site adjacent to the northwest of the Phase I Property. Land use is shown on Drawing PE5276-3-Surrounding Land Use Plan.

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

Two on-site potentially contaminating activities (PCAs), resulting in areas of potential environmental concern (APECs), were identified on the Phase I Property. Additionally, one off-site PCA, resulting in an APEC, was identified on the Phase I Property. The PCAs, APECs and associated CPCs are summarized in Table 1.

Table 1 - Areas of Potential Environmental Concern					
Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I Property	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1 Heavy Equipment Storage for Seasonal Road Maintenance	West-central portion of the Phase I Property	<i>"Item 52: Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems"</i>	On-Site	BTEX PHCs (F1-F4) EC SAR	Soil Groundwater
APEC 2 Fill Material of Unknown Quality	Western portion of the Phase I Property	<i>"Item 30: Importation of Fill Material of Unknown Quality"</i>	On-Site	BTEX PHCs (F1-F4) Metals	Soil

Table 1 - Areas of Potential Environmental Concern					
Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I Property	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 3 Waste Disposal Site	Northwestern portion of the Phase I Property	<i>"Item 58: Waste Disposal and Waste Management, including thermal treatment, landfilling and transfer of waste, other than use of biosoils as soil conditioners"</i>	Adjacent northwest	VOCs PHCs (F1-F4)	Groundwater

No additional PCAs were identified within the Phase I Study Area.

Contaminants of Potential Concern

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

- ☐ Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F₁-F₄);
- ☐ Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- ☐ Volatile Organic Compounds (VOCs)
- ☐ Metals (including arsenic (As), antimony (Sb), selenium (Se), hexavalent chromium (CrVI) and mercury (Hg));
- ☐ Electrical Conductivity (EC), and Sodium Adsorption Ratio (SAR).

These CPCs have the potential to be present in the soil matrix and 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 this Phase I ESA is considered to be sufficient to conclude that there are PCAs resulting in APECs associated with the Phase I Property. As such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Deviations from Sampling and Analysis Plan

The Sampling and Analysis Plan for this project is included in Appendix 1 of this report. No deviations from the sampling and analysis plan were identified during the Phase II ESA.

3.5 Impediments

No physical impediments were encountered during the Phase II ESA program.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was conducted on January 15, 2024. The field program consisted of drilling four boreholes across the Phase II Property.

The boreholes were drilled to a maximum depth of 6.15 m below ground surface (mbgs), all of which were completed as groundwater monitoring wells to access the groundwater table.

The boreholes were placed to address the aforementioned APECs as listed in Table 1.

The boreholes were drilled with a low clearance drill rig operated by George Downing Estate Drilling of Hawkesbury, Ontario, under full-time supervision of Paterson personnel. The borehole locations are indicated on the attached Drawing PE5276-3 – Test Hole Location Plan.

4.2 Soil Sampling

A total of 16 soil samples were obtained from the boreholes by means of grab sampling from auger flights/auger samples and split spoon sampling. Split spoon samples were taken at approximate 0.76 m intervals. Rock core samples were collected with the use of coring equipment.

The depths at which auger and split spoon samples were obtained from the boreholes are shown as “**AU**”, “**SS**” and “**RC**” respectively on the Soil Profile and Test Data Sheets.

The borehole profiles generally consist of thin layer of topsoil, followed by fill material consisting of brown silty sand with gravel, and some organics, followed

by native brown silty sand, underlain by glacial till. Bedrock was encountered at depths ranging from 1.98-3.81 mbgs.

Borehole locations are shown on Drawing PE5276-3 – Test Hole Location Plan.

4.3 Field Screening Measurements

Soil samples recovered at the time of sampling 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. Allowing the samples to stabilize to room temperature ensures consistency of readings between samples.

To measure the soil vapours, the analyser probe is inserted into the nominal headspace above the soil sample. A photo ionization detector (PID) was used to measure the volatile organic vapour concentrations. The sample is agitated/manipulated gently as the measurement is taken. The peak reading registered within the first 15 seconds is recorded as the vapour measurement.

The maximum vapour reading measured was 0.7 ppm in the soil samples obtained. These results were not considered to be indicative of potential significant contamination from volatile contaminants. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

No visual or olfactory indications of potential contamination were identified in the soil samples.

4.4 Groundwater Monitoring Well Installation

Four groundwater monitoring wells were installed on the Phase II Property as part of the subsurface investigation. The monitoring wells consisted of 32 mm diameter Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1. Monitoring wells had also been installed during a previous investigation by Pinchin. Pinchin monitoring well construction details are presented below in Table 2B.

Borehole locations and elevations were surveyed geodetically by Paterson personnel.

TABLE 2 - Monitoring Well Construction Details						
Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1-24	133.76	4.55	3.00-4.55	2.67-4.55	0-2.67	Stick-Up
BH2-24	132.63	4.55	3.00-4.55	2.74-4.55	0-2.74	Stick-Up
BH3-24	138.47	6.15	4.60-6.15	4.30-6.15	0-4.30	Stick-Up
BH4-24	131.43	3.20	1.70-3.20	1.40-3.20	0-1.40	Stick-Up

4.5 Groundwater Sampling

Groundwater sampling was conducted on January 23, 2024 and January 25, 2024. Groundwater sampling protocols were followed using the MECP document entitled “Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario”, dated May 1996. Groundwater samples were obtained from each monitoring well, using dedicated sampling equipment. Standing water was purged from each well prior to sampling. Samples were stored in coolers to reduce analyte volatilization during transportation. Details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan in Appendix 1.

4.6 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan appended to this report, the following soil and groundwater samples, as well as analyzed parameters are presented in Tables 3 and 4.

Table 3 - Testing Parameters for Submitted Soil Samples									
Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed						Rationale	
		Metals ¹	BTEX	PHCs F ₁ -F ₄	PAHs	VOCs	EC/SAR		pH
January 15, 2024									
BH1-23-SS2/SS3	0.76 – 2.13 m Silty Sand (Glacial Till)	X	X	X					Assess potential soil impacts resulting from the importation of fill material of unknown quality.
BH2-24-SS2	0.76 – 1.37 m Silty Sand (Glacial Till)	X		X		X			Assess potential soil impacts resulting from the importation of fill material of unknown quality.
DUP1 (BH2-24-SS2)	0.76 – 1.37 m Silty Sand (Glacial Till)					X			Duplicate soil sample (BH4-24-SS2) for QA/QC purposes

Table 3 - Testing Parameters for Submitted Soil Samples

January 16, 2024

BH3-24(D)-AU1	0.10 – 0.61 m Silty Sand (Fill Material)						X	Assess potential soil impacts resulting from the presence of heavy equipment and vehicle storage.
BH3-24(D)-SS4	2.29 – 2.90 m Silty Sand (Glacial Till)		X	X	X			Assess potential soil impacts resulting from the presence of heavy equipment and vehicle storage.
BH4-24(C)-SS4	2.29 – 2.90 m Silty Sand (Glacial Till)			X		X		Asses potential soil impacts from neighbouring waste disposal site.

Notes:

1 – including As, Sb, Se, CrVI and Hg

TABLE 4 - Testing Parameters for Submitted Groundwater Samples

Sample ID	Screened Interval	Parameters Analyzed					Rationale
		Metals ¹	BTEX	PHCs F ₁ -F ₄	VOCs	PAHs	
BH1-24 (A)	3.00-4.55 m Bedrock	X	X	X			Assess potential groundwater impacts resulting from the importation of fill material of unknown quality.
BH2-24 (B)	3.00-4.55 m Bedrock			X	X		Assess potential groundwater impacts resulting from the importation of fill material of unknown quality.
BH3-24 (D)	4.60-6.15 m Bedrock		X	X		X	Assess potential groundwater impacts resulting from the presence of heavy equipment and vehicle storage.
BH4-24 (C)	1.70-3.20 m Glacial Till	X		X	X		Assess potential groundwater impacts resulting from the neighbouring waste disposal site.

Notes:

▪ 1 – including As, Sb, Se, CrVI and Hg

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

4.7 Residue Management

All soil cuttings, purge water and fluids from equipment cleaning 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 quality assurance and quality control (QA/QC) measures, including sampling containers, preservation, labelling, handling, and custody, equipment cleaning procedures, and field quality control measurements is provided in the Sampling and Analysis Plan in Appendix 1.

5.0 REVIEW AND EVALUATION

5.1 Geology

The borehole profiles generally consist of a thin layer of topsoil, followed by fill material consisting of brown silty sand with gravel, and some organics, followed by native brown silty sand, underlain by glacial till. Bedrock was encountered at depths ranging from 1.98-3.81 mbgs.

Based on our observations, the fill material (brown silty sand) encountered in the boreholes appears to consist of reworked native material.

Groundwater was encountered within the overburden at depths of 1.15 and 2.11 mbgs, respectively.

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

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling event on January 25, 2024 using an electronic water level meter. Groundwater levels were recorded from the monitoring wells. Groundwater levels are summarized in Table 5.

TABLE 5 - Groundwater Level Measurements				
Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1-24	133.76	2.11	131.65	January 25, 2024
BH2-24	132.63	1.88	130.75	January 25, 2024
BH3-24	138.47	1.15	137.32	January 25, 2024
BH4-24	131.43	1.67	129.76	January 25, 2024

Based on the groundwater elevations measured during the sampling events, groundwater flow at the subject site is anticipated to flow in a northeasterly direction. It should be noted that groundwater levels are expected to fluctuate throughout the year with seasonal variations.

5.3 Fine-Coarse Soil Texture

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

5.4 Soil: Field Screening

Field screening of the soil samples collected during drilling resulted in vapour readings ranging from 0 to 0.7 ppm. No obvious visual or olfactory indications of potential environmental concerns were identified in the soil samples. The field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

5.5 Soil Quality

Based on the findings of the field screening in combination with sample depth and location, seven soil samples (including one duplicate) were submitted for analysis of metals (including As, Sb, Se, Hg and CrVI), BTEX, PHCs, PAHs, EC, SAR and/or pH. The results of the analytical testing are presented in Tables 6 to 10. The laboratory Certificates of Analysis are provided in Appendix 1.

TABLE 6 - Analytical Test Results – Soil Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)		MECP Table 2 Residential Standards (µg/g)
		January 15, 2024		
		BH1-24-SS2/SS3	BH2-24-SS2	
Antimony	1.0	nd	nd	7.5
Arsenic	1.0	2.3	3.3	18
Barium	1.0	305	123	390
Beryllium	0.5	nd	nd	4
Boron	5.0	10.2	nd	120
Cadmium	0.5	nd	nd	1.2
Chromium (VI)	0.2	nd	nd	8
Chromium	5.0	12	23.1	160
Cobalt	1.0	3.5	11.9	22
Copper	5.0	13.4	26.1	140
Lead	1.0	30.6	4.3	120
Mercury	0.1	nd	nd	0.27
Molybdenum	1.0	1.4	nd	6.9
Nickel	5.0	6.9	17.6	100
Selenium	1.0	nd	nd	2.4
Silver	0.3	nd	nd	20
Thallium	1.0	nd	nd	1
Uranium	1.0	nd	nd	23
Vanadium	10.0	21.3	41.8	86
Zinc	20.0	176	25.2	340

Notes:

MDL – Method Detection Limit

nd – not detected above the MDL

All detected metal concentrations in the soil samples analysed comply with the selected MECP Table 2 Residential Standards. The analytical results for metals tested in soil are shown on Drawing PE5276-4 – Analytical Testing Plan – Soil.

TABLE 7 - Analytical Test Results – Soil PHCs (F₁ – F₄)

Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 2 Residential Standards (µg/g)
		January 15, 2024		January 16, 2024		
		BH1-24- SS2/SS3	BH2-24- SS2	BH3-24(D)- SS4	BH4-24(C)- SS4	
F1 PHC (C6-C10)	7	nd	nd	nd	nd	55
F2 PHC (C10-C16)	4	nd	nd	nd	nd	98
F3 PHC (C16-C34)	8	60	nd	nd	nd	300
F4 PHC (C34-C50)	6	85	nd	nd	nd	2,800
Notes:						
- MDL – Method Detection Limit - nd – not detected above the MDL						

All PHC parameters concentrations in the soil samples analysed comply with the selected MECP Table 2 Standards. The analytical results for PHCs tested in soil are shown on Drawing PE5276-4 – Analytical Testing Plan – Soil.

**TABLE 8 - Analytical Test Results – Soil
BTEX/VOCs**

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 2 Residential Standards (µg/g)
		January 15, 2024			
		BH1-24- SS2/SS3	BH2-24-SS2	DUP1 (BH2- 24-SS2)	
Acetone	0.50	NA	nd	nd	16
Benzene	0.02	nd	nd	nd	0.21
Bromodichloromethane	0.05	NA	nd	nd	1.5
Bromoform	0.05	NA	nd	nd	0.27
Bromomethane	0.05	NA	nd	nd	0.05
Carbon Tetrachloride	0.05	NA	nd	nd	0.05
Chlorobenzene	0.05	NA	nd	nd	2.4
Chloroform	0.05	NA	nd	nd	0.05
Dibromochloromethane	0.05	NA	nd	nd	2.3
Dichlorodifluoromethane	0.05	NA	nd	nd	16
1,2-Dichlorobenzene	0.05	NA	nd	nd	1.2
1,3-Dichlorobenzene	0.05	NA	nd	nd	4.8
1,4-Dichlorobenzene	0.05	NA	nd	nd	0.083
1,1-Dichloroethane	0.05	NA	nd	nd	0.47
1,2-Dichloroethane	0.05	NA	nd	nd	0.05
1,1-Dichloroethylene	0.05	NA	nd	nd	0.05
cis-1,2-Dichloroethylene	0.05	NA	nd	nd	1.9
trans-1,2-Dichloroethylene	0.05	NA	nd	nd	0.084
1,2-Dichloropropane	0.05	NA	nd	nd	0.05
cis-1,3-Dichloropropylene	0.05	NA	nd	nd	
trans-1,3-Dichloropropylene	0.05	NA	nd	nd	
1,3-Dichloropropene, total	0.05	NA	nd	nd	0.05
Ethylbenzene	0.05	nd	nd	nd	1.1
Ethylene dibromide (dibromoethane, 1,2-)	0.05	NA	nd	nd	0.05
Hexane	0.05	NA	nd	nd	2.8
Methyl Ethyl Ketone (2-Butanone)	0.50	NA	nd	nd	16
Methyl Isobutyl Ketone	0.50	NA	nd	nd	1.7
Methyl tert-butyl ether	0.05	NA	nd	nd	0.75
Methylene Chloride	0.05	NA	nd	nd	0.1
Styrene	0.05	NA	nd	nd	0.7
1,1,1,2-Tetrachloroethane	0.05	NA	nd	nd	0.058
1,1,2,2-Tetrachloroethane	0.05	NA	nd	nd	0.05
Tetrachloroethylene	0.05	NA	nd	nd	0.28
Toluene	0.05	nd	nd	nd	2.3
1,1,1-Trichloroethane	0.05	NA	nd	nd	0.38
1,1,2-Trichloroethane	0.05	NA	nd	nd	0.05
Trichloroethylene	0.05	NA	nd	nd	0.061
Trichlorofluoromethane	0.05	NA	nd	nd	4
Vinyl Chloride	0.02	NA	nd	nd	0.02
m/p-Xylene	0.05	nd	nd	nd	
o-Xylene	0.05	nd	nd	nd	
Xylenes, total	0.05	nd	nd	nd	3.1
Notes: - MDL – Method Detection Limit - nd – not detected above the MDL - NA – Not Analyzed					

**TABLE 8 - Analytical Test Results – Soil - Continued
BTEX/VOCs**

Parameter	MDL (µg/g)	Soil Samples (µg/g)		MECP Table 2 Residential Standards (µg/g)
		January 16, 2024		
		BH3-24(D)-SS4	BH4-24(C)-SS4	
Acetone	0.50	NA	nd	16
Benzene	0.02	nd	nd	0.21
Bromodichloromethane	0.05	NA	nd	1.5
Bromoform	0.05	NA	nd	0.27
Bromomethane	0.05	NA	nd	0.05
Carbon Tetrachloride	0.05	NA	nd	0.05
Chlorobenzene	0.05	NA	nd	2.4
Chloroform	0.05	NA	nd	0.05
Dibromochloromethane	0.05	NA	nd	2.3
Dichlorodifluoromethane	0.05	NA	nd	16
1,2-Dichlorobenzene	0.05	NA	nd	1.2
1,3-Dichlorobenzene	0.05	NA	nd	4.8
1,4-Dichlorobenzene	0.05	NA	nd	0.083
1,1-Dichloroethane	0.05	NA	nd	0.47
1,2-Dichloroethane	0.05	NA	nd	0.05
1,1-Dichloroethylene	0.05	NA	nd	0.05
cis-1,2-Dichloroethylene	0.05	NA	nd	1.9
trans-1,2-Dichloroethylene	0.05	NA	nd	0.084
1,2-Dichloropropane	0.05	NA	nd	0.05
cis-1,3-Dichloropropylene	0.05	NA	nd	
trans-1,3-Dichloropropylene	0.05	NA	nd	
1,3-Dichloropropene, total	0.05	NA	nd	0.05
Ethylbenzene	0.05	nd	nd	1.1
Ethylene dibromide (dibromoethane, 1,2-)	0.05	NA	nd	0.05
Hexane	0.05	NA	nd	2.8
Methyl Ethyl Ketone (2-Butanone)	0.50	NA	nd	16
Methyl Isobutyl Ketone	0.50	NA	nd	1.7
Methyl tert-butyl ether	0.05	NA	nd	0.75
Methylene Chloride	0.05	NA	nd	0.1
Styrene	0.05	NA	nd	0.7
1,1,1,2-Tetrachloroethane	0.05	NA	nd	0.058
1,1,2,2-Tetrachloroethane	0.05	NA	nd	0.05
Tetrachloroethylene	0.05	NA	nd	0.28
Toluene	0.05	nd	nd	2.3
1,1,1-Trichloroethane	0.05	NA	nd	0.38
1,1,2-Trichloroethane	0.05	NA	nd	0.05
Trichloroethylene	0.05	NA	nd	0.061
Trichlorofluoromethane	0.05	NA	nd	4
Vinyl Chloride	0.02	NA	nd	0.02
m/p-Xylene	0.05	nd	nd	
o-Xylene	0.05	nd	nd	
Xylenes, total	0.05	nd	nd	3.1
Notes: - MDL – Method Detection Limit - nd – not detected above the MDL - NA – Not Analyzed				

No VOC parameter concentrations were detected in the soil samples analysed and therefore the results comply with the selected MECP Table 2 Residential

Standards. The analytical results for VOCs tested in soil are shown on Drawing PE5276-4 – Analytical Testing Plan – Soil.

TABLE 9 - Analytical Test Results – Soil PAHs			
Parameter	MDL (µg/g)	Soil Samples (µg/g)	MECP Table 2 Residential Standards (µg/g)
		January 16, 2024	
		BH3-24(D)-SS4	
Acenaphthene	0.02	nd	7.9
Acenaphthylene	0.02	nd	0.15
Anthracene	0.02	nd	0.67
Benzo[a]anthracene	0.02	nd	0.5
Benzo[a]pyrene	0.02	nd	0.3
Benzo[b]fluoranthene	0.02	nd	0.78
Benzo[g,h,i]perylene	0.02	nd	6.6
Benzo[k]fluoranthene	0.02	nd	0.78
Chrysene	0.02	nd	7
Dibenzo[a,h]anthracene	0.02	nd	0.1
Fluoranthene	0.02	nd	0.69
Fluorene	0.02	nd	62
Indeno[1,2,3-cd]pyrene	0.02	nd	0.38
1-Methylnaphthalene	0.02	nd	0.99
2-Methylnaphthalene	0.02	nd	0.99
Methylnaphthalene (1&2)	0.04	nd	0.99
Naphthalene	0.01	nd	0.6
Phenanthrene	0.02	nd	6.2
Pyrene	0.02	nd	78
Notes:			
▪ MDL – Method Detection Limit			
▪ nd – not detected above the MDL			

No PAH parameter concentrations were detected in the soil samples analysed and therefore the results comply with the selected MECP Table 2 Residential Standards. The analytical results for PAHs tested in soil are shown on Drawing PE5276-4 – Analytical Testing Plan – Soil.

TABLE 10 - Analytical Test Results – Soil General Inorganics				
Parameter	MDL	Soil Samples (µg/g)		MECP Table 2 Residential Standards
		January 16, 2024		
		BH3-24(D)-AU1	BH4-24(C)-SS4	
pH	0.05	NA	7.47	5.0-9.0 ¹ 5.0-11.0 ²
Conductivity	5	132	NA	700 uS/cm
Sodium Absorption Ratio	0.01	0.30	NA	5
Notes: - MDL – Method Detection Limit - N/A – Not Analyzed 1 – range for surface soil (no more than 1.5m beneath surface soil) 2 – range for subsurface soil (more than 1.5m beneath surface soil)				

All soil samples analyzed for pH, EC and/or SAR comply with the MECP Table 2 Residential Standards.

5.6 Groundwater Quality

Four groundwater samples from the monitoring wells were submitted for laboratory analysis of metals (including As, Sb, Se, Hg and Cr_{VI}), BTEX, PHCs and/or PAHs. The groundwater samples were obtained from the screened intervals noted in Table 2.

The results of the analytical testing are presented in Tables 11 to 14. The laboratory Certificates of Analysis are provided in Appendix 1.

TABLE 11 - Analytical Test Results – Groundwater Metals				
Parameter	MDL (µg/L)	Groundwater Samples (µg/L)		MECP Table 2 Residential Standards (µg/L)
		January 23, 2024	January 25, 2024	
		BH1-24 (A)	BH4-24 (C)	
Antimony	0.5	0.5	0.5	6
Arsenic	1	1	nd	25
Barium	1	166	329	1,000
Beryllium	0.5	nd	nd	4
Boron	10	133	15	5,000
Cadmium	0.1	nd	nd	2.7
Chromium	1	nd	nd	50
Chromium (VI)	10	nd	nd	25
Cobalt	0.5	nd	nd	3.8
Copper	0.5	1.1	2.7	87
Lead	0.1	nd	0.2	10
Mercury	0.1	nd	nd	0.29
Molybdenum	0.5	6	2.7	70
Nickel	1	2	3	100
Selenium	1	3	nd	10
Silver	0.1	nd	nd	1.5
Sodium	200	89,400	4,920	490,000
Thallium	0.1	nd	nd	2
Uranium	0.1	3.5	2.2	20
Vanadium	0.5	0.5	0.7	6.2
Zinc	5	nd	62	1,100
Notes:				
- MDL – Method Detection Limit - nd – not detected above the MDL				

All detected metal concentrations in the groundwater samples analysed comply with the selected MECP Table 2 Residential Standards. The analytical results for metals tested in groundwater are shown on Drawing PE5276-5 – Analytical Testing Plan – Groundwater.

TABLE 12 - Analytical Test Results – Groundwater PHCs (F ₁ -F ₄)						
Parameter	MDL (µg/L)	Groundwater Samples (µg/L)				MECP Table 2 Residential Standards (µg/L)
		January 23, 2024			January 25, 2024	
		BH1-24 (A)	BH2-24 (B)	BH3-24 (D)	BH4-24 (C)	
PHC F ₁	25	nd	nd	nd	nd	750
PHC F ₂	100	nd	nd	nd	nd	150
PHC F ₃	100	nd	nd	nd	nd	500
PHC F ₄	100	nd	nd	nd	nd	500
Notes: - MDL – Method Detection Limit - nd – not detected above the MDL						

No detectable PHC concentrations were identified in the groundwater samples analysed, therefore the results comply with the selected MECP Table 2 Residential Standards. The analytical results for groundwater tested are shown on Drawing PE5276-5– Analytical Testing Plan – Groundwater.

TABLE 13 - Analytical Test Results – Groundwater BTEX/VOCs						
Parameter	MDL (µg/L)	Groundwater Sample (µg/L)				MECP Table 2 Residential Standards (µg/L)
		January 23, 2024			January 25, 2024	
		BH1-24 (A)	BH2-24 (B)	BH3-24 (D)	BH4-24 (C)	
Acetone	5.0	NA	nd	NA	nd	2,700
Benzene	0.5	nd	nd	nd	nd	5
Bromodichloromethane	0.5	NA	nd	NA	nd	16
Bromoform	0.5	NA	nd	NA	nd	25
Bromomethane	0.5	NA	nd	NA	nd	0.89
Carbon Tetrachloride	0.2	NA	nd	NA	nd	0.79
Chlorobenzene	0.5	NA	nd	NA	nd	30
Chloroform	0.5	NA	nd	NA	nd	2.4
Dibromochloromethane	0.5	NA	nd	NA	nd	25
Dichlorodifluoromethane	1.0	NA	nd	NA	nd	590
1,2-Dichlorobenzene	0.5	NA	nd	NA	nd	3
1,3-Dichlorobenzene	0.5	NA	nd	NA	nd	59
1,4-Dichlorobenzene	0.5	NA	nd	NA	nd	1
1,1-Dichloroethane	0.5	NA	nd	NA	nd	5
1,2-Dichloroethane	0.5	NA	nd	NA	nd	1.6
1,1-Dichloroethylene	0.5	NA	nd	NA	nd	1.6
cis-1,2-Dichloroethylene	0.5	NA	nd	NA	nd	1.6
trans-1,2-Dichloroethylene	0.5	NA	nd	NA	nd	1.6
1,2-Dichloropropane	0.5	NA	nd	NA	nd	5
cis-1,3-Dichloropropylene	0.5	NA	nd	NA	nd	
trans-1,3-Dichloropropylene	0.5	NA	nd	NA	nd	
1,3-Dichloropropene, total	0.5	NA	nd	NA	nd	0.5
Ethylbenzene	0.5	nd	nd	nd	nd	2.4
Ethylene dibromide (dibromoethane, 1,2-)	0.2	NA	nd	NA	nd	0.2
Hexane	1.0	NA	nd	NA	nd	51

**TABLE 13 - Analytical Test Results – Groundwater
BTEX/VOCs**

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)				MECP Table 2 Residential Standards (µg/L)
		January 23, 2024			January 25, 2024	
		BH1-24 (A)	BH2-24 (B)	BH3-24 (D)	BH4-24 (C)	
Methyl Ethyl Ketone (2-Butanone)	5.0	NA	nd	NA	nd	1,800
Methyl Isobutyl Ketone	5.0	NA	nd	NA	nd	640
Methyl tert-butyl ether	2.0	NA	nd	NA	nd	15
Methylene Chloride	5.0	NA	nd	NA	nd	50
Styrene	0.5	NA	nd	NA	nd	5.4
1,1,1,2-Tetrachloroethane	0.5	NA	nd	NA	nd	1.1
1,1,2,2-Tetrachloroethane	0.5	NA	nd	NA	nd	1
Tetrachloroethylene	0.5	NA	nd	NA	nd	1.6
Toluene	0.5	nd	nd	2.4	nd	24
1,1,1-Trichloroethane	0.5	NA	nd	NA	nd	200
1,1,2-Trichloroethane	0.5	NA	nd	NA	nd	4.7
Trichloroethylene	0.5	NA	nd	NA	nd	1.6
Trichlorofluoromethane	1.0	NA	nd	NA	nd	150
Vinyl Chloride	0.5	NA	nd	NA	nd	0.5
m/p-Xylene	0.5	nd	nd	2	nd	
o-Xylene	0.5	nd	nd	0.5	nd	
Xylenes, total	0.5	nd	nd	2.5	nd	300
Notes: ■ MDL – Method Detection Limit ■ nd – not detected above the MDL ■ NA – Not Analyzed						

No detectable VOC concentrations were identified in the groundwater sample analysed; therefore, the results comply with the selected MECP Table 2 Residential Standards. The analytical results for groundwater tested are shown on Drawing PE5276-5– Analytical Testing Plan – Groundwater.

**TABLE 14 - Analytical Test Results – Groundwater
PAHs**

PAHs

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)	MECP Table 2 Residential Standards (µg/L)
		January 23, 2024	
		BH3-24 (D)	
Acenaphthene	0.05	nd	4.1
Acenaphthylene	0.05	nd	1
Anthracene	0.01	nd	2.4
Benzo[a]anthracene	0.01	nd	1
Benzo[a]pyrene	0.01	nd	0.01
Benzo[b]fluoranthene	0.05	nd	0.1
Benzo[g,h,i]perylene	0.05	nd	0.2
Benzo[k]fluoranthene	0.05	nd	0.1
Chrysene	0.05	nd	0.1
Dibenzo[a,h]anthracene	0.05	nd	0.2
Fluoranthene	0.01	nd	0.41
Fluorene	0.05	nd	120

TABLE 14 - Analytical Test Results – Groundwater PAHs			
Parameter	MDL (µg/L)	Groundwater Sample (µg/L)	MECP Table 2 Residential Standards (µg/L)
		January 23, 2024	
		BH3-24 (D)	
Indeno [1,2,3-cd] pyrene	0.05	nd	0.2
1-Methylnaphthalene	0.05	nd	3.2
2-Methylnaphthalene	0.05	nd	3.2
Methylnaphthalene (1&2)	0.10	nd	3.2
Naphthalene	0.05	nd	11
Phenanthrene	0.05	nd	1
Pyrene	0.01	nd	4.1
Notes: - MDL – Method Detection Limit - nd – not detected above the MDL			

No detectable PAH concentrations were identified in the groundwater sample analysed; therefore, the results comply with the selected MECP Table 2 Residential Standards. The analytical results for groundwater tested are shown on Drawing PE5276-5– Analytical Testing Plan – Groundwater.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of the January 2024 sampling events were handled in accordance with the Analytical Protocol with respect to preservation method, storage requirement, and container type. As per Subsection 47(3) of O.Reg. 153/04, as amended, under the Environmental Protection Act, a Certificate of Analysis has been received for each sample submitted for analysis and all Certificates of Analysis are appended to this report.

A duplicate soil sample from BH2-24-SS2 was submitted for laboratory analysis of VOCs. The duplicate was collected with the intent of calculating the relative percent difference (RPD) between duplicate sample values, as a way of assessing the quality of the analytical test results.

All parameters measured in both the original and duplicate samples for soil samples BH2-24-SS2 were identified as being non-detect. Based on the non-detect concentrations in both the original and duplicate samples, the results are considered to be acceptable.

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

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 153/04, as amended 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 of Areas of Potential Environmental Concern					
Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I Property	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1 Heavy Equipment Storage for Seasonal Road Maintenance	West-central portion of the Phase I Property	<i>"Item 52: Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems"</i>	On-Site	BTEX PHCs (F1-F4) EC SAR	Soil Groundwater
APEC 2 Fill Material of Unknown Quality	Western portion of the Phase I Property	<i>"Item 30: Importation of Fill Material of Unknown Quality"</i>	On-Site	BTEX PHCs (F1-F4) Metals	Soil
APEC 3 Waste Disposal Site	Northwestern corner of the Phase I Property	<i>"Item 58: Waste Disposal and Waste Management, including thermal treatment, landfilling and transfer of waste, other than use of biosoils as soil conditioners"</i>	Adjacent northwest	VOCs PHCs (F1-F4)	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:

- ☐ Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F₁-F₄);
- ☐ Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- ☐ Metals (including arsenic (As), antimony (Sb), selenium (Se), hexavalent chromium (CrVI) and mercury (Hg));
- ☐ Electrical Conductivity (EC), and Sodium Adsorption Ratio (SAR).

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

Subsurface Structures and Utilities

No subsurface structures were identified on the Phase II Property.

Physical Setting

Site Stratigraphy

The stratigraphy of the Phase II Property generally consists of:

- ☐ Topsoil; encountered at depths ranging from approximately 0.00 to 0.10 m below ground surface.
- ☐ Fill material consisting of brown silty sand with varying amounts of clay, gravel and crushed stone and occasional shale fragments; encountered at depths ranging from approximately 0.00 to 1.07 m below ground surface.
- ☐ Glacial till consisting of brown silty sand with gravel, shale fragments, occasional cobbles boulders and trace amounts of clay; encountered at depths ranging from approximately 0.69-3.98 m below ground surface.
- ☐ Limestone bedrock; encountered at depths ranging from approximately 1.98 to 3.81 mbgs.

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

Groundwater was encountered within the overburden in at depths ranging from 1.15 and 2.11 mbgs, respectively.

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

Approximate Depth to Bedrock

Limestone bedrock was encountered at depths ranging from 1.98 to 3.98 m below existing grade across the Phase II Property.

Approximate Depth to Water Table

The depth to the water table at the Phase II Property varies between approximately 1.15 to 2.11 m below existing grade.

Sections 35, 41 and 43.1 of the Regulation

Section 35 of O.Reg. 153/04 does not apply to the Phase II Property in that properties within the Phase I Study Area do not rely upon municipal drinking water.

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

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

Note that the Phase II Property is currently shown as wetland, however based on historical photos, and discussion with the current landowner, the area has been relatively dry. The wetland designation is currently being assessed, with the intention of lifting the designation.

Fill Placement

Fill material was identified in boreholes BH1-24 and BH3-24 on the Phase II Property, ranging in depth from 0.00 to 1.07 m below ground surface.

Areas of Natural Scientific Interest and Water Bodies

No areas of natural scientific interest are present on the Phase II Property.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding MECP Table 2 Residential Standards were identified within the soil or groundwater on the Phase II Property.

Types of Contaminants

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding MECP Table 2 Residential Standards were identified within the soil or groundwater on the Phase II Property.

Contaminated Media

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding MECP Table 2 Residential Standards were identified within the soil or groundwater on the Phase II Property.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding MECP Table 2 Residential Standards were identified within the soil or groundwater on the Phase II Property.

Distribution and Migration of Contaminants

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding MECP Table 2 Residential Standards were identified within the soil or groundwater on the Phase II Property.

Discharge of Contaminants

Based on the findings of this Phase II ESA, no contaminants have been discharged on the Phase II Property.

Climatic and Meteorological Conditions

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

Based on the findings of this Phase II ESA, climatic and meteorological conditions are not considered to have affected contaminant distribution on the Phase II Property.

Potential for Vapour Intrusion

Based on the findings of this Phase II ESA, there is no potential for vapour intrusion on the Phase II Property.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the property addressed Part of 1380 Howie Road, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

The Phase II ESA subsurface investigation consisted of drilling four boreholes across the Phase II Property. All boreholes were constructed with groundwater monitoring wells. The general soil profile encountered during the field program consisted of a thin layer of topsoil, followed by fill material consisting of brown silty sand with gravel, and some organics (reworked native), followed by native brown silty sand, underlain by glacial till. Bedrock was encountered at depths ranging from 1.98-3.81 mbgs.

A total of five soil samples (plus one duplicate) were submitted for analysis of metals (including As, Sb, Se, Hg and Cr_{VI}), BTEX, PHCs, PAHs, EC, SAR and/or pH. All parameter concentrations analyzed in the soil samples comply with MECP Table 2 Residential Standards.

A total of four groundwater samples (plus one duplicate) from the installed monitoring wells were collected during the January 23, 2024 and January 25, 2024 sampling events and submitted for laboratory analysis of metals (including As, Sb, Se, Hg and Cr_{VI}), BTEX, PHCs and/or PAHs. All groundwater results comply with the selected MECP Table 2 Standards.

Based on the findings of this Phase II ESA, no further environmental investigation is required.

Recommendations

Groundwater Monitoring Wells

It is our recommendation that the monitoring wells installed on the Phase II Property should remain viable for future monitoring. If they are not going to be used in the future, or will be entirely removed, they should be abandoned according to Ontario Regulation 903. The wells will be registered with the MECP under this regulation.

7.0 STATEMENT OF LIMITATIONS

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

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

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

This report was prepared for the sole use of T.G. Carroll Cartage. Notification from T.G. Carroll Cartage and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.



Joshua Dempsey, B.Sc.



Adrian Menyhart, P.Eng., Q.P.E.SA



Report Distribution:

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- ☐ Paterson Group

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE5276-1 – TEST HOLE LOCATION PLAN

DRAWING PE5276-2 – SITE PLAN

DRAWING PE5276-3 – SURROUNDING LAND USE PLAN

DRAWING PE5276-4 – ANALYTICAL TESTING PLAN – SOIL

**DRAWING PE5276-5 – ANALYTICAL TESTING PLAN –
GROUNDWATER**

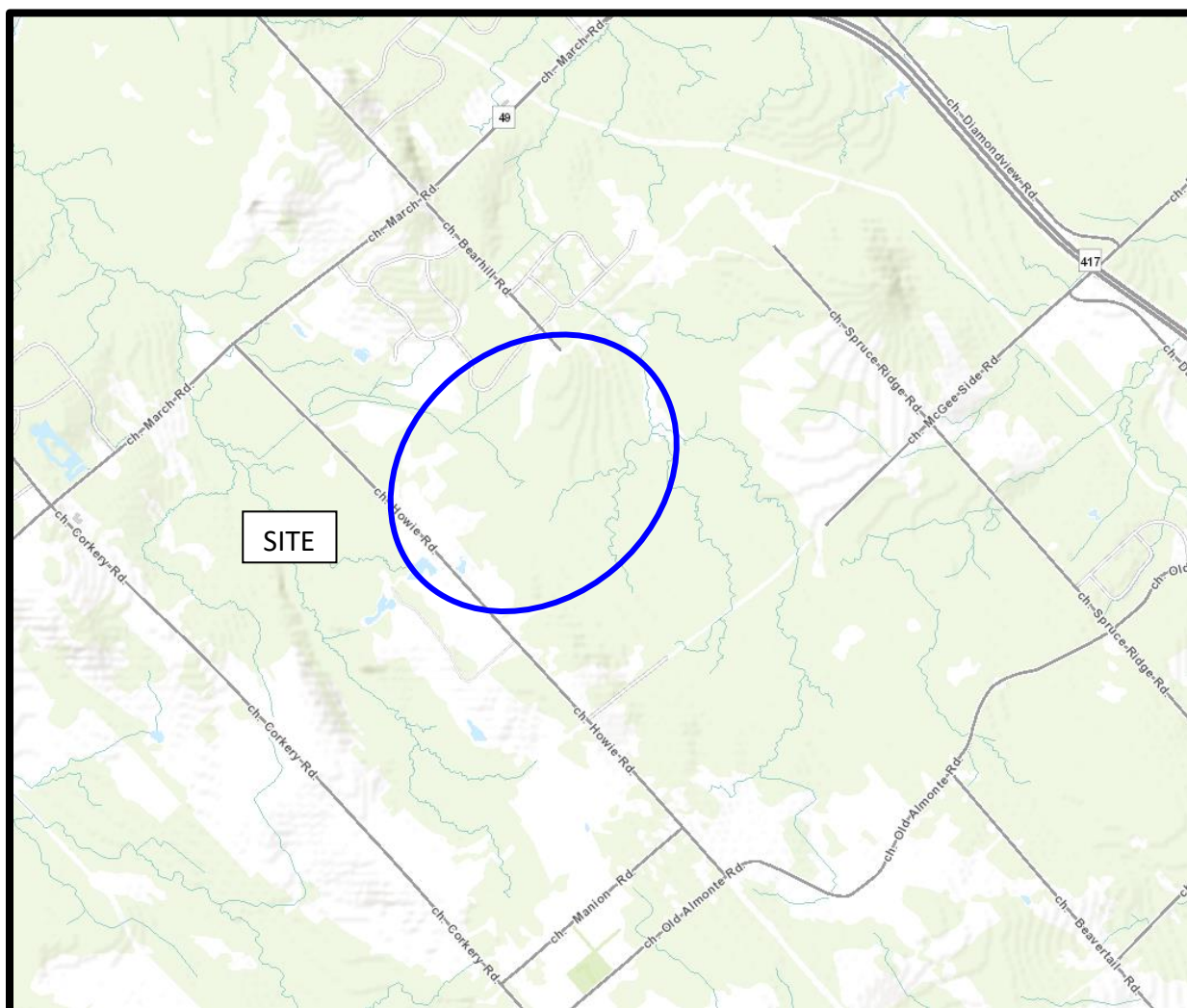
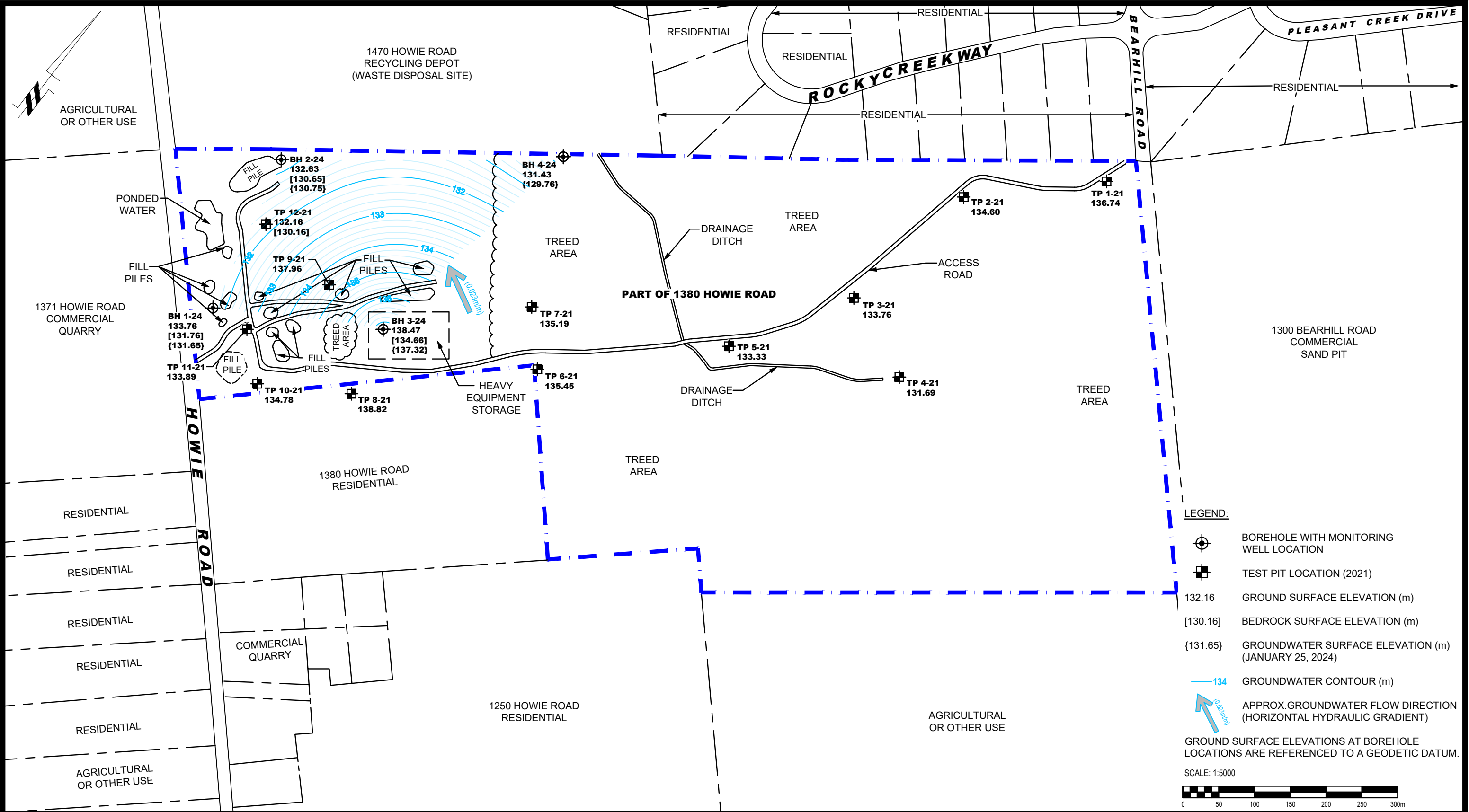


Figure 1:
KEY PLAN





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

NO.	REVISIONS	DATE	INITIAL

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT

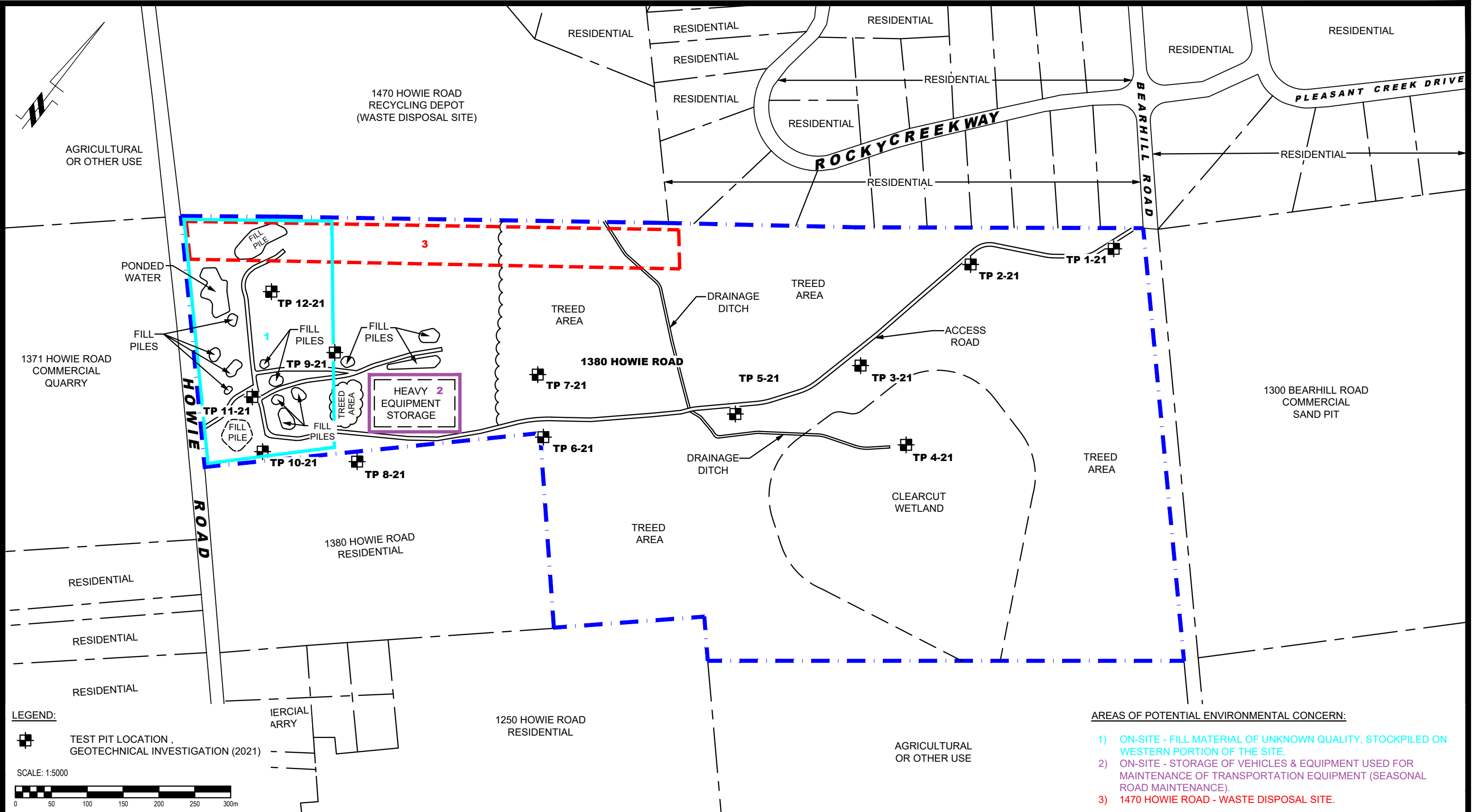
PART OF 1380 HOWIE ROAD

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale:	1:5000	Date:	04/2024
Drawn by:	GK	Report No.:	PE5276-2
Checked by:	JD	Dwg. No.:	PE5276-3
Approved by:	AM	Revision No.:	



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NO.	REVISIONS	DATE	INITIAL

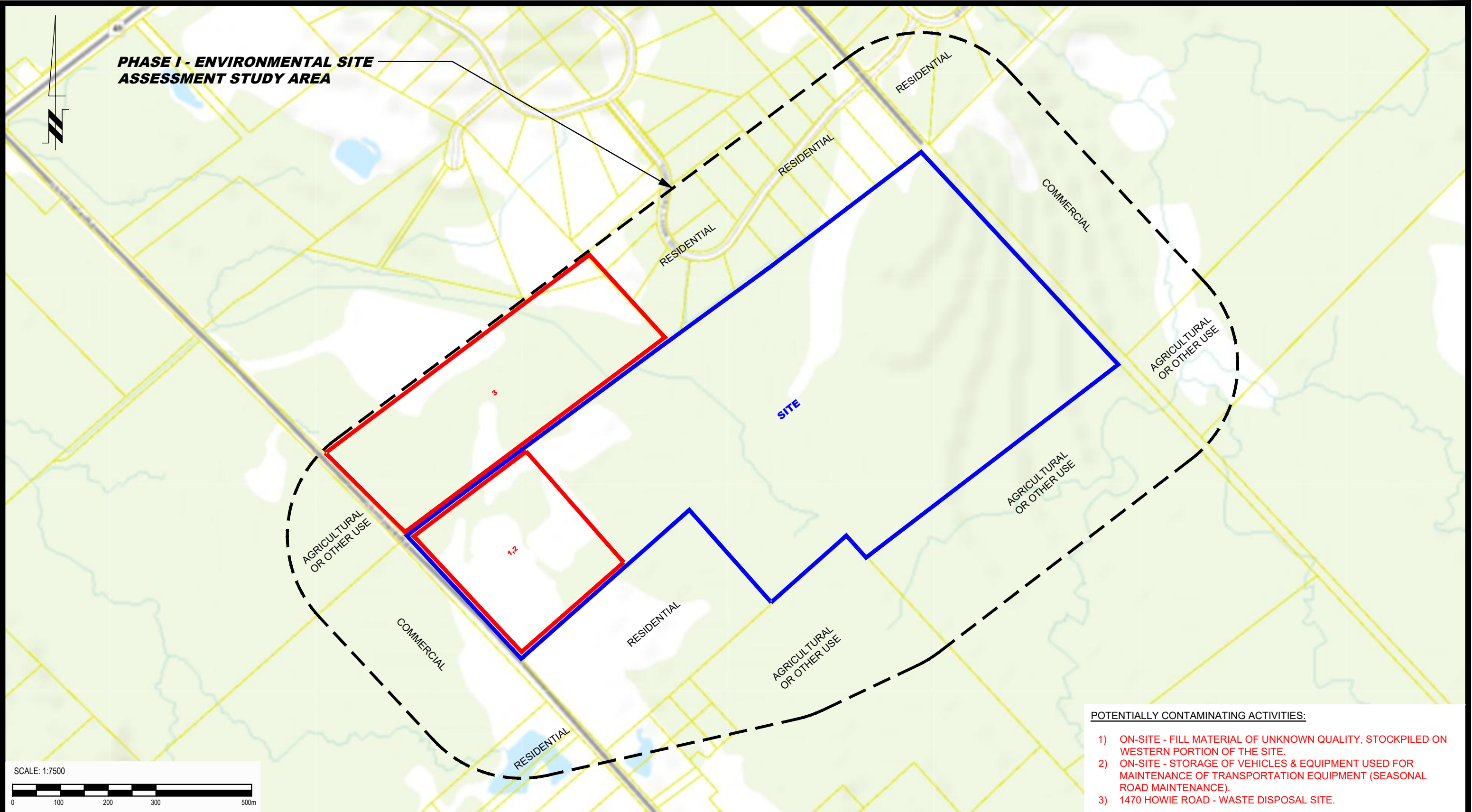
T.G. CARROLL CARTAGE LTD.
PHASE I - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1380 HOWIE ROAD

OTTAWA,
Title:

ONTARIO

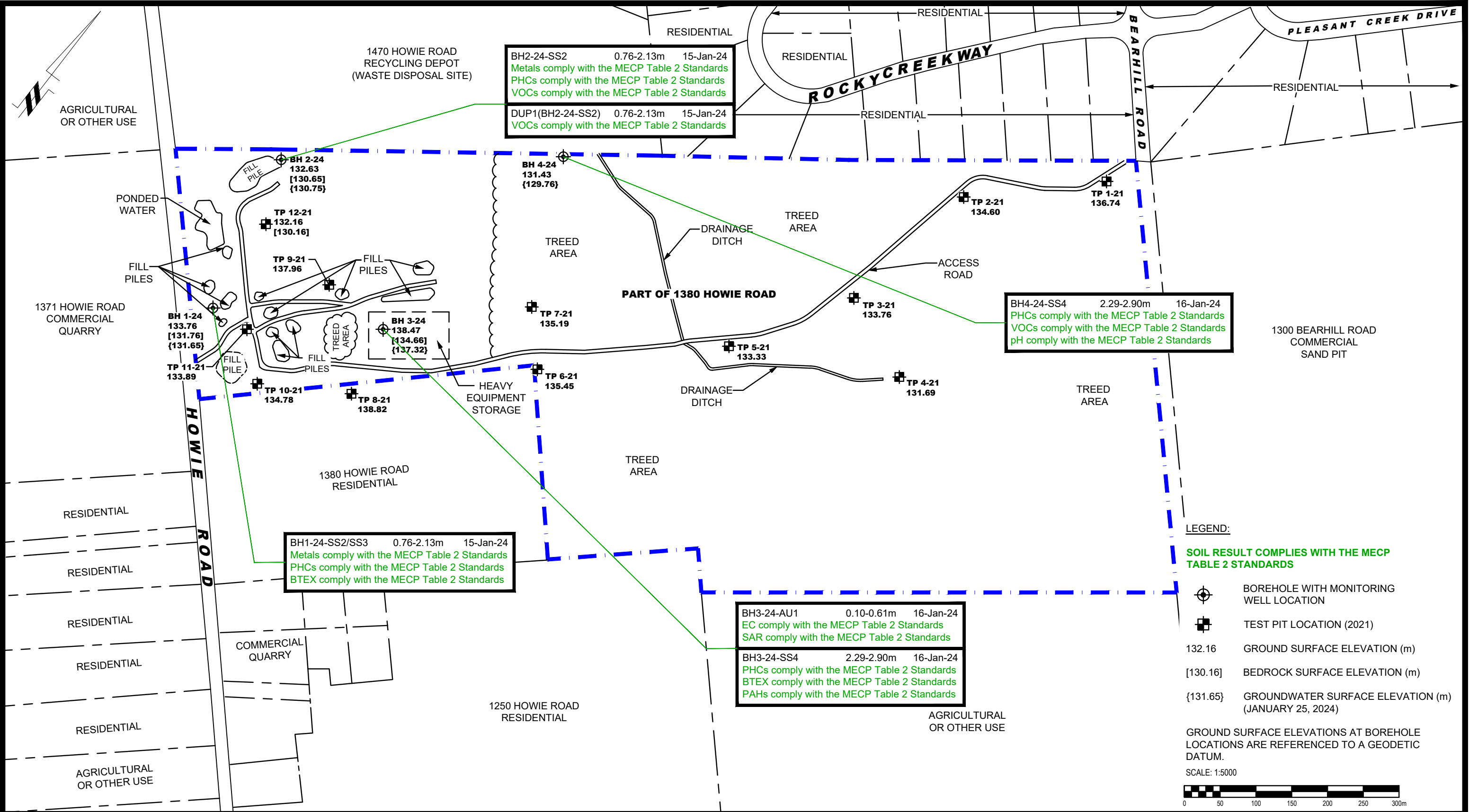
SITE PLAN

Scale:	1:5000	Date:	07/2021
Drawn by:	JM	Report No.:	PE5276-1
Checked by:	JA	Dwg. No.:	PE5276-2
Approved by:	MSD	Revision No.:	



- POTENTIALLY CONTAMINATING ACTIVITIES:
- 1) ON-SITE - FILL MATERIAL OF UNKNOWN QUALITY, STOCKPILED ON WESTERN PORTION OF THE SITE.
 - 2) ON-SITE - STORAGE OF VEHICLES & EQUIPMENT USED FOR MAINTENANCE OF TRANSPORTATION EQUIPMENT (SEASONAL ROAD MAINTENANCE).
 - 3) 1470 HOWIE ROAD - WASTE DISPOSAL SITE.

patersongroup consulting engineers 154 Colonnade Road South Ottawa, Ontario K2E 7J5 Tel: (613) 226-7381 Fax: (613) 226-6344					T.G CARROLL CARTAGE LTD. PHASE I - ENVIRONMENTAL SITE ASSESSMENT PART OF 1380 HOWIE ROAD OTTAWA, ONTARIO	Scale:	1:7500	Date:	07/2021
						Drawn by:	JM	Report No.:	PE5276-1
						Checked by:	JA	Dwg. No.:	PE5276-3
						Approved by:	MSD	Revision No.:	
					Title: SURROUNDING LAND USE PLAN				
	NO.	REVISIONS	DATE	INITIAL					





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PHASE II - ENVIRONMENTAL SITE ASSESSMENT

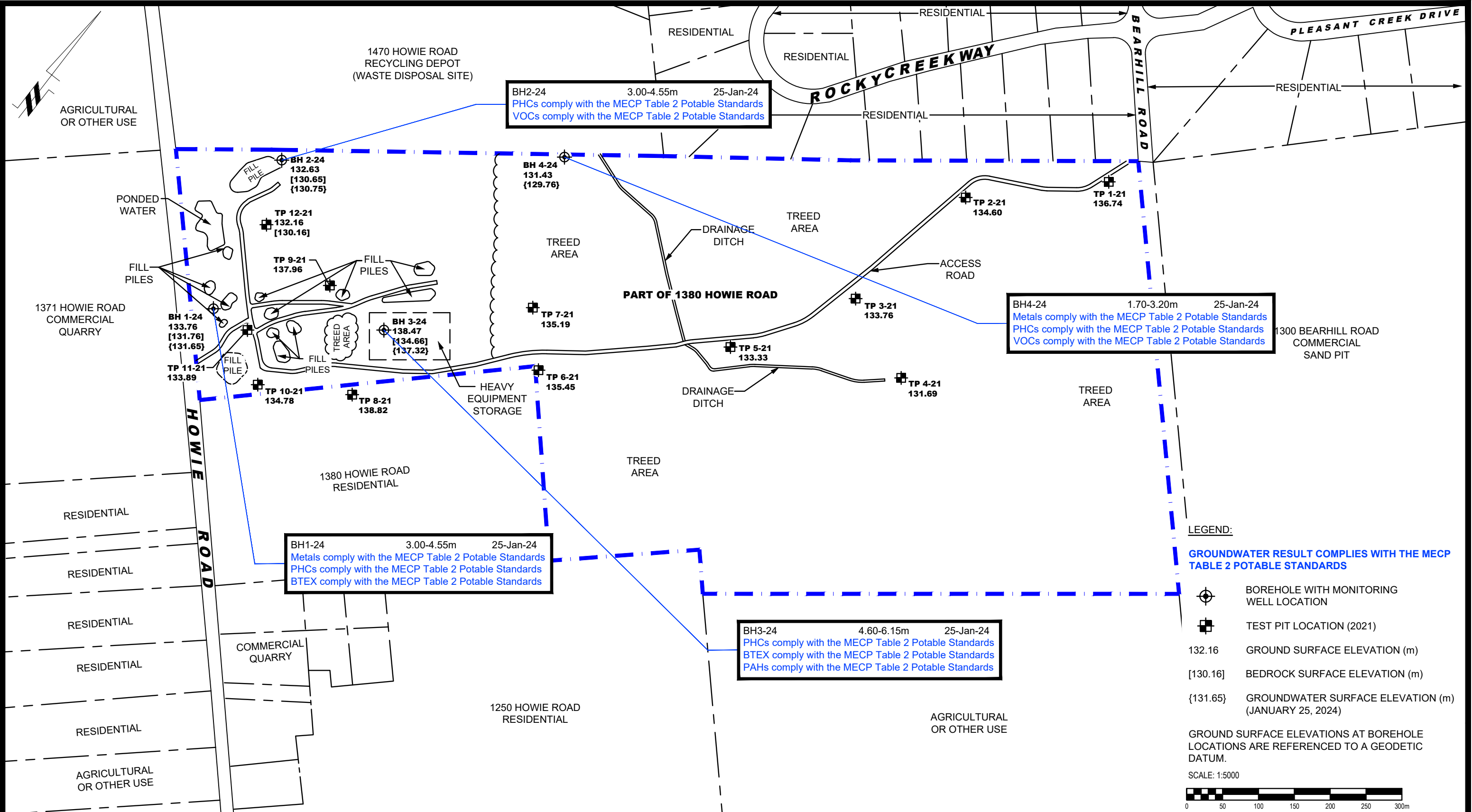
PART OF 1380 HOWIE ROAD

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL

Scale:	1:5000	Date:	04/2024
Drawn by:	GK	Report No.:	PE5276-2
Checked by:	JD	Dwg. No.:	PE5276-4
Approved by:	AM	Revision No.:	





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PHASE II - ENVIRONMENTAL SITE ASSESSMENT

PART OF 1380 HOWIE ROAD

OTTAWA, ONTARIO

ANALYTICAL TESTING PLAN - GROUNDWATER

Scale:	1:5000	Date:	04/2024
Drawn by:	GK	Report No.:	PE5276-2
Checked by:	JD	Dwg. No.:	PE5276-5
Approved by:	AM	Revision No.:	

APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

Sampling & Analysis Plan

Part 1380 Howie Road
Ottawa, Ontario

Prepared for T.G. Carroll Cartage

Report: PE5276-SAP
January 14, 2024

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4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)	8
5.0 DATA QUALITY OBJECTIVES.....	9
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1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Park River Properties, to conduct a Phase II – Environmental Site Assessment (Phase II-ESA) for the property addressed Part of 1380 Howie Road, in the City of Ottawa, Ontario.

Based on the findings of the Phase I-ESA, the following subsurface investigation program was developed. The Phase II-ESA was carried out in conjunction with a geotechnical investigation which covered additional properties.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-24	Western portion of the Phase II Property; to assess potential impacts resulting from the importation of fill material of unknown quality.	4-6 m; to intercept the groundwater table for purpose of installing a monitoring well.
BH2-24	Northwestern portion of the Phase II Property; to assess the potential impacts resulting from the presence of the neighbouring waste disposal site.	4-6 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH3-24	West central portion of the Phase II Property; to assess potential impacts resulting from the on-site heavy equipment storage.	4-6 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH4-24	North central portion of the Phase II Property; to assess potential impacts resulting from the neighbouring waste disposal site.	4-6 m; to intercept the groundwater table for the purpose of installing a monitoring well.

Borehole locations are shown on Drawing PE5276-1 – 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 all five boreholes to allow for the collection of groundwater samples.

2.0 ANALYTICAL TESTING PROGRAM

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

- ☐ At least one sample from each borehole within the identified APECs 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)
- ☐ RKL 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 F₁, a soil core from each soil sample, which may be analyzed, must be taken and placed in the laboratory-provided methanol vial.
- ☐ Note all and any odours or discolouration of samples.
- ☐ Split spoon samplers must be washed between samples.
- ☐ If obvious contamination is encountered, continue sampling until vertical extent of contamination is delineated.
- ☐ As a general rule, environmental boreholes should be deep enough to intercept the groundwater table (unless this is impossible/impractical - call project manager to discuss).
- ☐ If at all possible, soil samples should be submitted to a preliminary screening procedure on site, either using a RKI Eagle, PID, etc. depending on type of suspected contamination.

Spoon Washing Procedure

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

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

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

Screening Procedure

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

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

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

3.2 Monitoring Well Installation Procedure

Equipment

- ☐ 5' x 2" threaded sections of Schedule 40 PVC slotted well screen (5' x 1 1/4" if installing in cored hole in bedrock)
- ☐ 5' x 2" threaded sections of Schedule 40 PVC riser pipe (5' x 1 1/4" 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.

[illegible]

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1380 Howie Road
Ottawa, Ontario

EASTING: 338038.653 NORTHING: 5016332.488 ELEVATION: 132.63

DATUM: Geodetic

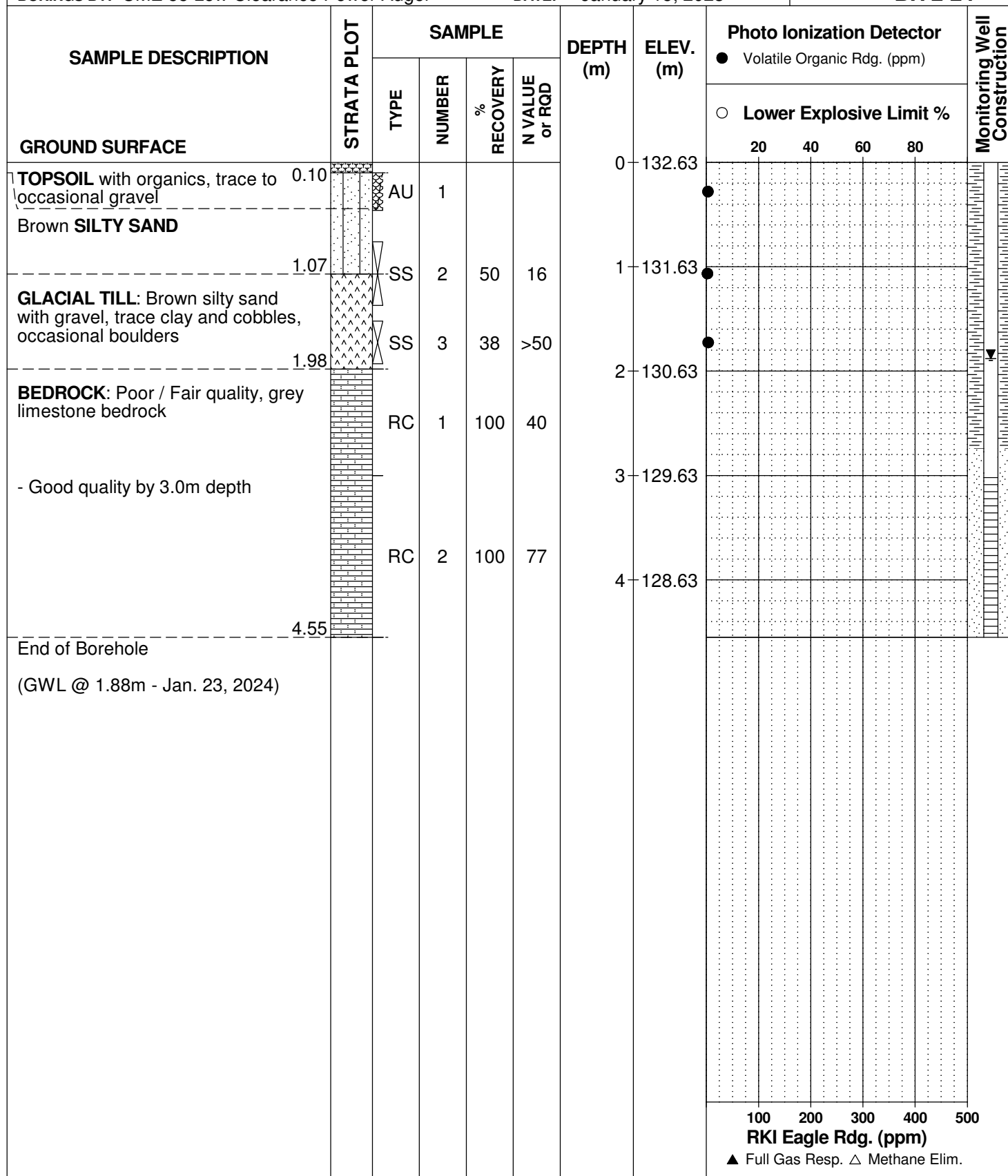
REMARKS:

BORINGS BY: CME 55 Low Clearance Power Auger

DATE: January 15, 2023

FILE NO. **PE5276**

HOLE NO. **BH 2-24**



SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1380 Howie Road
Ottawa, Ontario

EASTING: 338296.933 NORTHING: 5016233.842 ELEVATION: 138.47

DATUM: Geodetic

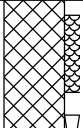
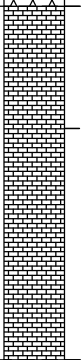
REMARKS:

BORINGS BY: CME 55 Low Clearance Power Auger

DATE: January 16, 2023

FILE NO. **PE5276**

HOLE NO. **BH 3-24**

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE								20	40	60	80	
FILL: Brown silty sand with gravel, some organics		AU	1			0	138.47					
0.91												
GLACIAL TILL: Brown silty clay, trace to some gravel, silt and sand		SS	2	42	5	1	137.47					
- trace cobbles and occasional boulders by 1.7m depth		SS	3	0	19	2	136.47					
		SS	4	100	16							
		SS	5	63	>50	3	135.47					
3.81												
BEDROCK: Good quality, grey limestone bedrock		RC	1	97	67	4	134.47					
		RC	2	100	85	5	133.47					
6.15						6	132.47					
End of Borehole												
(GWL @ 1.15m - Jan. 23, 2024)												

EASTING: 338346.286 NORTHING: 5016579.048 ELEVATION: 131.43

DATUM: Geodetic

REMARKS:

BORINGS BY: CME 55 Low Clearance Power Auger

DATE: January 16, 2023

FILE NO. **PE5276**

HOLE NO. **BH 4-24**

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)				
								○ Lower Explosive Limit %				
GROUND SURFACE								20	40	60	80	
TOPSOIL, trace organics, occasional gravel Brown SILTY SAND	0.10	AU	1			0	131.43					
	0.69											
GLACIAL TILL: Brown silty sand with gravel, trace clay and cobbles, occasional boulders		SS	2	17	11	1	130.43					
	1.45											
GLACIAL TILL: Brown to grey SILTY CLAY, some sand and gravel, trace cobbles, occasional boulders		SS	3	33	11	2	129.43					
		SS	4	38	23							
	3.20	SS	5	100	>50	3	128.43					
End of Borehole (GWL @ 1.67m - Jan. 25, 2024)												

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 = $(D_{30})^2 / (D_{10} \times D_{60})$
Cu	-	Uniformity coefficient = D_{60} / D_{10}

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

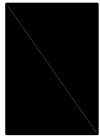
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidation ratio = p'_c / p'_o
Void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

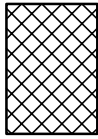
STRATA PLOT



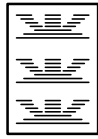
Topsoil



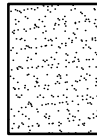
Asphalt



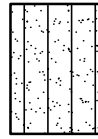
Fill



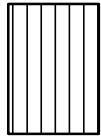
Peat



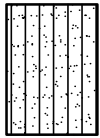
Sand



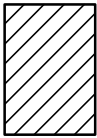
Silty Sand



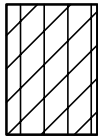
Silt



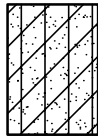
Sandy Silt



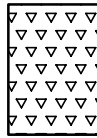
Clay



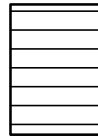
Silty Clay



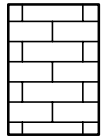
Clayey Silty Sand



Glacial Till



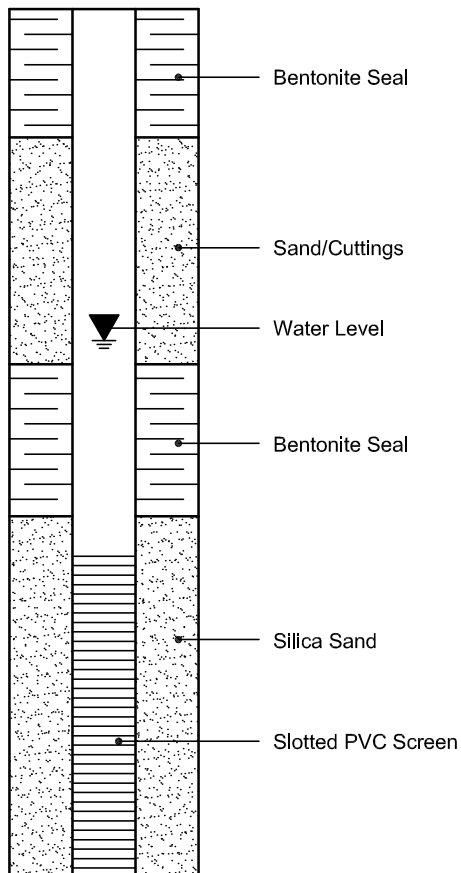
Shale



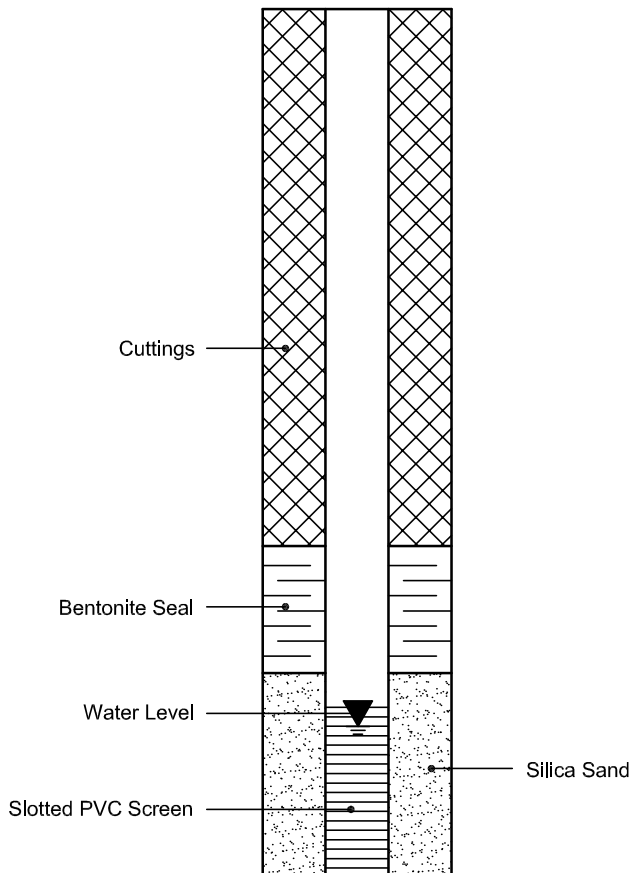
Bedrock

MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Certificate of Analysis

Paterson Group Consulting Engineers (Ottawa)

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Adrian Menyhart

Client PO: 59242
Project: PE5276
Custody:

Report Date: 22-Jan-2024

Order Date: 16-Jan-2024

Order #: 2403129

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

Paracel ID	Client ID
2403129-01	BH1-24-SS2/SS3
2403129-02	BH2-24-SS2
2403129-03	DUP 1

Approved By:



Mark Foto, M.Sc.

Lab Supervisor

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	18-Jan-24	19-Jan-24
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	17-Jan-24	22-Jan-24
Mercury by CVAA	EPA 7471B - CVAA, digestion	18-Jan-24	18-Jan-24
PHC F1	CWS Tier 1 - P&T GC-FID	18-Jan-24	19-Jan-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	17-Jan-24	18-Jan-24
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	18-Jan-24	18-Jan-24
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	18-Jan-24	19-Jan-24
Solids, %	CWS Tier 1 - Gravimetric	16-Jan-24	17-Jan-24

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Client ID:	BH1-24-SS2/SS3	BH2-24-SS2	DUP 1	-	
Sample Date:	15-Jan-24 09:00	15-Jan-24 09:00	15-Jan-24 09:00	-	-
Sample ID:	2403129-01	2403129-02	2403129-03	-	
Matrix:	Soil	Soil	Soil	-	
MDL/Units					

Physical Characteristics

% Solids	0.1 % by Wt.	84.1	86.5	88.7	-	-	-
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Metals

Antimony	1.0 ug/g	<1.0	<1.0	-	-	-	-
Arsenic	1.0 ug/g	2.3	3.3	-	-	-	-
Barium	1.0 ug/g	305	123	-	-	-	-
Beryllium	0.5 ug/g	<0.5	<0.5	-	-	-	-
Boron	5.0 ug/g	10.2	<5.0	-	-	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	-	-	-	-
Chromium (VI)	0.2 ug/g	<0.2	<0.2	-	-	-	-
Chromium	5.0 ug/g	12.0	23.1	-	-	-	-
Cobalt	1.0 ug/g	3.5	11.9	-	-	-	-
Copper	5.0 ug/g	13.4	26.1	-	-	-	-
Lead	1.0 ug/g	30.6	4.3	-	-	-	-
Mercury	0.1 ug/g	<0.1	<0.1	-	-	-	-
Molybdenum	1.0 ug/g	1.4	<1.0	-	-	-	-
Nickel	5.0 ug/g	6.9	17.6	-	-	-	-
Selenium	1.0 ug/g	<1.0	<1.0	-	-	-	-
Silver	0.3 ug/g	<0.3	<0.3	-	-	-	-
Thallium	1.0 ug/g	<1.0	<1.0	-	-	-	-
Uranium	1.0 ug/g	<1.0	<1.0	-	-	-	-
Vanadium	10.0 ug/g	21.3	41.8	-	-	-	-
Zinc	20.0 ug/g	176	25.2	-	-	-	-

Volatiles

Acetone	0.50 ug/g	-	<0.50	<0.50	-	-	-
Benzene	0.02 ug/g	-	<0.02	<0.02	-	-	-

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Client ID:	BH1-24-SS2/SS3	BH2-24-SS2	DUP 1	-	-
Sample Date:	15-Jan-24 09:00	15-Jan-24 09:00	15-Jan-24 09:00	-	-
Sample ID:	2403129-01	2403129-02	2403129-03	-	-
Matrix:	Soil	Soil	Soil	-	-
MDL/Units					

Volatiles

Bromodichloromethane	0.05 ug/g	-	<0.05	<0.05	-	-
Bromoform	0.05 ug/g	-	<0.05	<0.05	-	-
Bromomethane	0.05 ug/g	-	<0.05	<0.05	-	-
Carbon Tetrachloride	0.05 ug/g	-	<0.05	<0.05	-	-
Chlorobenzene	0.05 ug/g	-	<0.05	<0.05	-	-
Chloroform	0.05 ug/g	-	<0.05	<0.05	-	-
Dibromochloromethane	0.05 ug/g	-	<0.05	<0.05	-	-
Dichlorodifluoromethane	0.05 ug/g	-	<0.05	<0.05	-	-
1,2-Dichlorobenzene	0.05 ug/g	-	<0.05	<0.05	-	-
1,3-Dichlorobenzene	0.05 ug/g	-	<0.05	<0.05	-	-
1,4-Dichlorobenzene	0.05 ug/g	-	<0.05	<0.05	-	-
1,1-Dichloroethane	0.05 ug/g	-	<0.05	<0.05	-	-
1,2-Dichloroethane	0.05 ug/g	-	<0.05	<0.05	-	-
1,1-Dichloroethylene	0.05 ug/g	-	<0.05	<0.05	-	-
cis-1,2-Dichloroethylene	0.05 ug/g	-	<0.05	<0.05	-	-
trans-1,2-Dichloroethylene	0.05 ug/g	-	<0.05	<0.05	-	-
1,2-Dichloropropane	0.05 ug/g	-	<0.05	<0.05	-	-
cis-1,3-Dichloropropylene	0.05 ug/g	-	<0.05	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	-	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g	-	<0.05	<0.05	-	-
Ethylbenzene	0.05 ug/g	-	<0.05	<0.05	-	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	-	<0.05	<0.05	-	-
Hexane	0.05 ug/g	-	<0.05	<0.05	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g	-	<0.50	<0.50	-	-
Methyl Isobutyl Ketone	0.50 ug/g	-	<0.50	<0.50	-	-

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Client ID:	BH1-24-SS2/SS3	BH2-24-SS2	DUP 1	-	-
Sample Date:	15-Jan-24 09:00	15-Jan-24 09:00	15-Jan-24 09:00	-	-
Sample ID:	2403129-01	2403129-02	2403129-03	-	-
Matrix:	Soil	Soil	Soil	-	-
MDL/Units					

Volatiles

Methyl tert-butyl ether	0.05 ug/g	-	<0.05	<0.05	-	-
Methylene Chloride	0.05 ug/g	-	<0.05	<0.05	-	-
Styrene	0.05 ug/g	-	<0.05	<0.05	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	-	<0.05	<0.05	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	-	<0.05	<0.05	-	-
Tetrachloroethylene	0.05 ug/g	-	<0.05	<0.05	-	-
Toluene	0.05 ug/g	-	<0.05	<0.05	-	-
1,1,1-Trichloroethane	0.05 ug/g	-	<0.05	<0.05	-	-
1,1,2-Trichloroethane	0.05 ug/g	-	<0.05	<0.05	-	-
Trichloroethylene	0.05 ug/g	-	<0.05	<0.05	-	-
Trichlorofluoromethane	0.05 ug/g	-	<0.05	<0.05	-	-
Vinyl chloride	0.02 ug/g	-	<0.02	<0.02	-	-
m,p-Xylenes	0.05 ug/g	-	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	-	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	-	<0.05	<0.05	-	-
Dibromofluoromethane	Surrogate	-	96.9%	99.8%	-	-
Toluene-d8	Surrogate	-	89.8%	90.9%	-	-
4-Bromofluorobenzene	Surrogate	-	108%	108%	-	-
Benzene	0.02 ug/g	<0.02	-	-	-	-
Ethylbenzene	0.05 ug/g	<0.05	-	-	-	-
Toluene	0.05 ug/g	<0.05	-	-	-	-
m,p-Xylenes	0.05 ug/g	<0.05	-	-	-	-
o-Xylene	0.05 ug/g	<0.05	-	-	-	-
Xylenes, total	0.05 ug/g	<0.05	-	-	-	-
Toluene-d8	Surrogate	90.8%	-	-	-	-

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Client ID:	BH1-24-SS2/SS3	BH2-24-SS2	DUP 1	-	
Sample Date:	15-Jan-24 09:00	15-Jan-24 09:00	15-Jan-24 09:00	-	-
Sample ID:	2403129-01	2403129-02	2403129-03	-	
Matrix:	Soil	Soil	Soil	-	
MDL/Units					

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g	<7	<7	-	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	-	-	-
F3 PHCs (C16-C34)	8 ug/g	60	<8	-	-	-
F4 PHCs (C34-C50)	6 ug/g	85	<6	-	-	-

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%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					
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					

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Chlorobenzene	ND	0.05	ug/g					
Chloroform	ND	0.05	ug/g					
Dibromochloromethane	ND	0.05	ug/g					
Dichlorodifluoromethane	ND	0.05	ug/g					
1,2-Dichlorobenzene	ND	0.05	ug/g					
1,3-Dichlorobenzene	ND	0.05	ug/g					
1,4-Dichlorobenzene	ND	0.05	ug/g					
1,1-Dichloroethane	ND	0.05	ug/g					
1,2-Dichloroethane	ND	0.05	ug/g					
1,1-Dichloroethylene	ND	0.05	ug/g					
cis-1,2-Dichloroethylene	ND	0.05	ug/g					
trans-1,2-Dichloroethylene	ND	0.05	ug/g					
1,2-Dichloropropane	ND	0.05	ug/g					
cis-1,3-Dichloropropylene	ND	0.05	ug/g					
trans-1,3-Dichloropropylene	ND	0.05	ug/g					
1,3-Dichloropropene, total	ND	0.05	ug/g					
Ethylbenzene	ND	0.05	ug/g					
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.05	ug/g					
Hexane	ND	0.05	ug/g					
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g					
Methyl Isobutyl Ketone	ND	0.50	ug/g					
Methyl tert-butyl ether	ND	0.05	ug/g					
Methylene Chloride	ND	0.05	ug/g					
Styrene	ND	0.05	ug/g					
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g					
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g					
Tetrachloroethylene	ND	0.05	ug/g					
Toluene	ND	0.05	ug/g					
1,1,1-Trichloroethane	ND	0.05	ug/g					
1,1,2-Trichloroethane	ND	0.05	ug/g					
Trichloroethylene	ND	0.05	ug/g					
Trichlorofluoromethane	ND	0.05	ug/g					
Vinyl chloride	ND	0.02	ug/g					

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
m,p-Xylenes	ND	0.05	ug/g					
o-Xylene	ND	0.05	ug/g					
Xylenes, total	ND	0.05	ug/g					
Surrogate: 4-Bromofluorobenzene	8.30		%	104	50-140			
Surrogate: Dibromofluoromethane	7.37		%	92.2	50-140			
Surrogate: Toluene-d8	6.37		%	79.6	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	6.37		%	79.6	50-140			

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	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	2.8	1.0	ug/g	2.8			0.2	30	
Barium	95.1	1.0	ug/g	105			10.3	30	
Beryllium	ND	0.5	ug/g	ND			NC	30	
Boron	8.8	5.0	ug/g	9.4			6.4	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g	ND			NC	35	
Chromium	19.6	5.0	ug/g	21.3			8.0	30	
Cobalt	6.0	1.0	ug/g	6.4			6.8	30	
Copper	22.6	5.0	ug/g	23.8			5.1	30	
Lead	182	1.0	ug/g	194			6.3	30	
Mercury	ND	0.1	ug/g	ND			NC	30	
Molybdenum	ND	1.0	ug/g	1.0			NC	30	
Nickel	13.6	5.0	ug/g	14.5			6.4	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	30.4	10.0	ug/g	34.4			12.5	30	
Zinc	96.4	20.0	ug/g	103			6.6	30	
Physical Characteristics									
% Solids	90.4	0.1	% by Wt.	90.6			0.2	25	
Volatiles									
Acetone	ND	0.50	ug/g	ND			NC	50	
Benzene	ND	0.02	ug/g	ND			NC	50	

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromodichloromethane	ND	0.05	ug/g	ND			NC	50	
Bromoform	ND	0.05	ug/g	ND			NC	50	
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	0.185	0.05	ug/g	0.195			5.6	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	0.206	0.05	ug/g	0.237			13.8	50	

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	0.126	0.05	ug/g	0.149			16.8	50	
o-Xylene	0.073	0.05	ug/g	0.087			17.7	50	
Surrogate: 4-Bromofluorobenzene	10.0		%		109	50-140			
Surrogate: Dibromofluoromethane	8.58		%		93.5	50-140			
Surrogate: Toluene-d8	8.37		%		91.2	50-140			
Benzene	ND	0.02	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Toluene	0.206	0.05	ug/g	0.237			13.8	50	
m,p-Xylenes	0.126	0.05	ug/g	0.149			16.8	50	
o-Xylene	0.073	0.05	ug/g	0.087			17.7	50	
Surrogate: Toluene-d8	8.37		%		91.2	50-140			

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	187	7	ug/g	ND	93.3	85-115			
F2 PHCs (C10-C16)	96	4	ug/g	ND	102	60-140			
F3 PHCs (C16-C34)	241	8	ug/g	ND	105	60-140			
F4 PHCs (C34-C50)	169	6	ug/g	ND	116	60-140			
Metals									
Arsenic	48.3	1.0	ug/g	1.1	94.3	70-130			
Barium	84.9	1.0	ug/g	42.1	85.4	70-130			
Beryllium	46.5	0.5	ug/g	ND	92.6	70-130			
Boron	47.0	5.0	ug/g	ND	86.5	70-130			
Cadmium	45.4	0.5	ug/g	ND	90.4	70-130			
Chromium (VI)	0.2	0.2	ug/g	ND	84.5	70-130			
Chromium	54.2	5.0	ug/g	8.5	91.4	70-130			
Cobalt	47.8	1.0	ug/g	2.6	90.4	70-130			
Copper	52.5	5.0	ug/g	9.5	86.0	70-130			
Lead	120	1.0	ug/g	77.5	84.5	70-130			
Mercury	1.44	0.1	ug/g	ND	96.0	70-130			
Molybdenum	44.9	1.0	ug/g	ND	88.9	70-130			
Nickel	49.7	5.0	ug/g	5.8	87.7	70-130			
Selenium	43.1	1.0	ug/g	ND	85.9	70-130			
Silver	40.6	0.3	ug/g	ND	81.2	70-130			
Thallium	44.5	1.0	ug/g	ND	88.9	70-130			
Uranium	45.0	1.0	ug/g	ND	89.7	70-130			
Vanadium	59.0	10.0	ug/g	13.8	90.5	70-130			
Zinc	82.2	20.0	ug/g	41.2	82.0	70-130			
Volatiles									
Acetone	10.4	0.50	ug/g	ND	104	50-140			
Benzene	3.61	0.02	ug/g	ND	90.2	60-130			
Bromodichloromethane	4.86	0.05	ug/g	ND	122	60-130			
Bromoform	4.50	0.05	ug/g	ND	113	60-130			
Bromomethane	4.90	0.05	ug/g	ND	122	50-140			

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Carbon Tetrachloride	5.12	0.05	ug/g	ND	128	60-130			
Chlorobenzene	4.33	0.05	ug/g	ND	108	60-130			
Chloroform	3.40	0.05	ug/g	ND	85.0	60-130			
Dibromochloromethane	4.74	0.05	ug/g	ND	118	60-130			
Dichlorodifluoromethane	5.44	0.05	ug/g	ND	136	50-140			
1,2-Dichlorobenzene	3.98	0.05	ug/g	ND	99.6	60-130			
1,3-Dichlorobenzene	4.06	0.05	ug/g	ND	102	60-130			
1,4-Dichlorobenzene	4.04	0.05	ug/g	ND	101	60-130			
1,1-Dichloroethane	3.13	0.05	ug/g	ND	78.3	60-130			
1,2-Dichloroethane	3.75	0.05	ug/g	ND	93.8	60-130			
1,1-Dichloroethylene	2.98	0.05	ug/g	ND	74.5	60-130			
cis-1,2-Dichloroethylene	3.21	0.05	ug/g	ND	80.2	60-130			
trans-1,2-Dichloroethylene	3.26	0.05	ug/g	ND	81.5	60-130			
1,2-Dichloropropane	3.29	0.05	ug/g	ND	82.3	60-130			
cis-1,3-Dichloropropylene	3.54	0.05	ug/g	ND	88.5	60-130			
trans-1,3-Dichloropropylene	3.92	0.05	ug/g	ND	97.9	60-130			
Ethylbenzene	4.43	0.05	ug/g	ND	111	60-130			
Ethylene dibromide (dibromoethane, 1,2-)	3.95	0.05	ug/g	ND	98.7	60-130			
Hexane	4.37	0.05	ug/g	ND	109	60-130			
Methyl Ethyl Ketone (2-Butanone)	7.91	0.50	ug/g	ND	79.1	50-140			
Methyl Isobutyl Ketone	8.29	0.50	ug/g	ND	82.9	50-140			
Methyl tert-butyl ether	6.38	0.05	ug/g	ND	63.8	50-140			
Methylene Chloride	2.67	0.05	ug/g	ND	66.7	60-130			
Styrene	4.03	0.05	ug/g	ND	101	60-130			
1,1,1,2-Tetrachloroethane	4.95	0.05	ug/g	ND	124	60-130			
1,1,2,2-Tetrachloroethane	5.15	0.05	ug/g	ND	129	60-130			
Tetrachloroethylene	4.90	0.05	ug/g	ND	123	60-130			
Toluene	4.30	0.05	ug/g	ND	108	60-130			
1,1,1-Trichloroethane	4.47	0.05	ug/g	ND	112	60-130			
1,1,2-Trichloroethane	3.28	0.05	ug/g	ND	82.1	60-130			
Trichloroethylene	4.25	0.05	ug/g	ND	106	60-130			

Certificate of Analysis

Report Date: 22-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 16-Jan-2024

Client PO: 59242

Project Description: PE5276

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichlorofluoromethane	5.14	0.05	ug/g	ND	128	50-140			
Vinyl chloride	5.01	0.02	ug/g	ND	125	50-140			
m,p-Xylenes	8.63	0.05	ug/g	ND	108	60-130			
o-Xylene	4.14	0.05	ug/g	ND	103	60-130			
Surrogate: 4-Bromofluorobenzene	8.48		%		106	50-140			
Surrogate: Dibromofluoromethane	7.73		%		96.7	50-140			
Surrogate: Toluene-d8	6.10		%		76.3	50-140			
Benzene	3.61	0.02	ug/g	ND	90.2	60-130			
Ethylbenzene	4.43	0.05	ug/g	ND	111	60-130			
Toluene	4.30	0.05	ug/g	ND	108	60-130			
m,p-Xylenes	8.63	0.05	ug/g	ND	108	60-130			
o-Xylene	4.14	0.05	ug/g	ND	103	60-130			
Surrogate: Toluene-d8	6.10		%		76.3	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 59242

Report Date: 22-Jan-2024

Order Date: 16-Jan-2024

Project Description: PE5276

Qualifier Notes:

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 unless otherwise noted.

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.

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.



Paracel Order Number (Lab Use Only) 2403129	Chain Of Custody (Lab Use Only)
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Client Name: PATERSON	Project Ref: RES276	Page 1 of 1
Contact Name: ADRIAN MENYHART	Quote #:	Turnaround Time ☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Address: 9 AURIGA DR. NEPEAN, ON.	PO #: 59242	
Telephone: 613-226-7381	E-mail: AMENYHART@PATERSONGROUP.CA	
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 ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ Table _____ For RSC: ☐ Yes ☐ No	☐ REG 558 ☐ PWQO ☐ CCME ☐ MISA ☐ SU - Sani ☐ SU - Storm Mun: _____ ☐ Other: _____	Matrix Air Volume # of Containers Sample Taken Date Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	Cu/VI	B (HWS)										
Sample ID/Location Name																			
1 BH1-24-SS2/SS3		S	1	2	JAN 15/24		X			X	X	X							
2 BH2-24-SS2		S	1	2	JAN 15/24		X	X		X	X	X							
3 DUP 1		S	1	2	JAN 15/24		X	X		X	X	X							
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments: → JUST VOC PARAMETERS ON DUP1			Method of Delivery: Paracel Courier		
Relinquished By (Sign):	Received at Depot:	Received at Lab:	Verified By: SS		
Relinquished By (Print): Don P. C. Lavery	Date/Time:	Date/Time: Jan 16, 2024 16:30	Date/Time: Jan 17, 24 0857		
Date/Time: JAN 16/2024	Temperature: _____ °C	Temperature: 9.8	pH Verified: ☐ By: _____		

Certificate of Analysis

Paterson Group Consulting Engineers (Ottawa)

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Jesse Andrechek

Client PO: 59247
Project: PE5276
Custody:

Report Date: 23-Jan-2024

Order Date: 17-Jan-2024

Order #: 2403210

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

Paracel ID	Client ID
2403210-01	BH3-24(D) AU1
2403210-02	BH3-24(D) SS4
2403210-03	BH4-24(C) SS4

Approved By:



Dale Robertson, BSc

Laboratory Director

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	19-Jan-24	22-Jan-24
Conductivity	MOE E3138 - probe @25 °C, water ext	22-Jan-24	22-Jan-24
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	19-Jan-24	19-Jan-24
PHC F1	CWS Tier 1 - P&T GC-FID	19-Jan-24	22-Jan-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	18-Jan-24	18-Jan-24
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	18-Jan-24	18-Jan-24
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	19-Jan-24	22-Jan-24
SAR	Calculated	22-Jan-24	23-Jan-24
Solids, %	CWS Tier 1 - Gravimetric	18-Jan-24	19-Jan-24

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Client ID:	BH3-24(D) AU1	BH3-24(D) SS4	BH4-24(C) SS4	-	
Sample Date:	16-Jan-24 09:00	16-Jan-24 09:00	16-Jan-24 09:00	-	-
Sample ID:	2403210-01	2403210-02	2403210-03	-	
Matrix:	Soil	Soil	Soil	-	
MDL/Units					

Physical Characteristics

% Solids	0.1 % by Wt.	94.6	89.0	90.6	-	-
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General Inorganics

SAR	0.01 N/A	0.30	-	-	-	-
Conductivity	5 uS/cm	132	-	-	-	-
pH	0.05 pH Units	-	-	7.47	-	-

Volatiles

Acetone	0.50 ug/g	-	-	<0.50	-	-
Benzene	0.02 ug/g	-	-	<0.02	-	-
Bromodichloromethane	0.05 ug/g	-	-	<0.05	-	-
Bromoform	0.05 ug/g	-	-	<0.05	-	-
Bromomethane	0.05 ug/g	-	-	<0.05	-	-
Carbon Tetrachloride	0.05 ug/g	-	-	<0.05	-	-
Chlorobenzene	0.05 ug/g	-	-	<0.05	-	-
Chloroform	0.05 ug/g	-	-	<0.05	-	-
Dibromochloromethane	0.05 ug/g	-	-	<0.05	-	-
Dichlorodifluoromethane	0.05 ug/g	-	-	<0.05	-	-
1,2-Dichlorobenzene	0.05 ug/g	-	-	<0.05	-	-
1,3-Dichlorobenzene	0.05 ug/g	-	-	<0.05	-	-
1,4-Dichlorobenzene	0.05 ug/g	-	-	<0.05	-	-
1,1-Dichloroethane	0.05 ug/g	-	-	<0.05	-	-
1,2-Dichloroethane	0.05 ug/g	-	-	<0.05	-	-
1,1-Dichloroethylene	0.05 ug/g	-	-	<0.05	-	-
cis-1,2-Dichloroethylene	0.05 ug/g	-	-	<0.05	-	-
trans-1,2-Dichloroethylene	0.05 ug/g	-	-	<0.05	-	-
1,2-Dichloropropane	0.05 ug/g	-	-	<0.05	-	-

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Client ID:	BH3-24(D) AU1	BH3-24(D) SS4	BH4-24(C) SS4	-	
Sample Date:	16-Jan-24 09:00	16-Jan-24 09:00	16-Jan-24 09:00	-	-
Sample ID:	2403210-01	2403210-02	2403210-03	-	
Matrix:	Soil	Soil	Soil	-	
MDL/Units					

Volatiles

cis-1,3-Dichloropropylene	0.05 ug/g	-	-	<0.05	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	-	-	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g	-	-	<0.05	-	-
Ethylbenzene	0.05 ug/g	-	-	<0.05	-	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	-	-	<0.05	-	-
Hexane	0.05 ug/g	-	-	<0.05	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g	-	-	<0.50	-	-
Methyl Isobutyl Ketone	0.50 ug/g	-	-	<0.50	-	-
Methyl tert-butyl ether	0.05 ug/g	-	-	<0.05	-	-
Methylene Chloride	0.05 ug/g	-	-	<0.05	-	-
Styrene	0.05 ug/g	-	-	<0.05	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	-	-	<0.05	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	-	-	<0.05	-	-
Tetrachloroethylene	0.05 ug/g	-	-	<0.05	-	-
Toluene	0.05 ug/g	-	-	<0.05	-	-
1,1,1-Trichloroethane	0.05 ug/g	-	-	<0.05	-	-
1,1,2-Trichloroethane	0.05 ug/g	-	-	<0.05	-	-
Trichloroethylene	0.05 ug/g	-	-	<0.05	-	-
Trichlorofluoromethane	0.05 ug/g	-	-	<0.05	-	-
Vinyl chloride	0.02 ug/g	-	-	<0.02	-	-
m,p-Xylenes	0.05 ug/g	-	-	<0.05	-	-
o-Xylene	0.05 ug/g	-	-	<0.05	-	-
Xylenes, total	0.05 ug/g	-	-	<0.05	-	-
Toluene-d8	Surrogate	-	-	90.1%	-	-
Dibromofluoromethane	Surrogate	-	-	94.5%	-	-

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Client ID:	BH3-24(D) AU1	BH3-24(D) SS4	BH4-24(C) SS4	-	-
Sample Date:	16-Jan-24 09:00	16-Jan-24 09:00	16-Jan-24 09:00	-	-
Sample ID:	2403210-01	2403210-02	2403210-03	-	-
Matrix:	Soil	Soil	Soil	-	-
MDL/Units					

Volatiles

4-Bromofluorobenzene	Surrogate	-	-	106%	-	-
Benzene	0.02 ug/g	-	<0.02	-	-	-
Ethylbenzene	0.05 ug/g	-	<0.05	-	-	-
Toluene	0.05 ug/g	-	<0.05	-	-	-
m,p-Xylenes	0.05 ug/g	-	<0.05	-	-	-
o-Xylene	0.05 ug/g	-	<0.05	-	-	-
Xylenes, total	0.05 ug/g	-	<0.05	-	-	-
Toluene-d8	Surrogate	-	89.5%	-	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g	-	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	-	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	-	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g	-	<6	<6	-	-

Semi-Volatiles

Acenaphthene	0.02 ug/g	-	<0.02	-	-	-
Acenaphthylene	0.02 ug/g	-	<0.02	-	-	-
Anthracene	0.02 ug/g	-	<0.02	-	-	-
Benzo [a] anthracene	0.02 ug/g	-	<0.02	-	-	-
Benzo [a] pyrene	0.02 ug/g	-	<0.02	-	-	-
Benzo [b] fluoranthene	0.02 ug/g	-	<0.02	-	-	-
Benzo [g,h,i] perylene	0.02 ug/g	-	<0.02	-	-	-
Benzo [k] fluoranthene	0.02 ug/g	-	<0.02	-	-	-
Chrysene	0.02 ug/g	-	<0.02	-	-	-
Dibenzo [a,h] anthracene	0.02 ug/g	-	<0.02	-	-	-
Fluoranthene	0.02 ug/g	-	<0.02	-	-	-

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Client ID:	BH3-24(D) AU1	BH3-24(D) SS4	BH4-24(C) SS4	-	
Sample Date:	16-Jan-24 09:00	16-Jan-24 09:00	16-Jan-24 09:00	-	-
Sample ID:	2403210-01	2403210-02	2403210-03	-	
Matrix:	Soil	Soil	Soil	-	
MDL/Units					

Semi-Volatiles

Fluorene	0.02 ug/g	-	<0.02	-	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	-	<0.02	-	-	-
1-Methylnaphthalene	0.02 ug/g	-	<0.02	-	-	-
2-Methylnaphthalene	0.02 ug/g	-	<0.02	-	-	-
Methylnaphthalene (1&2)	0.04 ug/g	-	<0.04	-	-	-
Naphthalene	0.01 ug/g	-	<0.01	-	-	-
Phenanthrene	0.02 ug/g	-	<0.02	-	-	-
Pyrene	0.02 ug/g	-	<0.02	-	-	-
2-Fluorobiphenyl	Surrogate	-	64.2%	-	-	-
Terphenyl-d14	Surrogate	-	102%	-	-	-

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics								
Conductivity	ND	5	uS/cm					
Hydrocarbons								
F1 PHCs (C6-C10)	ND	7	ug/g					
F2 PHCs (C10-C16)	ND	4	ug/g					
F3 PHCs (C16-C34)	ND	8	ug/g					
F4 PHCs (C34-C50)	ND	6	ug/g					
Semi-Volatiles								
Acenaphthene	ND	0.02	ug/g					
Acenaphthylene	ND	0.02	ug/g					
Anthracene	ND	0.02	ug/g					
Benzo [a] anthracene	ND	0.02	ug/g					
Benzo [a] pyrene	ND	0.02	ug/g					
Benzo [b] fluoranthene	ND	0.02	ug/g					
Benzo [g,h,i] perylene	ND	0.02	ug/g					
Benzo [k] fluoranthene	ND	0.02	ug/g					
Chrysene	ND	0.02	ug/g					
Dibenzo [a,h] anthracene	ND	0.02	ug/g					
Fluoranthene	ND	0.02	ug/g					
Fluorene	ND	0.02	ug/g					
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g					
1-Methylnaphthalene	ND	0.02	ug/g					
2-Methylnaphthalene	ND	0.02	ug/g					
Methylnaphthalene (1&2)	ND	0.04	ug/g					
Naphthalene	ND	0.01	ug/g					
Phenanthrene	ND	0.02	ug/g					
Pyrene	ND	0.02	ug/g					
Surrogate: 2-Fluorobiphenyl	0.899		%	67.4	50-140			
Surrogate: Terphenyl-d14	1.43		%	107	50-140			
Volatiles								
Acetone	ND	0.50	ug/g					
Benzene	ND	0.02	ug/g					

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
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					
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					

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
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	7.57		%	94.6	50-140			
Surrogate: Dibromofluoromethane	5.85		%	73.1	50-140			
Surrogate: Toluene-d8	6.41		%	80.1	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	6.41		%	80.1	50-140			

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.67	0.01	N/A	0.67			0.0	30	
Conductivity	199	5	uS/cm	208			4.1	5	
pH	7.41	0.05	pH Units	7.46			0.7	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	
Physical Characteristics									
% Solids	88.4	0.1	% by Wt.	87.6			0.9	25	
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	
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	

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	8.76		%		102	50-140			
Surrogate: Dibromofluoromethane	7.89		%		91.4	50-140			
Surrogate: Toluene-d8	7.06		%		81.8	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	7.06		%		81.8	50-140			

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	198	7	ug/g	ND	99.0	85-115			
F2 PHCs (C10-C16)	96	4	ug/g	ND	102	60-140			
F3 PHCs (C16-C34)	241	8	ug/g	ND	105	60-140			
F4 PHCs (C34-C50)	169	6	ug/g	ND	116	60-140			
Semi-Volatiles									
Acenaphthene	0.138	0.02	ug/g	ND	83.0	50-140			
Acenaphthylene	0.126	0.02	ug/g	ND	75.8	50-140			
Anthracene	0.135	0.02	ug/g	ND	81.3	50-140			
Benzo [a] anthracene	0.125	0.02	ug/g	ND	74.8	50-140			
Benzo [a] pyrene	0.110	0.02	ug/g	ND	66.2	50-140			
Benzo [b] fluoranthene	0.093	0.02	ug/g	ND	56.1	50-140			
Benzo [g,h,i] perylene	0.102	0.02	ug/g	ND	61.3	50-140			
Benzo [k] fluoranthene	0.088	0.02	ug/g	ND	53.0	50-140			
Chrysene	0.150	0.02	ug/g	ND	90.0	50-140			
Dibenzo [a,h] anthracene	0.122	0.02	ug/g	ND	73.4	50-140			
Fluoranthene	0.133	0.02	ug/g	ND	80.0	50-140			
Fluorene	0.115	0.02	ug/g	ND	68.9	50-140			
Indeno [1,2,3-cd] pyrene	0.122	0.02	ug/g	ND	73.3	50-140			
1-Methylnaphthalene	0.124	0.02	ug/g	ND	74.6	50-140			
2-Methylnaphthalene	0.145	0.02	ug/g	ND	87.0	50-140			
Naphthalene	0.147	0.01	ug/g	ND	88.4	50-140			
Phenanthrene	0.148	0.02	ug/g	ND	88.9	50-140			
Pyrene	0.141	0.02	ug/g	ND	84.7	50-140			
Surrogate: 2-Fluorobiphenyl	0.843		%		63.2	50-140			
Surrogate: Terphenyl-d14	1.31		%		98.2	50-140			
Volatiles									
Acetone	8.62	0.50	ug/g	ND	86.2	50-140			
Benzene	2.71	0.02	ug/g	ND	67.8	60-130			
Bromodichloromethane	3.46	0.05	ug/g	ND	86.5	60-130			
Bromoform	4.12	0.05	ug/g	ND	103	60-130			

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromomethane	3.58	0.05	ug/g	ND	89.4	50-140			
Carbon Tetrachloride	3.96	0.05	ug/g	ND	99.1	60-130			
Chlorobenzene	3.38	0.05	ug/g	ND	84.5	60-130			
Chloroform	2.93	0.05	ug/g	ND	73.3	60-130			
Dibromochloromethane	4.67	0.05	ug/g	ND	117	60-130			
Dichlorodifluoromethane	4.10	0.05	ug/g	ND	103	50-140			
1,2-Dichlorobenzene	3.03	0.05	ug/g	ND	75.6	60-130			
1,3-Dichlorobenzene	3.09	0.05	ug/g	ND	77.3	60-130			
1,4-Dichlorobenzene	3.11	0.05	ug/g	ND	77.7	60-130			
1,1-Dichloroethane	2.86	0.05	ug/g	ND	71.4	60-130			
1,2-Dichloroethane	2.83	0.05	ug/g	ND	70.9	60-130			
1,1-Dichloroethylene	3.31	0.05	ug/g	ND	82.9	60-130			
cis-1,2-Dichloroethylene	2.89	0.05	ug/g	ND	72.3	60-130			
trans-1,2-Dichloroethylene	3.55	0.05	ug/g	ND	88.8	60-130			
1,2-Dichloropropane	4.48	0.05	ug/g	ND	112	60-130			
cis-1,3-Dichloropropylene	2.81	0.05	ug/g	ND	70.2	60-130			
trans-1,3-Dichloropropylene	3.27	0.05	ug/g	ND	81.7	60-130			
Ethylbenzene	3.49	0.05	ug/g	ND	87.2	60-130			
Ethylene dibromide (dibromoethane, 1,2-)	2.89	0.05	ug/g	ND	72.3	60-130			
Hexane	3.95	0.05	ug/g	ND	98.7	60-130			
Methyl Ethyl Ketone (2-Butanone)	11.2	0.50	ug/g	ND	112	50-140			
Methyl Isobutyl Ketone	7.22	0.50	ug/g	ND	72.2	50-140			
Methyl tert-butyl ether	6.49	0.05	ug/g	ND	64.9	50-140			
Methylene Chloride	3.18	0.05	ug/g	ND	79.6	60-130			
Styrene	3.07	0.05	ug/g	ND	76.6	60-130			
1,1,1,2-Tetrachloroethane	3.79	0.05	ug/g	ND	94.7	60-130			
1,1,2,2-Tetrachloroethane	3.96	0.05	ug/g	ND	98.9	60-130			
Tetrachloroethylene	3.72	0.05	ug/g	ND	93.1	60-130			
Toluene	3.33	0.05	ug/g	ND	83.4	60-130			
1,1,1-Trichloroethane	3.27	0.05	ug/g	ND	81.7	60-130			
1,1,2-Trichloroethane	2.78	0.05	ug/g	ND	69.5	60-130			

Certificate of Analysis

Report Date: 23-Jan-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 17-Jan-2024

Client PO: 59247

Project Description: PE5276

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichloroethylene	2.97	0.05	ug/g	ND	74.3	60-130			
Trichlorofluoromethane	4.24	0.05	ug/g	ND	106	50-140			
Vinyl chloride	4.66	0.02	ug/g	ND	117	50-140			
m,p-Xylenes	6.72	0.05	ug/g	ND	84.0	60-130			
o-Xylene	3.18	0.05	ug/g	ND	79.6	60-130			
Surrogate: 4-Bromofluorobenzene	8.30		%		104	50-140			
Surrogate: Dibromofluoromethane	7.66		%		95.8	50-140			
Surrogate: Toluene-d8	6.22		%		77.8	50-140			
Benzene	2.71	0.02	ug/g	ND	67.8	60-130			
Ethylbenzene	3.49	0.05	ug/g	ND	87.2	60-130			
Toluene	3.33	0.05	ug/g	ND	83.4	60-130			
m,p-Xylenes	6.72	0.05	ug/g	ND	84.0	60-130			
o-Xylene	3.18	0.05	ug/g	ND	79.6	60-130			
Surrogate: Toluene-d8	6.22		%		77.8	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 59247

Report Date: 23-Jan-2024

Order Date: 17-Jan-2024

Project Description: PE5276

Qualifier Notes: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 unless otherwise noted.

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.

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.

Comments:		Method of Delivery:	
Relinquished By (Sign): V. Naufal	Received at Depot:	Received at Lab: SD	Parcel Carrier Verified By: SS
Relinquished By (Print): Vanessa Naufal	Date/Time:	Date/Time: Jan 17, 2024 3:30pm	Date/Time: Jan 17, 24 1538
Date/Time: Jan 17, 2024	Temperature: °C	Temperature: 11.4	pH Verified: ☐ By:

Certificate of Analysis

Paterson Group Consulting Engineers (Ottawa)

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Jesse Andrechek

Client PO:
Project: PE5276
Custody: 140708

Report Date: 1-Feb-2024
Order Date: 26-Jan-2024

Order #: 2404483

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

Paracel ID	Client ID
2404483-01	BH1-24 (A)
2404483-02	BH2-24 (B)
2404483-03	BH3-24 (D)
2404483-04	BH4-24 (C)

Approved By:



Mark Foto, M.Sc.

Lab Supervisor

Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	29-Jan-24	29-Jan-24
Chromium, hexavalent - water	MOE E3056 - colourimetric	29-Jan-24	29-Jan-24
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	29-Jan-24	29-Jan-24
Metals, ICP-MS	EPA 200.8 - ICP-MS	29-Jan-24	29-Jan-24
PHC F1	CWS Tier 1 - P&T GC-FID	29-Jan-24	29-Jan-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	27-Jan-24	27-Jan-24
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	31-Jan-24	31-Jan-24
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	29-Jan-24	29-Jan-24

Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Client ID:	BH1-24 (A)	BH2-24 (B)	BH3-24 (D)	BH4-24 (C)	-	-
Sample Date:	23-Jan-24 09:00	23-Jan-24 09:00	23-Jan-24 09:00	25-Jan-24 09:00	-	-
Sample ID:	2404483-01	2404483-02	2404483-03	2404483-04	-	-
Matrix:	Ground Water	Ground Water	Ground Water	Ground Water	-	-
MDL/Units						

Metals

Mercury	0.1 ug/L	<0.1	-	-	<0.1	-	-
Antimony	0.5 ug/L	0.5	-	-	0.5	-	-
Arsenic	1 ug/L	1	-	-	<1	-	-
Barium	1 ug/L	166	-	-	329	-	-
Beryllium	0.5 ug/L	<0.5	-	-	<0.5	-	-
Boron	10 ug/L	133	-	-	15	-	-
Cadmium	0.1 ug/L	<0.1	-	-	<0.1	-	-
Chromium (VI)	10 ug/L	<10	-	-	<10	-	-
Chromium	1 ug/L	<1	-	-	<1	-	-
Cobalt	0.5 ug/L	<0.5	-	-	<0.5	-	-
Copper	0.5 ug/L	1.1	-	-	2.7	-	-
Lead	0.1 ug/L	<0.1	-	-	0.2	-	-
Molybdenum	0.5 ug/L	6.0	-	-	2.7	-	-
Nickel	1 ug/L	2	-	-	3	-	-
Selenium	1 ug/L	3	-	-	<1	-	-
Silver	0.1 ug/L	<0.1	-	-	<0.1	-	-
Sodium	200 ug/L	89400	-	-	4920	-	-
Thallium	0.1 ug/L	<0.1	-	-	<0.1	-	-
Uranium	0.1 ug/L	3.5	-	-	2.2	-	-
Vanadium	0.5 ug/L	0.5	-	-	0.7	-	-
Zinc	5 ug/L	<5	-	-	62	-	-

Volatiles

Acetone	5.0 ug/L	-	<5.0	-	<5.0	-	-
Benzene	0.5 ug/L	-	<0.5	-	<0.5	-	-
Bromodichloromethane	0.5 ug/L	-	<0.5	-	<0.5	-	-

Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Client ID:	BH1-24 (A)	BH2-24 (B)	BH3-24 (D)	BH4-24 (C)	-	-
Sample Date:	23-Jan-24 09:00	23-Jan-24 09:00	23-Jan-24 09:00	25-Jan-24 09:00	-	-
Sample ID:	2404483-01	2404483-02	2404483-03	2404483-04	-	-
Matrix:	Ground Water	Ground Water	Ground Water	Ground Water	-	-
MDL/Units						

Volatiles

Bromoform	0.5 ug/L	-	<0.5	-	<0.5	-	-
Bromomethane	0.5 ug/L	-	<0.5	-	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	-	<0.2	-	<0.2	-	-
Chlorobenzene	0.5 ug/L	-	<0.5	-	<0.5	-	-
Chloroform	0.5 ug/L	-	<0.5	-	<0.5	-	-
Dibromochloromethane	0.5 ug/L	-	<0.5	-	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	-	<1.0	-	<1.0	-	-
1,2-Dichlorobenzene	0.5 ug/L	-	<0.5	-	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	-	<0.5	-	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	-	<0.5	-	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	-	<0.5	-	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	-	<0.5	-	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	-	<0.5	-	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	-	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	-	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	-	<0.5	-	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	-	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	-	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	-	<0.5	-	<0.5	-	-
Ethylbenzene	0.5 ug/L	-	<0.5	-	<0.5	-	-
Ethylene dibromide (dibromoethane,	0.2 ug/L	-	<0.2	-	<0.2	-	-
Hexane	1.0 ug/L	-	<1.0	-	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	-	<5.0	-	<5.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	-	<5.0	-	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	-	<2.0	-	<2.0	-	-

Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Client ID:	BH1-24 (A)	BH2-24 (B)	BH3-24 (D)	BH4-24 (C)	-	-
Sample Date:	23-Jan-24 09:00	23-Jan-24 09:00	23-Jan-24 09:00	25-Jan-24 09:00	-	-
Sample ID:	2404483-01	2404483-02	2404483-03	2404483-04	-	-
Matrix:	Ground Water	Ground Water	Ground Water	Ground Water	-	-
MDL/Units						

Volatiles

Methylene Chloride	5.0 ug/L	-	<5.0	-	<5.0	-	-
Styrene	0.5 ug/L	-	<0.5	-	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	-	<0.5	-	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	-	<0.5	-	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	-	<0.5	-	<0.5	-	-
Toluene	0.5 ug/L	-	<0.5	-	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L	-	<0.5	-	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	-	<0.5	-	<0.5	-	-
Trichloroethylene	0.5 ug/L	-	<0.5	-	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	-	<1.0	-	<1.0	-	-
Vinyl chloride	0.5 ug/L	-	<0.5	-	<0.5	-	-
m,p-Xylenes	0.5 ug/L	-	<0.5	-	<0.5	-	-
o-Xylene	0.5 ug/L	-	<0.5	-	<0.5	-	-
Xylenes, total	0.5 ug/L	-	<0.5	-	<0.5	-	-
Toluene-d8	Surrogate	-	105%	-	105%	-	-
Dibromofluoromethane	Surrogate	-	84.7%	-	85.1%	-	-
4-Bromofluorobenzene	Surrogate	-	100%	-	102%	-	-
Benzene	0.5 ug/L	<0.5	-	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	2.4	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	2.0	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	2.5	-	-	-
Toluene-d8	Surrogate	105%	-	105%	-	-	-

Hydrocarbons

Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Client ID:	BH1-24 (A)	BH2-24 (B)	BH3-24 (D)	BH4-24 (C)	-	-
Sample Date:	23-Jan-24 09:00	23-Jan-24 09:00	23-Jan-24 09:00	25-Jan-24 09:00	-	-
Sample ID:	2404483-01	2404483-02	2404483-03	2404483-04	-	-
Matrix:	Ground Water	Ground Water	Ground Water	Ground Water	-	-
MDL/Units						

Hydrocarbons

F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100	-	-

Semi-Volatiles

Acenaphthene	0.05 ug/L	-	-	<0.05	-	-	-
Acenaphthylene	0.05 ug/L	-	-	<0.05	-	-	-
Anthracene	0.01 ug/L	-	-	<0.01	-	-	-
Benzo [a] anthracene	0.01 ug/L	-	-	<0.01	-	-	-
Benzo [a] pyrene	0.01 ug/L	-	-	<0.01	-	-	-
Benzo [b] fluoranthene	0.05 ug/L	-	-	<0.05	-	-	-
Benzo [g,h,i] perylene	0.05 ug/L	-	-	<0.05	-	-	-
Benzo [k] fluoranthene	0.05 ug/L	-	-	<0.05	-	-	-
Chrysene	0.05 ug/L	-	-	<0.05	-	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	-	-	<0.05	-	-	-
Fluoranthene	0.01 ug/L	-	-	<0.01	-	-	-
Fluorene	0.05 ug/L	-	-	<0.05	-	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	-	-	<0.05	-	-	-
1-Methylnaphthalene	0.05 ug/L	-	-	<0.05	-	-	-
2-Methylnaphthalene	0.05 ug/L	-	-	<0.05	-	-	-
Methylnaphthalene (1&2)	0.10 ug/L	-	-	<0.10	-	-	-
Naphthalene	0.05 ug/L	-	-	<0.05	-	-	-
Phenanthrene	0.05 ug/L	-	-	<0.05	-	-	-
Pyrene	0.01 ug/L	-	-	<0.01	-	-	-
2-Fluorobiphenyl	Surrogate	-	-	60.4%	-	-	-

Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Client ID:	BH1-24 (A)	BH2-24 (B)	BH3-24 (D)	BH4-24 (C)		
Sample Date:	23-Jan-24 09:00	23-Jan-24 09:00	23-Jan-24 09:00	25-Jan-24 09:00	-	-
Sample ID:	2404483-01	2404483-02	2404483-03	2404483-04		
Matrix:	Ground Water	Ground Water	Ground Water	Ground Water		
MDL/Units						

Semi-Volatiles

Terphenyl-d14	Surrogate	-	-	67.1%	-	-	-
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Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons								
F1 PHCs (C6-C10)	ND	25	ug/L					
F2 PHCs (C10-C16)	ND	100	ug/L					
F3 PHCs (C16-C34)	ND	100	ug/L					
F4 PHCs (C34-C50)	ND	100	ug/L					
Metals								
Mercury	ND	0.1	ug/L					
Antimony	ND	0.5	ug/L					
Arsenic	ND	1	ug/L					
Barium	ND	1	ug/L					
Beryllium	ND	0.5	ug/L					
Boron	ND	10	ug/L					
Cadmium	ND	0.1	ug/L					
Chromium (VI)	ND	10	ug/L					
Chromium	ND	1	ug/L					
Cobalt	ND	0.5	ug/L					
Copper	ND	0.5	ug/L					
Lead	ND	0.1	ug/L					
Molybdenum	ND	0.5	ug/L					
Nickel	ND	1	ug/L					
Selenium	ND	1	ug/L					
Silver	ND	0.1	ug/L					
Sodium	ND	200	ug/L					
Thallium	ND	0.1	ug/L					
Uranium	ND	0.1	ug/L					
Vanadium	ND	0.5	ug/L					
Zinc	ND	5	ug/L					
Volatiles								
Acetone	ND	5.0	ug/L					
Benzene	ND	0.5	ug/L					
Bromodichloromethane	ND	0.5	ug/L					
Bromoform	ND	0.5	ug/L					
Bromomethane	ND	0.5	ug/L					

Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Carbon Tetrachloride	ND	0.2	ug/L					
Chlorobenzene	ND	0.5	ug/L					
Chloroform	ND	0.5	ug/L					
Dibromochloromethane	ND	0.5	ug/L					
Dichlorodifluoromethane	ND	1.0	ug/L					
1,2-Dichlorobenzene	ND	0.5	ug/L					
1,3-Dichlorobenzene	ND	0.5	ug/L					
1,4-Dichlorobenzene	ND	0.5	ug/L					
1,1-Dichloroethane	ND	0.5	ug/L					
1,2-Dichloroethane	ND	0.5	ug/L					
1,1-Dichloroethylene	ND	0.5	ug/L					
cis-1,2-Dichloroethylene	ND	0.5	ug/L					
trans-1,2-Dichloroethylene	ND	0.5	ug/L					
1,2-Dichloropropane	ND	0.5	ug/L					
cis-1,3-Dichloropropylene	ND	0.5	ug/L					
trans-1,3-Dichloropropylene	ND	0.5	ug/L					
1,3-Dichloropropene, total	ND	0.5	ug/L					
Ethylbenzene	ND	0.5	ug/L					
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.2	ug/L					
Hexane	ND	1.0	ug/L					
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L					
Methyl Isobutyl Ketone	ND	5.0	ug/L					
Methyl tert-butyl ether	ND	2.0	ug/L					
Methylene Chloride	ND	5.0	ug/L					
Styrene	ND	0.5	ug/L					
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L					
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L					
Tetrachloroethylene	ND	0.5	ug/L					
Toluene	ND	0.5	ug/L					
1,1,1-Trichloroethane	ND	0.5	ug/L					
1,1,2-Trichloroethane	ND	0.5	ug/L					
Trichloroethylene	ND	0.5	ug/L					
Trichlorofluoromethane	ND	1.0	ug/L					

Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
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	77.3		%	96.7	50-140			
Surrogate: Dibromofluoromethane	57.0		%	71.3	50-140			
Surrogate: Toluene-d8	86.6		%	108	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	86.6		%	108	50-140			

Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Metals									
Mercury	ND	0.1	ug/L	ND			NC	20	
Antimony	ND	5.0	ug/L	ND			NC	20	
Arsenic	ND	10	ug/L	ND			NC	20	
Barium	287	10	ug/L	275			4.4	20	
Beryllium	ND	5.0	ug/L	ND			NC	20	
Boron	127	100	ug/L	121			4.7	20	
Cadmium	ND	1.0	ug/L	ND			NC	20	
Chromium (VI)	ND	10	ug/L	ND			NC	20	
Chromium	ND	10	ug/L	ND			NC	20	
Cobalt	ND	5.0	ug/L	ND			NC	20	
Copper	ND	5.0	ug/L	ND			NC	20	
Lead	ND	1.0	ug/L	ND			NC	20	
Molybdenum	5.03	5.0	ug/L	5.32			5.6	20	
Nickel	ND	10	ug/L	ND			NC	20	
Selenium	ND	10	ug/L	8930			NC	20	
Silver	ND	1.0	ug/L	ND			NC	20	
Sodium	1640000	2000	ug/L	1440000			12.9	20	
Thallium	ND	1.0	ug/L	ND			NC	20	
Uranium	2.2	1.0	ug/L	2.0			9.4	20	
Vanadium	ND	5.0	ug/L	ND			NC	20	
Zinc	ND	50	ug/L	ND			NC	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	

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Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	1.11	0.5	ug/L	0.89			22.0	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	

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Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	79.8		%		99.8	50-140			
Surrogate: Dibromofluoromethane	68.0		%		85.0	50-140			
Surrogate: Toluene-d8	83.5		%		104	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	83.5		%		104	50-140			

Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1980	25	ug/L	ND	99.0	85-115			
F2 PHCs (C10-C16)	1420	100	ug/L	ND	88.4	60-140			
F3 PHCs (C16-C34)	4110	100	ug/L	ND	105	60-140			
F4 PHCs (C34-C50)	2610	100	ug/L	ND	105	60-140			
Metals									
Mercury	3.02	0.1	ug/L	ND	101	70-130			
Antimony	44.0	0.5	ug/L	ND	87.7	80-120			
Arsenic	49.7	1	ug/L	ND	98.8	80-120			
Barium	63.5	1	ug/L	20.0	87.0	80-120			
Beryllium	46.3	0.5	ug/L	ND	92.7	80-120			
Boron	41	10	ug/L	ND	82.6	80-120			
Cadmium	45.8	0.1	ug/L	ND	91.5	80-120			
Chromium (VI)	195	10	ug/L	ND	97.5	70-130			
Chromium	46.9	1	ug/L	ND	93.4	80-120			
Cobalt	45.6	0.5	ug/L	ND	91.1	80-120			
Copper	44.7	0.5	ug/L	1.96	85.4	80-120			
Lead	42.2	0.1	ug/L	ND	84.3	80-120			
Nickel	45.8	1	ug/L	ND	90.8	80-120			
Selenium	46.1	1	ug/L	ND	91.9	80-120			
Silver	46.3	0.1	ug/L	ND	92.5	80-120			
Sodium	8330	200	ug/L	ND	83.3	80-120			
Thallium	43.5	0.1	ug/L	ND	87.1	80-120			
Uranium	43.6	0.1	ug/L	ND	87.2	80-120			
Vanadium	46.9	0.5	ug/L	ND	93.7	80-120			
Zinc	48	5	ug/L	ND	89.9	80-120			
Volatiles									
Acetone	84.6	5.0	ug/L	ND	84.6	50-140			
Benzene	31.3	0.5	ug/L	ND	78.2	60-130			
Bromodichloromethane	29.5	0.5	ug/L	ND	73.8	60-130			
Bromoform	26.1	0.5	ug/L	ND	65.3	60-130			

Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromomethane	35.9	0.5	ug/L	ND	89.8	50-140			
Carbon Tetrachloride	24.1	0.2	ug/L	ND	60.3	60-130			
Chlorobenzene	38.0	0.5	ug/L	ND	95.1	60-130			
Chloroform	27.9	0.5	ug/L	ND	69.7	60-130			
Dibromochloromethane	25.4	0.5	ug/L	ND	63.6	60-130			
Dichlorodifluoromethane	25.4	1.0	ug/L	ND	63.4	50-140			
1,2-Dichlorobenzene	34.1	0.5	ug/L	ND	85.2	60-130			
1,3-Dichlorobenzene	33.9	0.5	ug/L	ND	84.7	60-130			
1,4-Dichlorobenzene	35.1	0.5	ug/L	ND	87.8	60-130			
1,1-Dichloroethane	35.6	0.5	ug/L	ND	89.0	60-130			
1,2-Dichloroethane	30.7	0.5	ug/L	ND	76.8	60-130			
1,1-Dichloroethylene	30.4	0.5	ug/L	ND	76.1	60-130			
cis-1,2-Dichloroethylene	32.4	0.5	ug/L	ND	80.9	60-130			
trans-1,2-Dichloroethylene	32.4	0.5	ug/L	ND	81.1	60-130			
1,2-Dichloropropane	38.9	0.5	ug/L	ND	97.4	60-130			
cis-1,3-Dichloropropylene	25.8	0.5	ug/L	ND	64.4	60-130			
trans-1,3-Dichloropropylene	29.2	0.5	ug/L	ND	73.1	60-130			
Ethylbenzene	39.1	0.5	ug/L	ND	97.6	60-130			
Ethylene dibromide (dibromoethane, 1,2-)	29.6	0.2	ug/L	ND	74.0	60-130			
Hexane	39.5	1.0	ug/L	ND	98.7	60-130			
Methyl Ethyl Ketone (2-Butanone)	64.3	5.0	ug/L	ND	64.3	50-140			
Methyl Isobutyl Ketone	67.8	5.0	ug/L	ND	67.8	50-140			
Methyl tert-butyl ether	70.9	2.0	ug/L	ND	70.9	50-140			
Methylene Chloride	30.1	5.0	ug/L	ND	75.3	60-130			
Styrene	33.4	0.5	ug/L	ND	83.6	60-130			
1,1,1,2-Tetrachloroethane	39.1	0.5	ug/L	ND	97.8	60-130			
1,1,2,2-Tetrachloroethane	25.3	0.5	ug/L	ND	63.3	60-130			
Tetrachloroethylene	39.6	0.5	ug/L	ND	99.1	60-130			
Toluene	40.0	0.5	ug/L	ND	100	60-130			
1,1,1-Trichloroethane	27.2	0.5	ug/L	ND	68.1	60-130			
1,1,2-Trichloroethane	31.4	0.5	ug/L	ND	78.5	60-130			

Certificate of Analysis

Report Date: 01-Feb-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 26-Jan-2024

Client PO:

Project Description: PE5276

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichloroethylene	32.0	0.5	ug/L	ND	79.9	60-130			
Trichlorofluoromethane	26.3	1.0	ug/L	ND	65.6	60-130			
Vinyl chloride	39.8	0.5	ug/L	ND	99.6	50-140			
m,p-Xylenes	76.0	0.5	ug/L	ND	95.0	60-130			
o-Xylene	36.5	0.5	ug/L	ND	91.2	60-130			
Surrogate: 4-Bromofluorobenzene	80.0		%		100	50-140			
Surrogate: Dibromofluoromethane	71.2		%		89.0	50-140			
Surrogate: Toluene-d8	82.6		%		103	50-140			
Benzene	31.3	0.5	ug/L	ND	78.2	60-130			
Ethylbenzene	39.1	0.5	ug/L	ND	97.6	60-130			
Toluene	40.0	0.5	ug/L	ND	100	60-130			
m,p-Xylenes	76.0	0.5	ug/L	ND	95.0	60-130			
o-Xylene	36.5	0.5	ug/L	ND	91.2	60-130			
Surrogate: Toluene-d8	82.6		%		103	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers (Ottawa)

Client PO:

Report Date: 01-Feb-2024

Order Date: 26-Jan-2024

Project Description: PE5276

Qualifier Notes: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.

Any use of these results implies your agreement that our total liability in connection with this work, however arising, shall be limited to the amount paid by you for this work, and that our employees or agents shall not under any circumstances be liable to you in connection with this work.



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Parcel Order Number
(Lab Use Only)

2404483

Chain Of Custody
(Lab Use Only)

No 140708

Client Name: Paterson Group
Contact Name: Jesse Andrechek
Address: 9 Auriga Dr.
Telephone: 613-226-7381

Project Ref: PE5276
Quote #:
PO #:
E-mail: jandrechek@patersongroup.ca

Page 1 of 1
Turnaround Time
☐ 1 day
☐ 2 day
☒ Regular
Date Required:

☒ REG 153/04 ☐ Table 1 ☐ Table 2 ☐ Table 3 ☒ Table 8 For RSC: ☐ Yes ☐ No		☐ REG 406/19 ☐ Res/Park ☐ Ind/Comm ☐ Agri/Other ☒ Coarse		Other Regulation ☐ REG 558 ☐ CCME ☐ SU - Sani ☐ SU - Storm ☐ PWQO ☐ MISA ☐ Other:		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)		Required Analysis PHCs F1-F4+BTEX VOCs PAHs Metals by ICP Hg CrVI B (HWS)										
Sample ID/Location Name						Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	
									Date	Time								
1	BH1-24 (A)					GW	✓	6	23-JAN/24	✓	✓	✓	✓	✓	✓	✓		
2	BH2-24 (B)					↓	↓	3	↓	↓	✓	✓						
3	BH3-24 (D)					↓	↓	4	↓	↓	✓		✓					
4	BH4-24 (C)					↓	↓	6	25-JAN/24	↓	✓	✓		✓	✓	✓		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Relinquished By (Sign): *J. Andrechek*
 Relinquished By (Print): Jesse Andrechek
 Date/Time: 26-JAN/24 3PM

Received By Driver/Depot:
 Date/Time:
 Temperature: °C

Received at Lab: *KB 1640*
 Date/Time: Jan 26/24
 Temperature: 7.3, 11.9

Method of Delivery: Walk In
 Verified By: *[Signature]*
 Date/Time: Jan 24/24 858
 pH Verified: ☐