

Phase II-Environmental Site Assessment

4816 Bank Street, Ottawa, Ontario

Prepared For: DCR Phoenix Development Corporation

Report: PE6552-2

Date: October 18, 2024

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was carried out for the property addressed 4816 Bank Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address one potentially contaminating activity (PCA) that was identified during the Phase I ESA and was considered to result in an area of potential environmental concern (APEC) on the Phase II Property.

The Phase II ESA builds upon a preexisting soil characterization investigation. Based on the results of the soil characterization investigation, carried out in June 2024, soil samples from the Phase II Property were found to comply with MECP Table 2 Residential Coarse-Grained standards.

The Phase II ESA program consisted of drilling 3 boreholes at the Phase II Property, all of which were instrumented with groundwater monitoring wells. Boreholes were placed to address the previously identified APEC and to provide coverage for groundwater flow triangulation. The soil and groundwater sampling programs were carried out in October of 2024.

Soil samples obtained during the Phase II ESA were screened using visual and olfactory observations as well as organic vapour measurements. A total of 4 soil samples (including one duplicate) were submitted for laboratory analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum hydrocarbons (PHCs, F₁-F₄), volatile organic compounds (VOCs) and/or pH. All results comply with the MECP Table 2 Standards.

Three groundwater samples from monitoring wells installed in BH4-24, BH5-24, and BH6-24 were submitted for laboratory analysis of PHCs (F₁-F₄), and VOCs. No sheen, free product or odour was noted during the groundwater sampling event. All groundwater results comply with the selected MECP Table 2 Standards.

Based on the findings of this Phase II-ESA, it is our opinion that **no further environmental investigation is required.**

1.0 INTRODUCTION

At the request of DCR Phoenix Development Corporation, Paterson Group (Paterson) carried out a Phase II Environmental Site Assessment for 4816 Bank Street (herein referred to as the Phase II Property), in the City of Ottawa, Ontario. The purpose of this Phase II ESA has been to address the area of potential environmental concern (APEC) identified on the Phase II Property, during the Phase I ESA carried out by Paterson in July of 2024.

1.1 Site Description

Address: 4816 Bank Street, Ottawa, Ontario.

Legal Description: Part of Lot 21, Concession 4, Township of Gloucester in the City of Ottawa.

Location: The Phase II Property is situated on the west side of Bank Street, southwest of the intersection of Bank Street and Blais Road, in the City of Ottawa, Ontario. For the purposes of this report, Bank Street runs in a north-south orientation. Refer to Figure 1- Key Plan for the site location context.

Latitude and Longitude: 45° 18' 43.5" N, 75° 35' 26.0" W

Site Description:

Configuration: Irregular

Area: 26,348m² (approximate)

1.2 Property Ownership

The current registered property owner of the Phase II Property is DCR Phoenix Development Corporation. Paterson was engaged to conduct this Phase II ESA by Mr. Michael Boucher, Vice President of Land Development with DCR Phoenix Development Corporation. The head office of DCR Phoenix Development Corporation is located at 18A Bentley Avenue, Ottawa, Ontario. Mr. Boucher can be reached by telephone at (613) 723-9227.

1.3 Current and Proposed Future Uses

The Phase II Property exists as undeveloped land with forested areas covering much of the property. The study area consists of a mixture of residential and commercial, with some vacant land use. It is our understanding that the Phase II Property will be developed with approximately 128 back-to-back stacked residential units and approximately 44 back-to-back town homes. The proposed development will generally include asphalt-paved parking areas and roadways, as well as landscaped areas. It is expected that the proposed development will be municipally serviced.

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 Ministry of the 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 site conditions
- ☐ Potable groundwater conditions
- ☐ Residential land use.

Section 36 of O.Reg. 153/04 does apply to the Phase II Property in that some of the properties within 250m of the Phase II Property are expected to rely upon potable groundwater.

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 and the pH of the soil is between 5 and 9.

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

The residential standards were selected based on proposed land use of the Phase II Property. Coarse grained soil standards were assumed for the purposes of this Phase II ESA.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is situated on the west side of Bank Street, approximately 100m south of the intersection of Bank Street and Miikana Road - Blais Road, in the City of Ottawa, Ontario, within an area comprised of residential, parkland, agricultural, and commercial land uses.

The Phase II Property is highest in the centre and slopes downward to the east and west. Site drainage consists primarily of infiltration.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

A preliminary soil characterization investigation was carried out on June 10th, 2024. The field program consisted of excavating 7 test pits. The test pits were excavated to a maximum depth of between 1.6 and 2.6m below the existing grade, or to practical refusal on cobbles and boulders. A total of 28 soil samples were retrieved and subjected to preliminary screening. Six representative soil samples were submitted for laboratory analysis of Benzene, ethylbenzene, toluene, and xylenes (BTEX), petroleum hydrocarbons (PHCs, Fractions F₁ to F₄), and metals. Two representative soil samples were also submitted for pH analysis and two other representative soil samples were submitted for PAH analysis. All results complied with the selected MECP Table 2 Residential Coarse-Grained Standards. The results have been incorporated into this report.

Following the receipt of records from the City of Ottawa's Historical Land Use Inventory (HLUI) database, a subsurface environmental investigation was conducted in October of 2024. Three boreholes were drilled on October 1st, 2024, to investigate APEC 1. Boreholes were drilled to maximum depths of between 3.2 and 6.4m below the existing grade. All three boreholes were instrumented with groundwater monitoring wells. Thirteen soil samples were retrieved from the boreholes and subjected to a preliminary screening. Four samples, including one duplicate, were submitted for laboratory analysis. The monitoring wells in BH4-24, BH5-24 and BH6-24, were purged and sampled on October 4th, 2024.

The borehole and test pit locations are shown on Drawing PE6552-3 – Test Hole Location Plan, appended to this report.

3.2 Media Investigated

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

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

Based on available mapping information from the Geological Survey of Canada, the bedrock beneath the Phase I Property generally consists of dolostone and sandstone of the Beekmantown Group. The surficial geology consists largely of till deposits consisting of sand and silt, with a drift thickness ranging from approximately 5m to 10m. Hydrogeological conditions are considered to mimic the topographic setting; as a result, groundwater is expected to flow east.

Fill placement

Based on the preliminary soil characterization investigation of the Phase I ESA Property, fill material is present on the eastern portion of the Phase I Property. The tested fill material meets all Table 2 Residential Coarse-Grained standards. Fill discovered onsite is not considered to represent a potentially contaminating activity for the Phase I Property.

Water Bodies and Areas of Natural and Scientific Interest

No water bodies or areas of natural and scientific interest are present on the Phase I Property.

The nearest named water body with respect to the Phase I Property is Findlay Creek, located approximately 120m to the north.

Drinking Water Wells

Though the Phase I Property is located within a municipally serviced area, not all properties within the Phase I Study Area are serviced with city water. As such, drinking water wells are expected to remain in use within the Phase I Study Area.

Existing Buildings and Structures

The Phase I Property is currently occupied by two small storage sheds, one two-storey storage building and a dilapidated timber building.

Subsurface Structures and Utilities

The Phase I Property is situated in a municipally serviced area however, the property is not serviced with utilities.

Neighbouring Land Use

The surrounding lands within the Phase I Study Area consist of a mix of residential, and commercial properties along Bank Street, residential properties along Cedar Creek Drive and Miikana Road, and vacant land along Dun Skipper Drive. Current land use is depicted on Drawing PE6552-2 – Surrounding Land Use Plan, in the Figures section of this report.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

No potentially contaminating activities were identified on the Phase I Property. Five PCAs were identified with respect to off-site properties situated within the Phase I Study Area; one of which is considered to have resulted in an APEC on the Phase I Property, as presented in the table below.

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 (Commercial Auto Body Shop)	Northern portion of Phase I Property	PCA 10: (Commercial Autobody Shops)	Off-Site	VOCs PHCs (F1-F4)	Soil Groundwater

The PCA identified as #1 on Drawing PE6552-2 – Surrounding Land Use Plan correlates to Potentially Contaminating Activity Item No. 10: Commercial Autobody Shops from Table 2 of Ontario Regulation 153/04. This PCA is associated with the historical commercial autobody shop located adjacent to the northern portion of the Phase I Property at 4806 Bank Street.

It is our understanding that historical operations may have begun as early as 1973 and continued as late as 2017.

The location of APEC 1 on the Phase I Property is presented on Drawing P6552-1– Site Plan.

Off-site PCAs not considered to result in APECs on the Phase I Property include the following:

- ☐ ID #2 – PCA 28: Gasoline and Associate Products Storage in Fixed Tanks Associated with an Aboveground Storage Tank Observed at 4810 Bank Street.
- ☐ ID #3 – PCA 55: Transformer Manufacturing, Processing and Use Associated with an Historical Transformer Oil Spill of Non-PCBs at 4820 Bank Street.
- ☐ ID #4 – PCA 12: Concrete, Cement and Lime Manufacturing Associated with a Ready-Mix Concrete Plant at RR#6, Highway 31 and Blais Road (3151 Blais Road).
- ☐ ID #5 – PCA 3: Airstrips and Hangars Operation Associated with a Transport Canada Property located at 3151 Blais Road.

Based on the separation distances and the downgradient orientation with respect to the Phase I Property, none of PCA ID #2-5 are considered to represent an APEC on the Phase I Property.

Contaminants of Potential Concern (CPCs)

Contaminants of potential concern identified with respect to APEC 1 include F1-F4 fractionations of petroleum hydrocarbons (PHCs F1-F4), and volatile organic compounds (VOCs).

Current and Future Property Use

The Phase I Property is currently used for personal storage and limited agricultural purposes.

It is our understanding that the Phase I Property is to be redeveloped with approximately 128 back-to-back stacked residential units and approximately 44 back-to-back townhomes. Since the land use will change from agricultural/other to residential, a record of site condition (RSC) will not be required to be filed with the MECP.

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 one PCA has resulted in an APEC on the Phase I Property.

This was confirmed by a variety of independent sources, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Deviations from 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

A soil characterization investigation was conducted on June 10th, 2024. The field program consisted of excavating 7 test pits with a backhoe to a maximum depth of between 1.6 and 2.6m. Test pits were placed for general coverage and soil samples were retrieved.

A subsequent Phase II investigation was carried out on October 1st, 2024, following the discovery of a potentially contaminating activity resulting in an APEC on the Phase II Property. This field program consisted of drilling 3 boreholes to depths between 3.2 and 6.4m. A monitoring well was installed in each borehole and soil and groundwater samples were retrieved.

Test hole locations and borehole locations are shown on Drawing PE6552-3 – Test Hole Location Plan appended to this report.

4.2 Soil Sampling

A total of 32 soil samples were obtained between the two field investigations from the test pits and boreholes. Samples were taken between 0.0m and 3.66m below existing grade. The depths at which grab samples were obtained from the test pits are shown as “G” on the Soil Profile and Test Data Sheets. Split spoon samples are shown as “SS” and rock cores are shown as “RC”.

The site stratigraphy in the areas investigated generally consists of topsoil overlying glacial till. Fill material was present in some locations throughout the site. Bedrock was only encountered in one borehole at a depth of 2.21m.

Specific details of the soil profile at each test hole location are presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

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 PID readings were found range from 0.2 to 1.9ppm in the soil samples obtained. These results are not considered to be indicative of potential contamination from volatile contaminants. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

4.4 Groundwater Monitoring Well Installation

Three groundwater monitoring wells were installed on the Phase II Property as part of the Phase II ESA. One groundwater monitoring well was preexisting on the Phase II Property from the previous geotechnical investigation. BH4-24, BH5-24 and BH6-24 were sampled on October 4, 2024. The monitoring well installed in BH4-24 consisted of 32mm diameter schedule 40 threaded PVC risers and screens. The monitoring wells installed in BH5-24 and BH6-24 consisted of 50mm diameter schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed below in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

Table 2 - Monitoring Well Construction Details						
Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand /Silt Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH3-24	95.90	3.30	1.8 – 3.30	1.17 – 3.30	0.30 – 1.17	Stick-Up
BH4-24	94.84	6.40	3.40 – 6.40	2.74 - 6.40	1.22 – 2.74	Stick-Up
BH5-24	94.39	3.20	1.7 – 3.20	1.22 – 3.20	0.00 – 1.22	Stick-Up
BH6-24	93.82	3.66	2.16 – 3.66	1.85 – 3.66	0.00 – 1.85	Stick-Up

4.5 Field Measurement of Water Quality Parameters

Groundwater sampling was conducted on October 4, 2024. Water quality parameters were not measured in the field at the time of water sampling.

4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MECP document entitled "Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario," dated May 1996. Groundwater samples were obtained from each monitoring well, using dedicated sampling equipment.

Standing water was purged from each well prior to sampling. No free product was observed in any of the monitoring wells during the sampling event. 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.

4.7 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan, appended to this report, the following soil samples were submitted for analysis:

Table 4 - Soil Samples Submitted - Continued								
Sample ID	Screened Interval/ Stratigraphic Unit	Parameter Analyzed						Rationale
		pH	PAH	VOCs	BTEX	PHCs F ₁ -F ₄	Metals	
TP1-G2	0.23 – 0.43m	X			X	X	X	Soil Characterization for Excess Soil Management
TP2-G4	1.52 – 1.77m	X			X	X	X	Soil Characterization for Excess Soil Management
TP3-G1	0.25 – 0.38m		X		X	X	X	Soil Characterization for Excess Soil Management
TP4-G1	0.13 – 0.25m		X		X	X	X	Soil Characterization for Excess Soil Management
TP6-G2	0.4 – 0.5m			X	X	X	X	Soil Characterization for Excess Soil Management
TP7-G4	1.7 – 1.8m				X	X	X	Soil Characterization for Excess Soil Management
BH4-24-SS2	0.76 – 1.37m Silty Sand	X		X	X	X		Assess APEC 1 (Former Commercial Autobody Shop)
BH5-24-SS3	1.52 – 2.13m Till			X	X	X		Assess APEC 1 (Former Commercial Autobody Shop)
BH6-24-SS4	2.29 – 2.90m Sand	X		X	X	X		Assess APEC 1 (Former Commercial Autobody Shop)

Table 4 - Soil Samples Submitted								
Sample ID	Screened Interval/ Stratigraphic Unit	Parameter Analyzed						Rationale
		pH	PAH	VOCs	BTEX	PHCs F ₁ -F ₄	Metals	
DUP1-24 ¹	0.76 – 1.37m Silty Sand			X	X	X		Duplicate soil sample for QA/QC purposes
Notes: ▪ 1 – Duplicate of Sample BH4-24-SS2								

Based on the guidelines outlined in the Sampling and Analysis Plan, appended to this report, the following groundwater samples were submitted for analysis:

Table 5 - Groundwater Samples Submitted				
Sample ID	Screened Interval/ Stratigraphic Unit	Parameter Analyzed		Rationale
		PHCs F ₁ -F ₄	VOCs	
BH4-24-GW1	3.35 – 6.4m Bedrock	X	X	Assess APEC 1 (Historical Commercial Autobody Shop)
BH5-24-GW1	1.68 – 3.2m Till	X	X	Assess APEC 1 (Historical Commercial Autobody Shop)
BH6-24-GW1	2.14 – 3.66m Sand	X	X	Assess APEC 1 (Historical Commercial Autobody Shop)

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

4.8 Residue Management

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

4.9 Elevation Surveying

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

4.10 Quality Assurance and Quality Control Measures

A summary of quality assurance and quality control (QA/QC) measures, including sampling containers, preservation, labelling, handling, 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

Stratigraphy at the Phase II Property generally consists of the following:

- ☐ **Fill** was identified at the ground surface at three test pit locations and extended to depths of 0.3 – 0.51mbgs.
- ☐ **Topsoil** was encountered across the Phase II Property with a strata thickness ranging between 0.1 - 0.3m. This layer was encountered at the surface except where it was overlain by fill material.
- ☐ **Glacial Till** generally consisting of brown silty sand with gravel, cobbles and boulders was encountered across the site. It was encountered at depths ranging from 0.10 – 3.3mbgs.
- ☐ **Bedrock** was encountered in borehole BH4-24 and consisted of excellent quality dolostone. Bedrock was encountered at a depth of 2.21m and extended to the termination of the borehole at 6.4mbgs.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling event on October 4, 2024, using an electronic water level meter. Based on the measured groundwater levels the groundwater on the Phase II Property is interpreted to flow in a northwesterly direction. A horizontal hydraulic gradient of 0.025m/m was calculated. Groundwater levels are summarized below in Table 6. All ground surface elevations were acquired through a GPS survey completed at the time of the initial subsurface investigation.

Table 6 - Groundwater Level Measurements				
Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (Asl)	Date of Measurement
BH4-24	94.84	1.39	93.45	October 4, 2024
BH5-24	94.39	2.11	92.28	October 4, 2024
BH6-24	93.82	2.64	91.18	October 4, 2024

Based on the groundwater levels recorded on October 4, 2024, the groundwater appears to flow to the northwest.

5.3 Fine-Coarse Soil Texture

A grain size distribution analysis was not completed for the Phase II Property. As a conservative approach, coarse-grained soil standards were chosen for the purposes of this Phase II ESA.

5.4 Soil: Field Screening

Field screening of the soil samples collected resulted in vapour readings of 0.2 – 1.9ppm for all samples. These results are not considered to be indicative of significant contamination from volatile contaminants. No visual or olfactory observations were noted at the time of sampling. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

5.5 Soil Quality

A total of 10 soil samples (including one duplicate) were submitted for analysis of Metals, BTEX, PHCs (F₁-F₄), PAH and/or VOCs. Four of these samples were also submitted for analysis of pH. The results of the analytical soil testing completed during the subsurface program are presented in Table 1 following the body of this report. The laboratory certificates of analysis are provided in Appendix 1.

Metals

All metal parameters in the samples analysed comply with MECP Table 2 Standards. The analytical results are presented in Table 1, and on Drawing PE6552-4 – Analytical Testing Plan – Soil and Groundwater, appended to this report.

BTEX and PHCs (F₁-F₄)

No BTEX parameters were identified in the samples analysed. All BTEX parameters comply with MECP Table 2 Standards. No PHC parameters were detected in the soil samples analysed with the exception of BH6-24-SS4. This sample complied with the selected MECP Table 2 Standards. The analytical results are presented in Table 1, and on Drawing PE6552-4 – Analytical Testing Plan – Soil and Groundwater appended to this report.

PAHs

All PAH parameters in the samples analysed comply with MECP Table 2 Standards. The analytical results are presented in Table 1, and on Drawing PE6552-4 – Analytical Testing Plan – Soil and Groundwater, appended to this report.

VOCs

No VOC parameters were identified in the samples analysed. All VOC parameters comply with MECP Table 2 Standards. The analytical results are presented in Table 1, and on Drawing PE6552-4 – Analytical Testing Plan – Soil and Groundwater appended to this report.

The maximum concentrations of analyzed parameters in the soil at the Phase II Property are summarized in Table 7.

TABLE 7 - Maximum Concentrations – Soil			
Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
Arsenic	8.3	TP1-G2	0.23 – 0.43
Barium	204	TP3-G1	0.25 – 0.38
Beryllium	0.8	TP1-G2	0.23 – 0.43
Boron	7.2	TP1-G2	0.23 – 0.43
Chromium	27.8	TP6-G2	0.40 – 0.50
Cobalt	9	TP1-G2	0.23 – 0.43
Copper	21.5	TP1-G2	0.23 – 0.43
Lead	31	TP4-G1	0.13 – 0.25
Molybdenum	3.6	TP1-G2	0.23 – 0.43
Nickel	19.2	TP1-G2	0.23 – 0.43
Uranium	1.4	TP1-G2	0.23 – 0.43
Vanadium	45.8	TP6-G2	0.40 – 0.50
Zinc	61.8	TP6-G2	0.40 – 0.50
F3 PHCs (C16-C34)	28	BH6-24-SS4	2.29 – 2.90
F4 PHCs (C34-C50)	28	TP3-G1	0.25 – 0.38
Acenaphthene	0.03	TP3-G1	0.25 – 0.38
Acenaphthylene	0.04	TP3-G1	0.25 – 0.38
Anthracene	0.12	TP3-G1	0.25 – 0.38

TABLE 7 - Maximum Concentrations – Soil -			
Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
Benzo[a]anthracene	0.25	TP3-G1	0.25 – 0.38
Benzo[a]pyrene	0.18	TP3-G1	0.25 – 0.38
Benzo[b]fluoranthene	0.21	TP3-G1	0.25 – 0.38
Benzo[g,h,i]perylene	0.14	TP3-G1	0.25 – 0.38
Benzo[k]fluoranthene	0.14	TP3-G1	0.25 – 0.38
Chrysene	0.21	TP3-G1	0.25 – 0.38
Dibenzo[a,h]anthracene	0.03	TP3-G1	0.25 – 0.38
Fluoranthene	0.65	TP3-G1	0.25 – 0.38
Fluorene	0.03	TP3-G1	0.25 – 0.38
Indeno [1,2,3-cd] pyrene	0.11	TP3-G1	0.25 – 0.38
Phenanthrene	0.4	TP3-G1	0.25 – 0.38
Pyrene	0.48	TP3-G1	0.25 – 0.38

All remaining parameter results were non-detect. The laboratory Certificates of Analysis are provided in Appendix 1.

5.6 Groundwater Quality

Three groundwater samples from the monitoring wells installed in BH4-24, BH5-24 and BH6-24 were submitted for laboratory analysis of PHCs (F₁-F₄) and VOCs.

The groundwater samples were obtained from the screened interval noted in Table 2. The results of the analytical testing are appended to this report. The laboratory certificate of analysis is provided in Appendix 1.

PHCs

No PHC parameter concentrations were detected in the groundwater samples analysed. Therefore, the results comply with the selected MECP Table 2 Standards. The analytical results for PHCs in the tested groundwater are presented in Table 2 and on Drawing PE6552-4 – Analytical Testing Plan – Soil and Groundwater appended to this report.

VOCs

All VOC parameter concentrations detected in the groundwater samples analysed comply with the selected MECP Table 2 Standards. The analytical results for VOCs in the tested groundwater are presented in Table 2 and on Drawing PE6552-4 – Analytical Testing Plan – Soil and Groundwater appended to this report.

The maximum concentrations of analyzed parameters in the groundwater at the Phase II Property are summarized in Table 8.

TABLE 8 - Maximum Concentrations – Groundwater			
Parameter	Maximum Concentration (µg/L)	Sample ID	Depth Interval (m BGS)
Chloroform	1	BH4-24	3.35 – 6.4; Bedrock

All remaining parameter results were non-detect. The laboratory Certificates of Analysis are provided in Appendix 1.

5.7 Quality Assurance and Quality Control Results

All soil and groundwater samples were handled in accordance with the Analytical Protocol with respect to holding time, preservation method, storage requirement, and container type.

As per Subsection 47(3) of O.Reg. 153/04 as amended, a Certificate of Analysis has been received for each sample submitted for analysis and all Certificates of Analysis are appended to this report.

As per the Sampling and Analysis Plan, a duplicate soil sample was obtained from Sample BH4-24-SS2 and submitted for laboratory analysis of VOCs, PHCs, and BTEX parameters. 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.

Where non-detect concentrations were present in the original sample, the corresponding duplicate sample, or both, the results are considered to be acceptable. Typically, RPD values below 20% are considered to be of satisfactory quality. All VOC, PHC, and BTEX parameters were non-detect in both the original and duplicate sample. As such all results were considered to meet the data quality objectives outlined in the Sampling and Analysis Plan, appended to this report. As a result, it is our opinion that the quality of the field data collected during this investigation is considered to be sufficient to meet the overall objectives of this assessment.

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 269/11 amended by the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

Site Description

The Phase II Property addressed 4816 Bank Street is situated on the west side of Bank Street, approximately 110m south the intersection Bank Street and Miikana Road - Blais Road, in the City of Ottawa, Ontario. The legal description for the Phase II Property is Part of Lot 21, Concession 4, Township of Gloucester.

The Phase II Property is an irregular shaped parcel of land, with an approximate area of 2.63 hectares. At the time of the 2024 Phase II ESA, the Phase II Property existed as predominantly vacant land with several storage buildings, covered with a combination of low-lying vegetation and forest.

The Phase II Property is currently not serviced; municipal services will be provided to the Phase II Property upon development. Some residential properties within the 250m study area are not serviced with municipal water.

Based on the municipal and geological setting and the proposed residential development, the MECP Table 2 Residential Standards are applicable to the Phase II Property. The more conservative coarse-grained soil standards were chosen to represent the site conditions.

Background

A Phase I ESA was carried out by Paterson in July of 2024. Based on the findings of the Phase I ESA, one (1) off-site PCA was considered to result in one (1) APEC on the Phase II Property.

A Phase II ESA was subsequently carried out in October of 2024. Soil and groundwater quality at the Phase II Property was determined to comply with MECP Table 2 residential standards.

Potentially Contaminating Activity and Areas of Potential Environmental Concern

No PCAs were identified on the Phase I Property. Five off-site PCAs were identified within the Phase I Study Area, one of which is considered to have resulted in an APEC on the Phase I Property, as presented in the table below.

Table 9 - Areas of Potential Environmental Concern 4816 Bank Street, Ottawa					
Area of potential environmental concern	Location of area of potential environmental concern on Phase I Property	Potentially contaminating activity	Location of PCA (onsite or off-site)	Contaminants of potential concern	Media potentially impacted (Ground water, soil and/or sediment)
APEC 1 (Commercial Auto Body Shop)	Northern portion of Phase I Property	PCA 10: (Commercial Autobody Shops)	Off-Site	VOCs PHCs (F ₁ -F ₄)	Soil Groundwater

APEC 1 – Former Autobody Shop Located at 4806 Bank Street – PCA 1 on Drawing PE6552-1, Item 10 “Commercial Autobody Shops”

The Phase I ESA identified the historical operation of a commercial autobody shop on the Property addressed 4806 Bank Street, north of the Phase I Property, identified as APEC 1. The Historical Land Use Inventory database returned records of a former autobody shop at 4806 Bank Street operating between 1973 and 2017.

The presence of a former autobody shop adjacent to the Phase II Property is considered to be a potentially contaminating activity (PCA 1; Item 10), resulting in an APEC on the Phase II Property, as depicted on Drawing PE6552-1 – Site Plan.

Additional PCAs Identified Within the Phase I Study Area

There were four other PCAs identified within the Phase I Study Area. These PCAs were not considered to represent APECs on the Phase II Property based on separation distance, orientation relative to groundwater flow direction, and nature of the activity. These PCAs are shown on Drawing PE6552-2 – Surrounding Land Use Plan.

Contaminants of Potential Concern

The following Contaminants of Potential Concern (CPCs) were identified with respect to the soil on the Phase II Property:

- ☐ Petroleum Hydrocarbons fractions 1 through 4 (PHCs F₁-F₄)
- ☐ Volatile Organic Compounds (VOCs)

The following Contaminants of Potential Concern (CPCs) were identified with respect to the groundwater beneath the Phase II Property:

- ☐ Petroleum Hydrocarbons fractions 1 through 4 (PHCs F₁-F₄)
- ☐ Volatile Organic Compounds (VOCs)

Subsurface Structures

No subsurface structures were present on the Phase II Property at the time of the Phase I ESAs.

Underground Utilities

The site was not serviced at the time of the Phase I site visit. Underground service locates were completed prior to the subsurface investigation.

Physical Setting

Site Stratigraphy

Stratigraphy at the Phase II Property generally consists of the following:

- ☐ **Fill** was identified at the ground surface at three test pit locations and extended to depths of 0.3 – 0.51mbgs.
- ☐ **Topsoil** was encountered across the Phase II Property with a strata thickness ranging between 0.1 - 0.3m. This layer was encountered at the surface except where it was overlain by fill material.
- ☐ **Glacial Till** generally consisting of brown silty sand with gravel, cobbles and boulders was encountered across the site. It was encountered at depths ranging from 0.10 – 3.3mbgs.
- ☐ **Bedrock** was encountered in borehole BH4-24 and consisted of excellent quality dolostone. Bedrock was encountered at a depth of 2.21m and extended to the termination of the borehole at 6.4mbgs.

Hydrogeological Characteristics

Groundwater levels were measured at the Phase II Property in October of 2024.

The measured groundwater levels ranged from approximately 1.39 to 2.64m below existing grade. It is noted that groundwater elevations fluctuate seasonally.

Based on the groundwater levels recorded during the October 2024 monitoring event, groundwater contour mapping was completed. Based on the contour mapping, groundwater flow at the Phase II Property is interpreted to flow in a northwesterly direction. A horizontal hydraulic gradient of 0.025m/m was calculated. Groundwater contours are presented on Drawing PE6552-3 – Test Hole Location Plan.

Free product was not observed in any of the monitoring wells during the sampling event conducted at the Phase II Property. There was also no odour or visible sheen observed at the time of sampling.

Approximate Depth to Bedrock

Based on available mapping, bedrock in the area of the Phase II Property is reported to consist of dolostone and sandstone of the Beekmantown Group.

Bedrock was encountered on the Phase II Property as part of the Phase II ESA investigation in BH4-24 at a depth of 2.21m below grade. Bedrock was not encountered in the other boreholes or in any of the test pits.

Approximate Depth to Water Table

Depth to water table at the Phase II Property varies between approximately 1.39m to 2.64m below existing grade.

Section 35 of the Regulation: Non-Potable Groundwater

Section 35 of the Regulation does not apply to the Phase II Property as follows:

- ☐ The Phase II Property, and other properties located in whole or in part, within 250 metres of the boundaries of the Phase II Property, are not supplied by a municipal drinking water system, and have a well used or intended for use as a source of water for human consumption or agriculture.
- ☐ The Phase II Property is an agricultural or other use.

Section 41 of Ontario Regulation 153/04: Environmentally Sensitive Areas

Section 41 of the Regulation (Site Condition Standards, Environmentally Sensitive Areas) does not apply to the Phase II Property, in that the Phase II Property is not within 30m of an environmentally sensitive area and the pH of the surface soil is between 5 and 9.

Section 43.1 of Ontario Regulation 153/04: Shallow Soil Property or Water Body

Section 43.1 of the Regulation does not apply to the Phase II Property as bedrock is generally located more than 2m below ground surface. There are no water bodies located on or within 30m of the Phase II Property.

Existing Buildings and Structures

The Phase II Property is currently occupied by two small storage sheds, one two-storey storage building and a dilapidated timber building.

Proposed Buildings and Other Structures

It is our understanding that the Phase I Property is to be redeveloped with approximately 128 back-to-back stacked residential units and approximately 44 back-to-back town homes.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of the Phase II ESA, soil results and groundwater results comply with the MECP Table 2 residential standards. Therefore, no contaminants are present on the Phase II Property.

Types of Contaminants

Based on the findings of the Phase II ESA, there are no contaminants of concern present on the Phase II Property.

Contaminated Media

Based on the findings of the Phase II ESA, there are no contaminated media present on the Phase II Property.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of the Phase II ESA, there are no contaminants present on the Phase II Property.

Distribution of Contaminants

Based on the findings of the Phase II ESA, soil and groundwater at the Phase II Property comply with the MECP Table 2 standards.

Migration of Contaminants

Based on the findings of the Phase II ESA, contaminants are not present on the Phase II Property and as such, no migration of contaminants has occurred.

Discharge of Contaminants

Based on the findings of the Phase II ESA, discharge of contaminants is not considered to have occurred on the Phase II Property.

Climatic and Meteorological Conditions

Given that there are no contaminants present on the Phase II Property, climatic and meteorological conditions are not considered to have affected contaminant distribution at the Phase II Property.

Potential for Vapour Intrusion

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

6.0 CONCLUSIONS

Assessment

A Phase II ESA was carried out for the property addressed 4816 Bank Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address one potentially contaminating activity (PCA) that was identified during the Phase I ESA and was considered to result in an area of potential environmental concern (APEC) on the Phase II Property.

The Phase II ESA builds upon a preexisting soil characterization investigation. Based on the results of the soil characterization investigation, carried out in June 2024, soil samples from the Phase II Property were found to comply with MECP Table 2 Residential Coarse-Grained standards.

The Phase II ESA program consisted of drilling 3 boreholes at the Phase II Property, all of which were instrumented with groundwater monitoring wells. Boreholes were placed to address the previously identified APEC and to provide coverage for groundwater flow triangulation. The soil and groundwater sampling programs were carried out in October of 2024.

Soil samples obtained during the Phase II ESA were screened using visual and olfactory observations as well as organic vapour measurements. A total of 4 soil samples (including one duplicate) were submitted for laboratory analysis of benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum hydrocarbons (PHCs, F₁-F₄), volatile organic compounds (VOCs) and/or pH. All results comply with the MECP Table 2 Standards.

Three groundwater samples from monitoring wells installed in BH4-24, BH5-24, and BH6-24 were submitted for laboratory analysis of PHCs (F₁-F₄), and VOCs. No sheen, free product or odour was noted during the groundwater sampling event. All groundwater results comply with the selected MECP Table 2 Standards.

Based on the findings of this Phase II-ESA, it is our opinion that **no further environmental investigation is required.**

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared in general accordance with O.Reg. 153/04 as amended and CSA Z769-00 (reaffirmed 2022). The conclusions presented herein are based on information gathered from a limited sampling and testing program. The test results represent conditions at specific test locations at the time of the field program.

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

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

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

Paterson Group Inc.



Mark Bujaki, B.Sc., MBA



Mark D'Arcy, P.Eng., QP_{ESA}



Report Distribution:

- DCR Phoenix Development Corporation
- Paterson Group

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE6552-1 – SITE PLAN

DRAWING PE6552-2 – SURROUNDING LAND USE PLAN

DRAWING PE6552-3 – TEST HOLE LOCATION PLAN

**DRAWING PE6552-4 – ANALYTICAL TESTING PLAN – SOIL AND
GROUNDWATER**

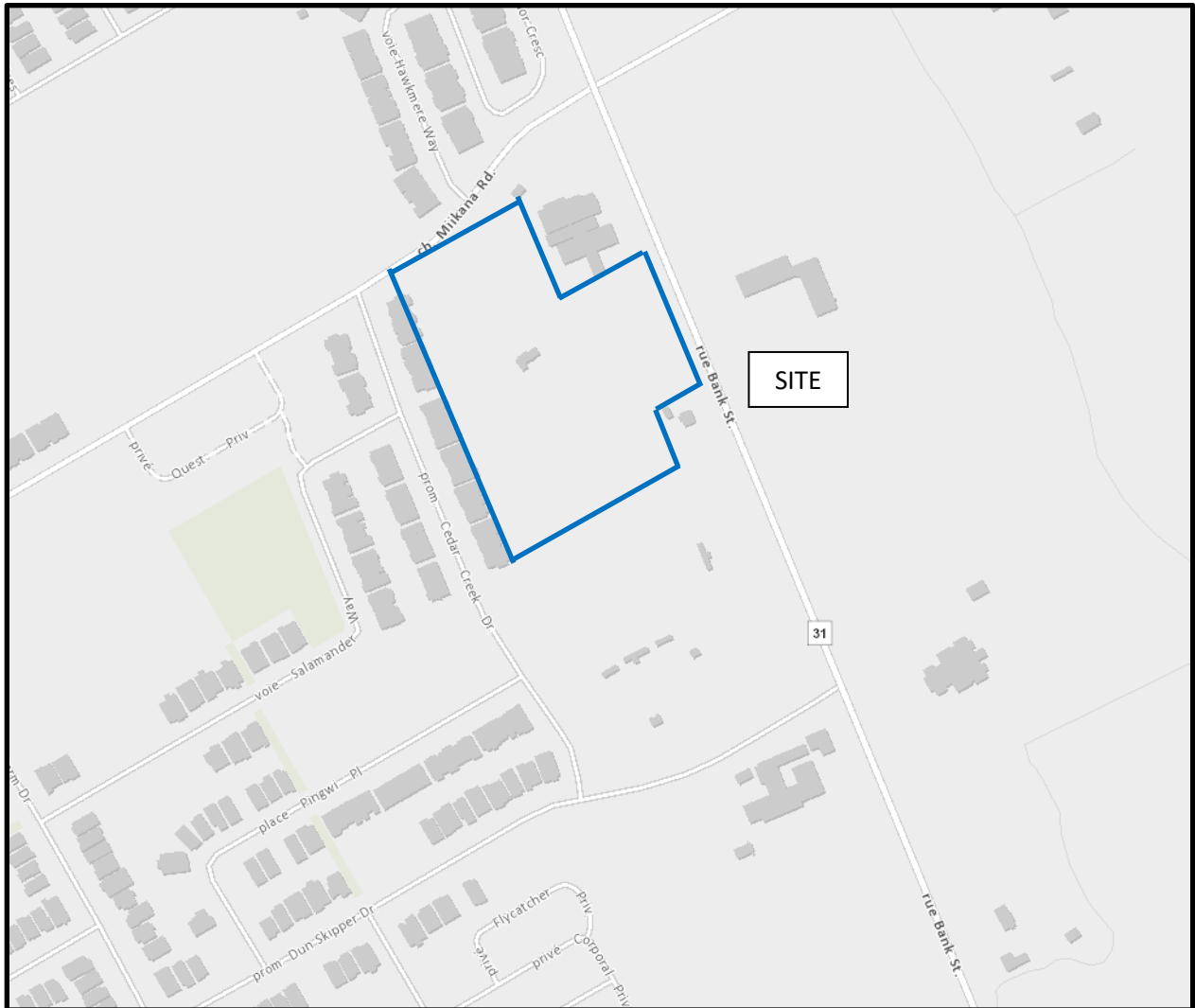
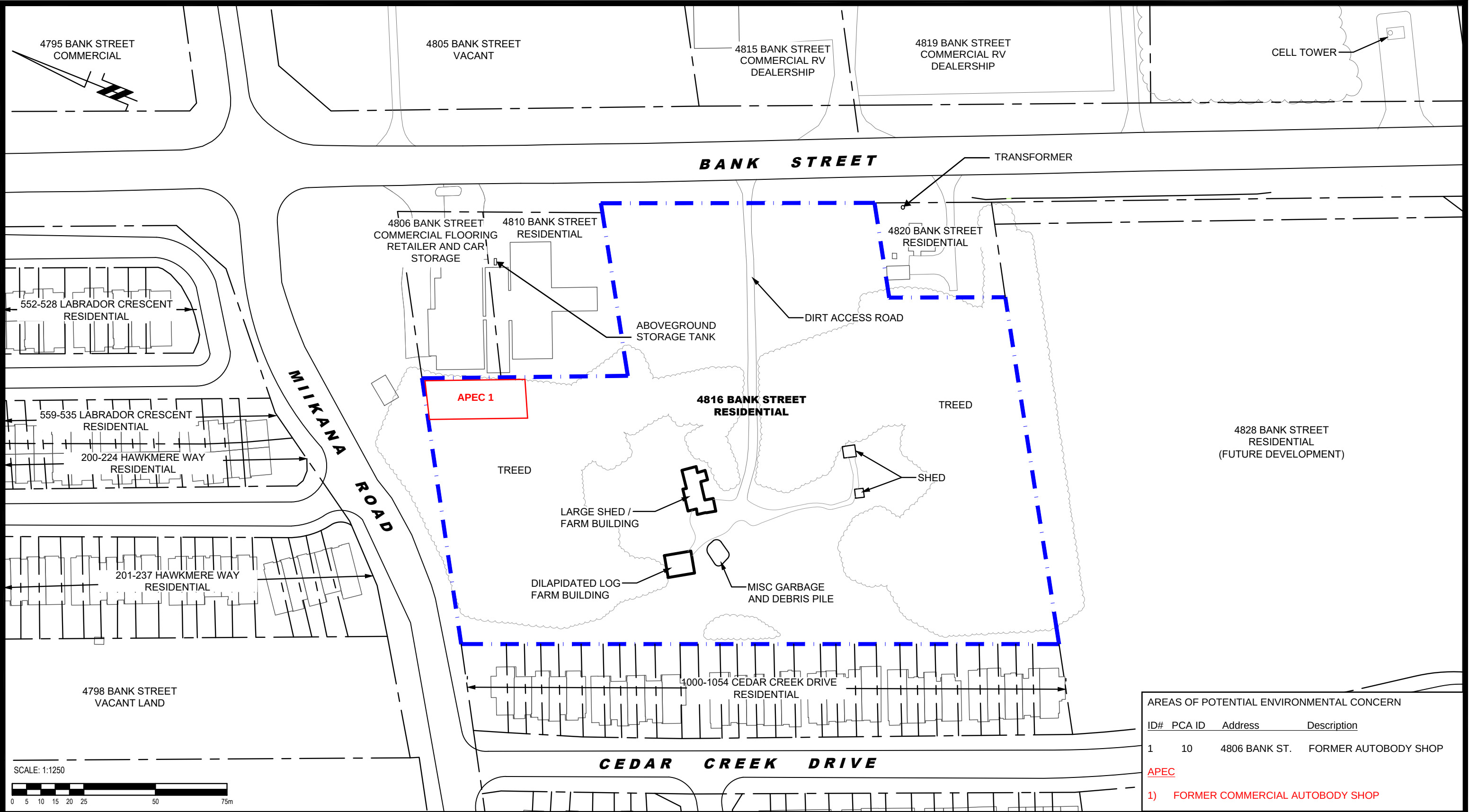


FIGURE 1
KEY PLAN



AREAS OF POTENTIAL ENVIRONMENTAL CONCERN			
ID#	PCA ID	Address	Description
1	10	4806 BANK ST.	FORMER AUTOBODY SHOP
APEC			
1) FORMER COMMERCIAL AUTOBODY SHOP			



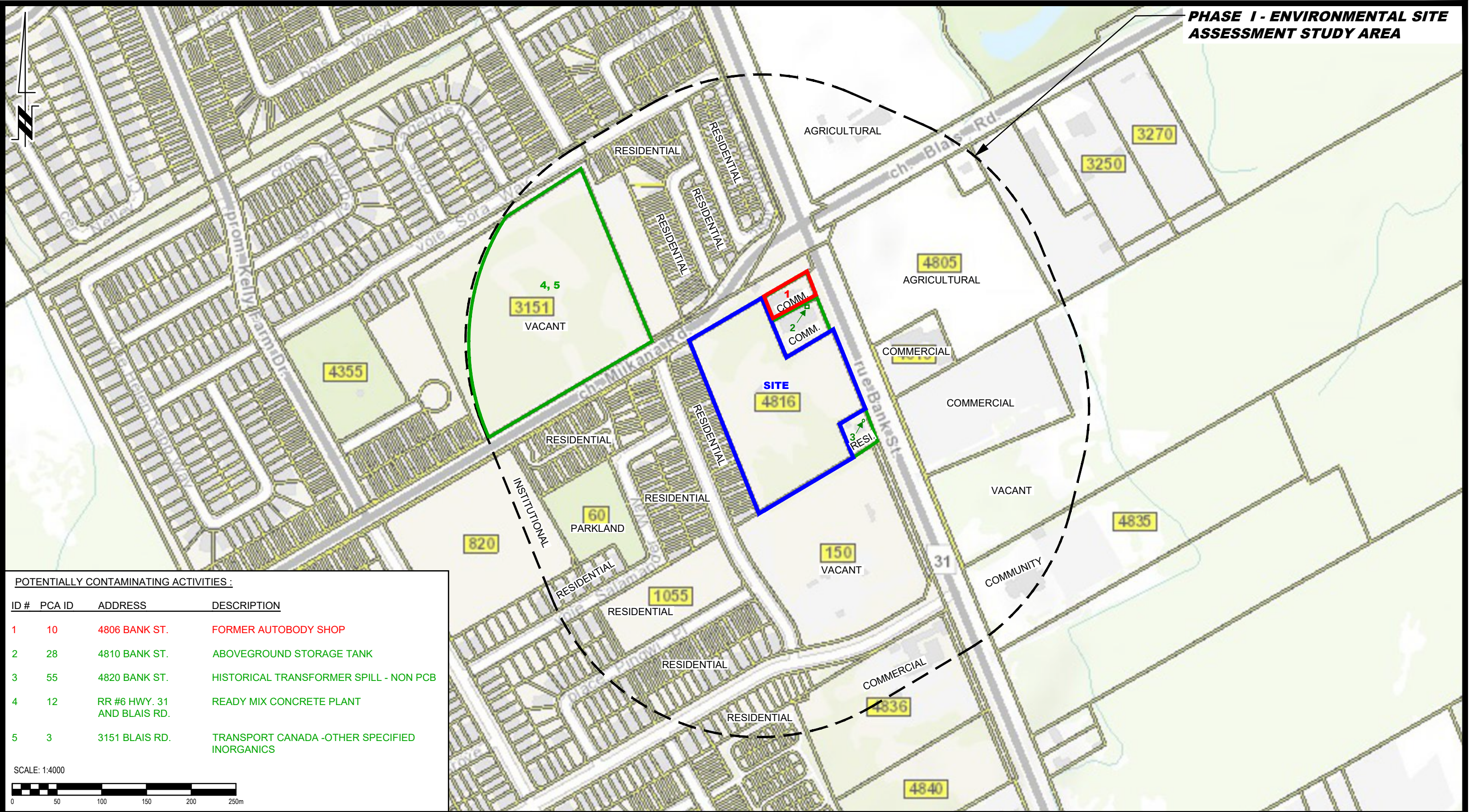
9 AURIGA DRIVE
OTTAWA, ON
K2E 7T9
TEL: (613) 226-7381

NO.	REVISIONS	DATE	INITIAL

DCR PHOENIX DEVELOPMENT CORPORATION
PHASE I - ENVIRONMENTAL SITE ASSESSMENT
4816 BANK STREET

OTTAWA,
Title: **SITE PLAN** ONTARIO

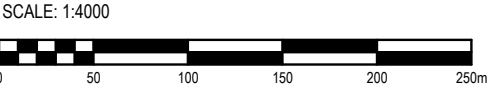
Scale:	1:1250	Date:	05/2024
Drawn by:	ZS	Report No.:	PE6552-1
Checked by:	MB	Dwg. No.:	PE6552-1
Approved by:	MSD	Revision No.:	



PHASE I - ENVIRONMENTAL SITE ASSESSMENT STUDY AREA

POTENTIALLY CONTAMINATING ACTIVITIES :

ID #	PCA ID	ADDRESS	DESCRIPTION
1	10	4806 BANK ST.	FORMER AUTOBODY SHOP
2	28	4810 BANK ST.	ABOVEGROUND STORAGE TANK
3	55	4820 BANK ST.	HISTORICAL TRANSFORMER SPILL - NON PCB
4	12	RR #6 HWY. 31 AND BLAIS RD.	READY MIX CONCRETE PLANT
5	3	3151 BLAIS RD.	TRANSPORT CANADA -OTHER SPECIFIED INORGANICS





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

NO.	REVISIONS	DATE	INITIAL

DCR PHOENIX DEVELOPMENT CORPORATION

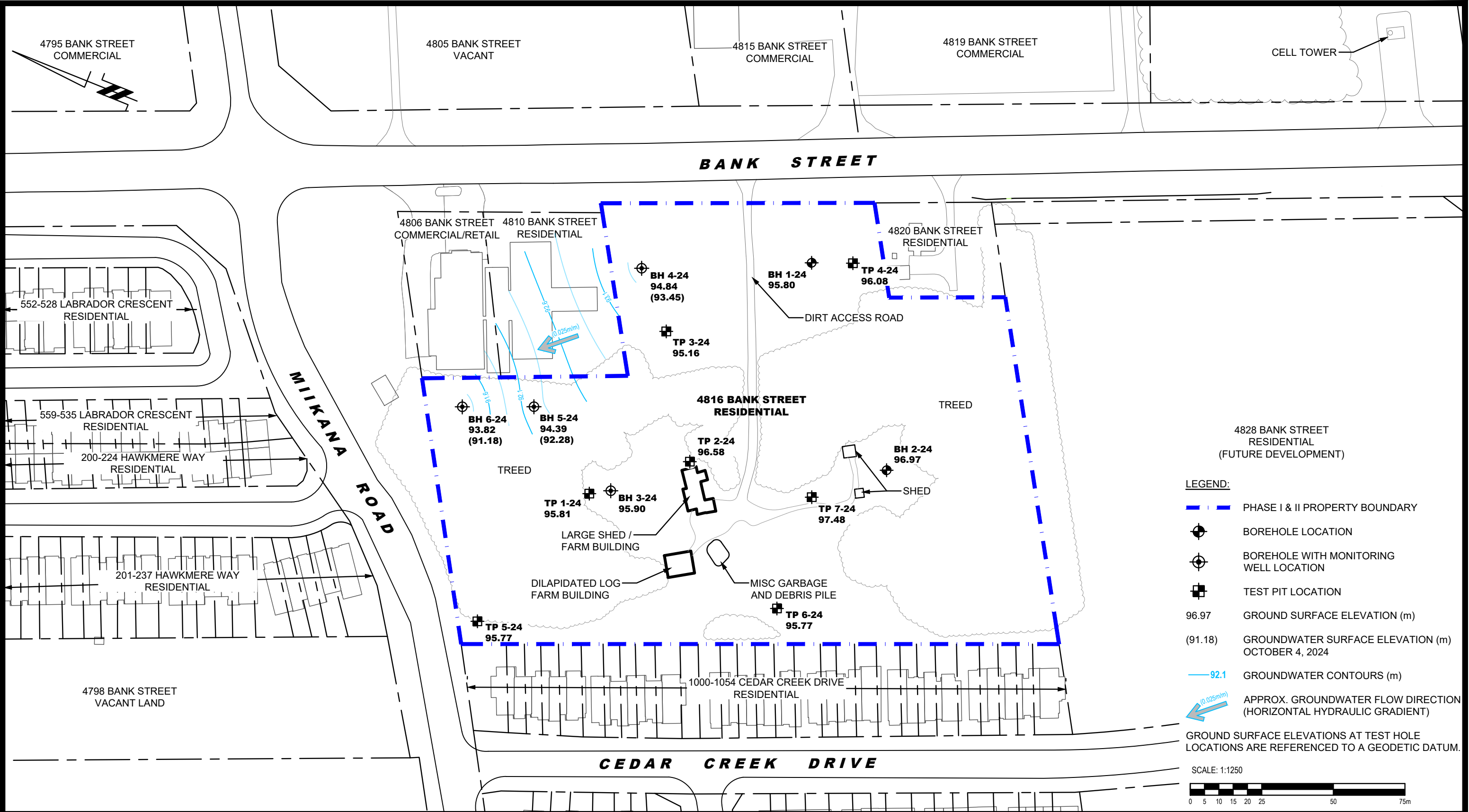
PHASE I - ENVIRONMENTAL SITE ASSESSMENT

4816 BANK STREET

OTTAWA, ONTARIO

Title: **SURROUNDING LAND USE PLAN**

Scale:	1:4000	Date:	06/2024
Drawn by:	GK	Report No.:	PE6552-1
Checked by:	MB	Dwg. No.:	PE6552-2
Approved by:	MSD	Revision No.:	





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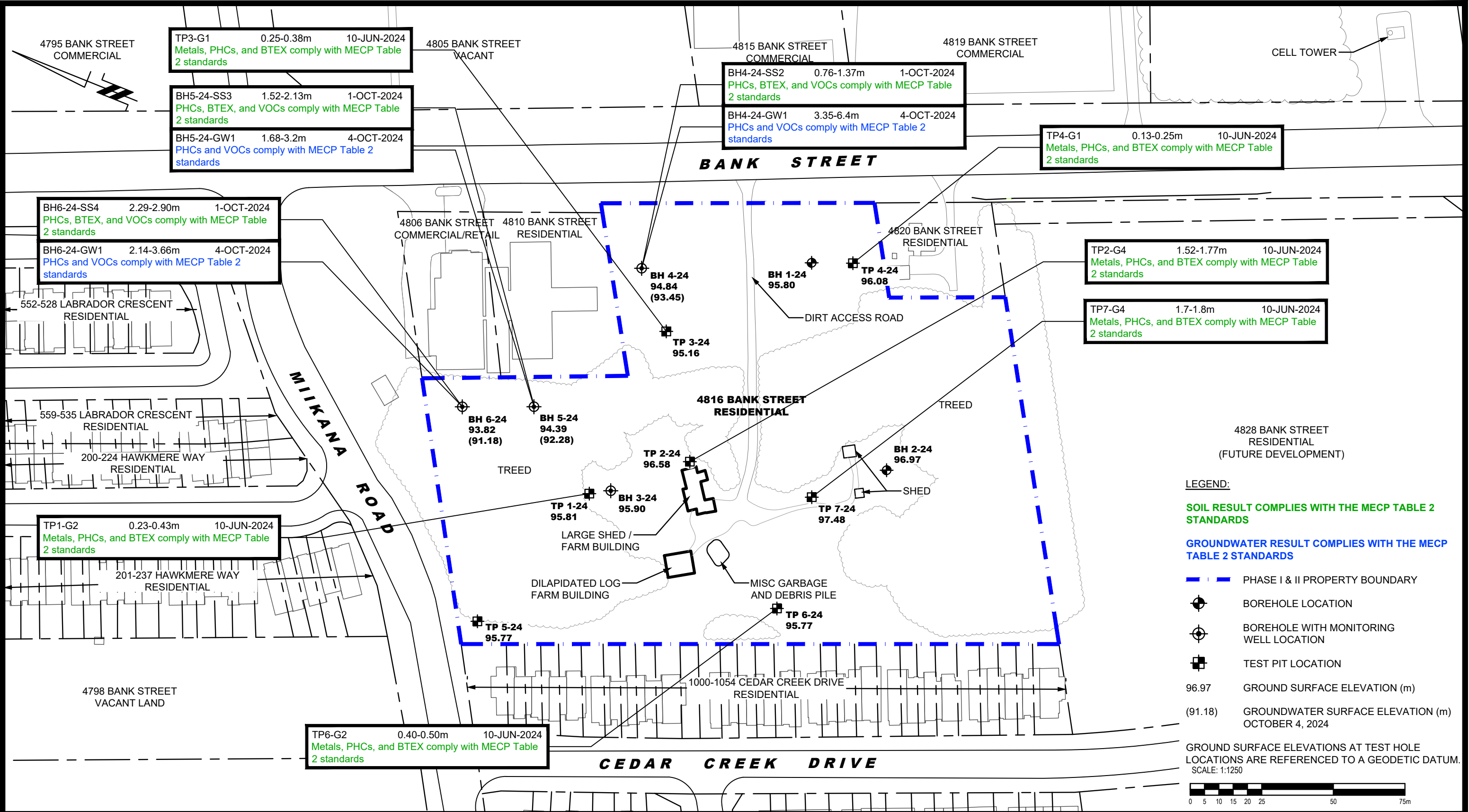
NO.	REVISIONS	DATE	INITIAL

OTTAWA,
Title:

DCR PHOENIX DEVELOPMENT CORPORATION
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
4816 BANK STREET
ONTARIO

TEST HOLE LOCATION PLAN

Scale:	1:1250	Date:	10/2024
Drawn by:	ZS	Report No.:	PE6552-2
Checked by:	MSWB	Dwg. No.:	PE6552-3
Approved by:	MSD	Revision No.:	



LEGEND:

SOIL RESULT COMPLIES WITH THE MECP TABLE 2 STANDARDS

GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 2 STANDARDS

--- PHASE I & II PROPERTY BOUNDARY

⊕ BOREHOLE LOCATION

⊕ BOREHOLE WITH MONITORING WELL LOCATION

⊕ TEST PIT LOCATION

96.97 GROUND SURFACE ELEVATION (m)

(91.18) GROUNDWATER SURFACE ELEVATION (m) OCTOBER 4, 2024

GROUND SURFACE ELEVATIONS AT TEST HOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM. SCALE: 1:1250

 9 AURIGA DRIVE OTTAWA, ON K2E 7T9 TEL: (613) 226-7381					DCR PHOENIX DEVELOPMENT CORPORATION PHASE II - ENVIRONMENTAL SITE ASSESSMENT 4816 BANK STREET	Scale: 1:1250 Drawn by: ZS Checked by: MSWB Approved by: MSD	Date: 10/2024 Report No.: PE6552-2 Dwg. No.: PE6552-4 Revision No.:
					OTTAWA, ONTARIO		
					Title: ANALYTICAL TESTING PLAN (SOIL AND GROUNDWATER)		
	NO.	REVISIONS	DATE	INITIAL			

TABLES

**TABLE 1 – ANALYTICAL TEST RESULTS – SOIL – METALS, BTEX, PHCs,
VOCs, PAHs, pH – MECP TABLE 2 COMPARISON**

**TABLE 2 – ANALYTICAL TEST RESULTS – GROUNDWATER – PHCs,
VOCs – MECP TABLE 2 COMPARISON**

Table 1: Analytical Test Results - Soil - Metals, BTEX, PHCs, VOCs, PAHs, pH - MECP Table 2 Comparison

Parameter	Units	MDL	Regulation	Sample PE6552									
				TP1-G2 2424308-01	TP2-G4 2424308-02	TP3-G1 2424308-03	TP4-G1 2424308-04	TP6-G2 2424308-05	TP7-G4 2424308-06	BH4-24-SS2 2440370-01	BH5-24-SS3 2440370-02	BH6-24-SS4 2440370-03	DUP1-24 (BH4-24-SS2) 2440370-04
Sample Depth (m)			Reg 153/04-Table 2 Residential, coarse	23 - .43	1.52 - 1.77	0.25 - 0.38	0.13 - 0.25	0.4 - 0.5	1.7 - 1.8	0.76 - 1.37	1.52 - 2.13	2.29 - 2.90	0.76 - 1.37
Sample Date				10-Jun-2024	10-Jun-2024	10-Jun-2024	10-Jun-2024	10-Jun-2024	10-Jun-2024	1-Oct-2024	1-Oct-2024	1-Oct-2024	1-Oct-2024
Physical Characteristics													
% Solids	% by Wt.	0.1		82.1	92.4	89.8	84.6	79.2	85	80.2	93.6	91.0	80.4
General Inorganics													
pH	pH units	0.05	NV	6.53	7.25	N/A	N/A	N/A	N/A	7.20	N/A	7.93	N/A
Metals													
Antimony	ug/g dry	1.0	7.5	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	N/A	N/A	N/A	N/A
Arsenic	ug/g dry	1.0	18	8.3	2.7	2.6	3.5	4	3.1	N/A	N/A	N/A	N/A
Barium	ug/g dry	1.0	390	59.1	25.1	204	92.7	80.2	44.4	N/A	N/A	N/A	N/A
Beryllium	ug/g dry	0.5	4.0	0.8	ND (0.5)	ND (0.5)	0.5	0.6	ND (0.5)	N/A	N/A	N/A	N/A
Boron	ug/g dry	0.5	120	7.2	ND (5.0)	5.8	5.8	ND (5.0)	5.2	N/A	N/A	N/A	N/A
Cadmium	ug/g dry	0.5	1.2	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	N/A	N/A	N/A	N/A
Chromium	ug/g dry	5	160	24.7	12.3	22.6	24.2	27.8	16.2	N/A	N/A	N/A	N/A
Cobalt	ug/g dry	1	22	9	5.9	6.4	7.4	6.9	6.2	N/A	N/A	N/A	N/A
Copper	ug/g dry	5	140	21.5	13	14.2	19.4	10.3	16.6	N/A	N/A	N/A	N/A
Lead	ug/g dry	1	120	13.7	4.8	20.4	31	9.7	4.6	N/A	N/A	N/A	N/A
Molybdenum	ug/g dry	1	6.9	3.6	1.1	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	N/A	N/A	N/A	N/A
Nickel	ug/g dry	5	100	19.2	10	14	15	14.9	11.9	N/A	N/A	N/A	N/A
Selenium	ug/g dry	1	2.4	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	N/A	N/A	N/A	N/A
Silver	ug/g dry	0.3	20	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	N/A	N/A	N/A	N/A
Thallium	ug/g dry	1	1.0	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	N/A	N/A	N/A	N/A
Uranium	ug/g dry	5	23	1.4	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	N/A	N/A	N/A	N/A
Vanadium	ug/g dry	1	86	36.6	24.3	30.3	34.4	45.8	30	N/A	N/A	N/A	N/A
Zinc	ug/g dry	10	340	54.4	22.4	45.8	56.5	61.8	21.9	N/A	N/A	N/A	N/A
Volatiles													
Acetone	ug/g dry	0.50	16	N/A	N/A	N/A	N/A	ND (0.50)	N/A	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Benzene	ug/g dry	0.02	0.21	N/A	N/A	N/A	N/A	ND (0.02)	N/A	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Bromodichloromethane	ug/g dry	0.05	1.5	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Bromoform	ug/g dry	0.05	0.27	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Bromomethane	ug/g dry	0.05	0.05	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Carbon Tetrachloride	ug/g dry	0.05	0.05	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Chlorobenzene	ug/g dry	0.05	2.4	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Chloroform	ug/g dry	0.05	0.05	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Dibromochloromethane	ug/g dry	0.05	2.3	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Dichlorodifluoromethane	ug/g dry	0.20	16	N/A	N/A	N/A	N/A	ND (0.20)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,2-Dichlorobenzene	ug/g dry	0.05	1.2	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,3-Dichlorobenzene	ug/g dry	0.05	4.8	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,4-Dichlorobenzene	ug/g dry	0.05	0.083	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,1-Dichloroethane	ug/g dry	0.05	0.47	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,2-Dichloroethane	ug/g dry	0.05	0.05	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,1-Dichloroethylene	ug/g dry	0.05	0.05	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
cis-1,2-Dichloroethylene	ug/g dry	0.05	1.9	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
trans-1,2-Dichloroethylene	ug/g dry	0.05	0.084	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,2-Dichloropropane	ug/g dry	0.05	0.05	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
cis-1,3-Dichloropropylene	ug/g dry	0.05	0.05	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
trans-1,3-Dichloropropylene	ug/g dry	0.05	0.05	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,3-Dichloropropene, total	ug/g dry	0.05	0.05	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Ethylbenzene	ug/g dry	0.05	1.1	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Ethylene dibromide (dibrom)	ug/g dry	0.05	0.05	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Hexane	ug/g dry	0.05	2.8	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Methyl Ethyl Ketone (2-But)	ug/g dry	0.05	16	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Methyl Isobutyl Ketone	ug/g dry	0.05	1.7	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Methyl tert-butyl ether	ug/g dry	0.05	0.75	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Methylene Chloride	ug/g dry	0.50	0.1	N/A	N/A	N/A	N/A	ND (0.50)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Styrene	ug/g dry	2.00	0.7	N/A	N/A	N/A	N/A	ND (2.00)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,1,1,2-Tetrachloroethane	ug/g dry	0.50	0.058	N/A	N/A	N/A	N/A	ND (0.50)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,1,2,2-Tetrachloroethane	ug/g dry	0.05	0.05	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Tetrachloroethylene	ug/g dry	0.05	0.28	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	ug/g dry	0.05	2.3	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,1,1-Trichloroethane	ug/g dry	0.05	0.38	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,1,2-Trichloroethane	ug/g dry	0.05	0.05	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Trichloroethylene	ug/g dry	0.05	0.061	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Trichlorofluoromethane	ug/g dry	0.05	4.0	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Vinyl Chloride	ug/g dry	0.05	0.02	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
m/p-Xylene	ug/g dry	0.05	3.1	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	ug/g dry	0.05	3.1	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes, total	ug/g dry	0.05	3.1	N/A	N/A	N/A	N/A	ND (0.05)	N/A	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
BTEX													
Benzene	ug/g dry	0.002	0.21	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Ethylbenzene	ug/g dry	0.002	1.1	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	ug/g dry	0.002	2.3	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
m/p-Xylene	ug/g dry	0.002	3.1	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	ug/g dry	0.002	3.1	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes, total	ug/g dry	0.002	3.1	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Hydrocarbons													
F1 PHCs (C6-C10)	ug/g dry	7	55	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)	ND (7)
F2 PHCs (C10-C16)	ug/g dry	4	98	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
F3 PHCs (C16-C34)	ug/g dry	8	300	ND (8)	ND (8)	20	10	ND (8)	ND (8)	ND (8)	ND (8)	28	ND (8)
F4 PHCs (C34-C50)	ug/g dry	6	2800	ND (6)	ND (6)	28	22	ND (6)	ND (6)	ND (6)	ND (6)	8	ND (6)
Semi-Volatiles													
Acenaphthene	ug/g dry	0.02	7.9	N/A	N/A	0.03	0.02	N/A	N/A	N/A	N/A	N/A	N/A
Acenaphthylene	ug/g dry	0.02	0.15	N/A	N/A	0.04							

Table 2: Analytical Test Results - Groundwater -
PHCs, VOCs - MECP Table 2 Comparison

Parameter		Units	MDL	Regulation	Sample PE6552		
					BH4-24-GW1 2441093-01	BH5-24-GW1 2441093-02	BH6-24-GW1 2441093-03
Sample Depth (m)			Reg 153/04-Table 2 Potable Groundwater, coarse	3.35 - 6.4	1.68 - 3.2	2.14 - 3.66	
Sample Date				4-Oct-2024	4-Oct-2024	4-Oct-2024	
Volatiles							
Acetone	ug/L	5.0	2700	ND (5.0)	ND (5.0)	ND (5.0)	
Benzene	ug/L	0.5	5.0	ND (0.5)	ND (0.5)	ND (0.5)	
Bromodichloromethane	ug/L	0.5	16	ND (0.5)	ND (0.5)	ND (0.5)	
Bromoform	ug/L	0.5	25	ND (0.5)	ND (0.5)	ND (0.5)	
Bromomethane	ug/L	0.5	0.89	ND (0.5)	ND (0.5)	ND (0.5)	
Carbon Tetrachloride	ug/L	0.2	0.79	ND (0.2)	ND (0.2)	ND (0.2)	
Chlorobenzene	ug/L	0.5	30	ND (0.5)	ND (0.5)	ND (0.5)	
Chloroform	ug/L	0.5	2.4	1	ND (0.5)	ND (0.5)	
Dibromochloromethane	ug/L	0.5	25	ND (0.5)	ND (0.5)	ND (0.5)	
Dichlorodifluoromethane	ug/L	1.0	590	ND (1.0)	ND (1.0)	ND (1.0)	
1,2-Dichlorobenzene	ug/L	0.5	3.0	ND (0.5)	ND (0.5)	ND (0.5)	
1,3-Dichlorobenzene	ug/L	0.5	59	ND (0.5)	ND (0.5)	ND (0.5)	
1,4-Dichlorobenzene	ug/L	0.5	1.0	ND (0.5)	ND (0.5)	ND (0.5)	
1,1-Dichloroethane	ug/L	0.5	5.0	ND (0.5)	ND (0.5)	ND (0.5)	
1,2-Dichloroethane	ug/L	0.5	1.6	ND (0.5)	ND (0.5)	ND (0.5)	
1,1-Dichloroethylene	ug/L	0.5	1.6	ND (0.5)	ND (0.5)	ND (0.5)	
cis-1,2-Dichloroethylene	ug/L	0.5	1.6	ND (0.5)	ND (0.5)	ND (0.5)	
trans-1,2-Dichloroethylene	ug/L	0.5	1.6	ND (0.5)	ND (0.5)	ND (0.5)	
1,2-Dichloropropane	ug/L	0.5	5.0	ND (0.5)	ND (0.5)	ND (0.5)	
cis-1,3-Dichloropropylene	ug/L	0.5	0.5	ND (0.5)	ND (0.5)	ND (0.5)	
trans-1,3-Dichloropropylene	ug/L	0.5	0.5	ND (0.5)	ND (0.5)	ND (0.5)	
1,3-Dichloropropene, total	ug/L	0.5	0.5	ND (0.5)	ND (0.5)	ND (0.5)	
Ethylbenzene	ug/L	0.5	2.4	ND (0.5)	ND (0.5)	ND (0.5)	
Ethylene dibromide (dibromoethane, 1	ug/L	0.2	NV	ND (0.2)	ND (0.2)	ND (0.2)	
Hexane	ug/L	1.0	51	ND (1.0)	ND (1.0)	ND (1.0)	
Methyl Ethyl Ketone (2-Butanone)	ug/L	5.0	NV	ND (5.0)	ND (5.0)	ND (5.0)	
Methyl Isobutyl Ketone	ug/L	5.0	640	ND (5.0)	ND (5.0)	ND (5.0)	
Methyl tert-butyl ether	ug/L	2.0	15	ND (2.0)	ND (2.0)	ND (2.0)	
Methylene Chloride	ug/L	5.0	50	ND (5.0)	ND (5.0)	ND (5.0)	
Styrene	ug/L	0.5	5.4	ND (0.5)	ND (0.5)	ND (0.5)	
1,1,1,2-Tetrachloroethane	ug/L	0.5	1.1	ND (0.5)	ND (0.5)	ND (0.5)	
1,1,2,2-Tetrachloroethane	ug/L	0.5	1.0	ND (0.5)	ND (0.5)	ND (0.5)	
Tetrachloroethylene	ug/L	0.5	1.6	ND (0.5)	ND (0.5)	ND (0.5)	
Toluene	ug/L	0.5	24	ND (0.5)	ND (0.5)	ND (0.5)	
1,1,1-Trichloroethane	ug/L	0.5	200	ND (0.5)	ND (0.5)	ND (0.5)	
1,1,2-Trichloroethane	ug/L	0.5	4.7	ND (0.5)	ND (0.5)	ND (0.5)	
Trichloroethylene	ug/L	0.5	1.6	ND (0.5)	ND (0.5)	ND (0.5)	
Trichlorofluoromethane	ug/L	1.0	150	ND (1.0)	ND (1.0)	ND (1.0)	
Vinyl Chloride	ug/L	0.5	0.5	ND (0.5)	ND (0.5)	ND (0.5)	
m/p-Xylene	ug/L	0.5	300	ND (0.5)	ND (0.5)	ND (0.5)	
o-Xylene	ug/L	0.5	300	ND (0.5)	ND (0.5)	ND (0.5)	
Xylenes, total	ug/L	0.5	300	ND (0.5)	ND (0.5)	ND (0.5)	
Hydrocarbons							
F1 PHCs (C6-C10)	ug/L	25	750	ND (25)	ND (25)	ND (25)	
F2 PHCs (C10-C16)	ug/L	100	150	ND (100)	ND (100)	ND (100)	
F3 PHCs (C16-C34)	ug/L	100	500	ND (100)	ND (100)	ND (100)	
F4 PHCs (C34-C50)	ug/L	100	500	ND (100)	ND (100)	ND (100)	

2.00

Sample exceeds Reg 153/04-Table 2 Potable Groundwater, coarse Standards

ND (0.2)

No concentrations identified above the MDL

NA

Parameter not analysed

NV

No value given for indicated parameter

APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATE OF ANALYSIS

Sampling and Analysis Plan

4816 Bank Street, Ottawa, Ontario

Prepared for: DCR Phoenix Development Corporation

Report: PE6552-SAP

Date: September 27, 2024

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1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by DCR Phoenix Development Corporation, to conduct a Phase II – Environmental Site Assessment (Phase II-ESA) at 4816 Bank Street, in the City of Ottawa, Ontario. The Phase II ESA was carried out in conjunction with a geotechnical investigation.

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

Borehole	Location & Rationale	Proposed Depth & Rationale
BH4-24	Place on the eastern side of the Phase II Property for coverage and triangulation purposes.	5-7 m; Drill to intercept water table for monitoring well installation.
BH5-24	Place on the north portion of the Phase II Property behind 4810 Bank Street to assess potential soil and groundwater impacts resulting from the presence of the historic commercial autobody shop.	3-4 m; Drill to intercept water table for monitoring well installation.
BH6-24	Place on the north portion of the Phase II Property behind 4806 Bank Street to assess potential soil and groundwater impacts resulting from the presence of the historic commercial autobody shop.	3-4 m; Drill to intercept water table for monitoring well installation.

Borehole locations are shown on Drawing PE6552-3 – Test Hole Location Plan, appended to the main report.

This subsurface investigation built upon a previous limited excess soil investigation soil characterization investigation wherein seven test pits were excavated to practical refusal. A total of 28 soil samples were retrieved and subject to preliminary screening.

At each borehole, split-spoon samples of the overburden soils will be obtained at 0.76 m (2'6") intervals until practical refusal to augering or until the borehole has extended to a depth beyond the requirements of the geotechnical and environmental investigations. All soil samples will be retained, and samples will be selected for submission following a preliminary screening analysis. Following the borehole drilling, groundwater monitoring wells will be installed in boreholes (BH4-24, BH5-24, and BH6-24) for the collection of groundwater samples.

2.0 ANALYTICAL TESTING PROGRAM

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

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

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

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

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

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

Drilling Procedure

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

- ☐ Continuous split spoon samples (every 0.6 m or 2') or semi-continuous (every 0.76 m or 2'6") are required.
- ☐ Make sure samples are well sealed in plastic bags with no holes prior to screening and are kept cool but unfrozen.
- ☐ If sampling for VOCs, BTEX, or PHCs 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 TO SAMPLING & ANALYSIS PLAN

Physical impediments to the Sampling and Analysis plan may include:

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

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

EASTING: 376096.516 NORTHING: 5019574.295 ELEVATION: 95.81

DATUM: Geodetic

REMARKS:

BORINGS BY: Backhoe

DATE: June 10, 2024

FILE NO. **PE6552**

HOLE NO. **TP 1-24**

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				PIEZOMETER CONSTRUCTION
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)				
								○ Lower Explosive Limit %				
GROUND SURFACE								20	40	60	80	
TOPSOIL and organics		G	1			0	95.81					
0.23 GLACIAL TILL: Brown silt with trace organics, trace clay and gravel		G	2									
0.43 GLACIAL TILL: Compact to dense brown silty sand with gravel, cobbles and boulders		G	3									
		G	4			1	94.81					
						2	93.81					
2.36 End of Test Pit												
Practical refusal on cobbles and boulders at 2.36 m depth												
- Boulders observed to be approximately up to 1 m in its longest dimension												
								100	200	300	400	500
								RKI Eagle Rdg. (ppm)				
								▲ Full Gas Resp. △ Methane Elim.				

[illegible]

[illegible]

EASTING: 376205.564 NORTHING: 5019518.876 ELEVATION: 96.08

DATUM: Geodetic

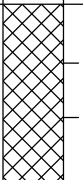
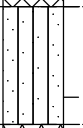
REMARKS:

BORINGS BY: Backhoe

DATE: June 10, 2024

FILE NO. **PE6552**

HOLE NO. **TP 4-24**

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				PIEZOMETER CONSTRUCTION	
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %				
								20	40	60	80		
GROUND SURFACE													
FILL: Compact brown silty sand with gravel, crushed stone, trace asphalt and clay		G	1			0	96.08	●					
0.40 Compact brown SANDY SILT, trace clay		G	2					●					
0.66 GLACIAL TILL: Compact brown silty sand with gravel, cobbles and boulders, trace clay		G	3			1	95.08	●					
- Clay content decreasing with depth													
2.00 End of Test Pit		G	4			2	94.08	●					
Practical refusal on boulders and cobbles at 2.0 m depth													
- Boulders observed to be approximately up to 1 m in its longest dimension													

EASTING: 376040.538 NORTHING: 5019593.93 ELEVATION: 95.77

DATUM: Geodetic

REMARKS:

BORINGS BY: Backhoe

DATE: June 10, 2024

FILE NO. **PE6552**

HOLE NO. **TP 5-24**

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector					PIEZOMETER CONSTRUCTION
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)					
								○ Lower Explosive Limit %					
GROUND SURFACE								20	40	60	80		
FILL: Organics with sand, gravel and crushed stone						0	95.77						
0.20 FILL: Compact crushed stone with sand		G	1										
0.30 Dense brown SANDY SILT, trace clay and gravel		G	2										
0.63 GLACIAL TILL: Compact to dense brown silty sand to sandy silt with gravel, cobbles and boulders		G	3			1	94.77						
1.70 End of Test Pit		G	4										
Practical refusal on boulders at 1.7 m depth													
- Boulders observed to be approximately up to 1 m in its longest dimension													
								100	200	300	400	500	
								RKI Eagle Rdg. (ppm)					
								▲ Full Gas Resp. △ Methane Elim.					

EASTING: 376083.711 NORTHING: 5019498.515 ELEVATION: 95.77

DATUM: Geodetic

REMARKS:

BORINGS BY: Backhoe

DATE: June 10, 2024

FILE NO. **PE6552**

HOLE NO. **TP 6-24**

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				PIEZOMETER CONSTRUCTION	
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)					
								○ Lower Explosive Limit %					
GROUND SURFACE								20	40	60	80		
TOPSOIL and organics		G	1			0	95.77	●					
0.25 Compact brown SILT, trace clay		G	2					●					
0.61 Compact brown SANDY SILT													
0.80 GLACIAL TILL: Compact to dense brown silty sand to sandy silt with gravel, cobbles and boulders		G	3					●					
1.60 End of Test Pit		G	4			1	94.77	●					
Practical refusal at 1.6 m depth on boulders													
- Boulders observed to be approximately up to 1 m in its longest dimension													

[illegible]

COORD. SYS.: UTM ZONE 18N EASTING: 453776.71

NORTHING: 5017846.76

ELEVATION: 94.84

PROJECT: Phase II Environmental Site Assessment

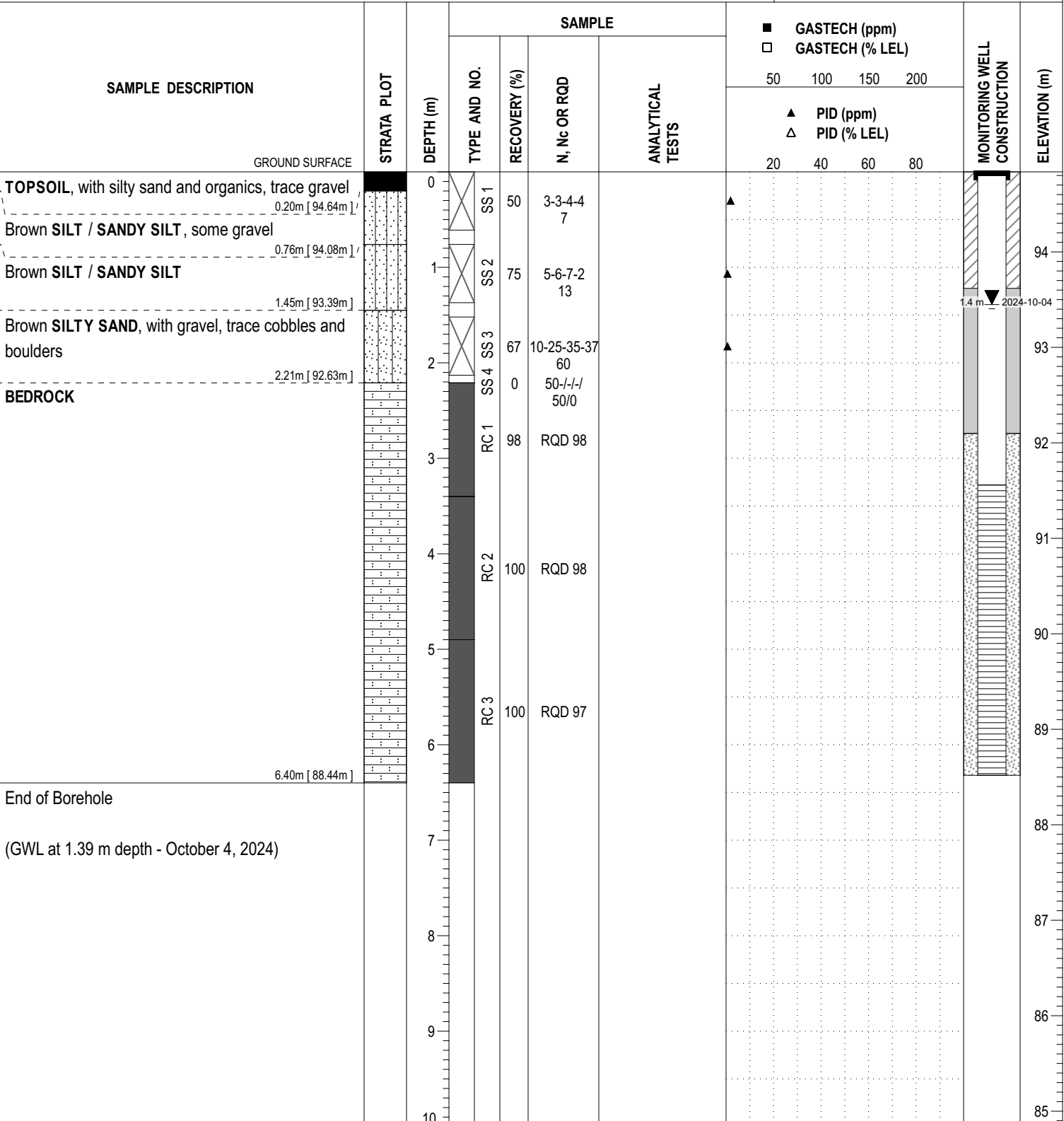
FILE NO. : PE6552

BORINGS BY:

REMARKS:

DATE: October 01, 2024

HOLE NO. : BH4-24



COORD. SYS.: UTM ZONE 18N **EASTING:** 453718.12

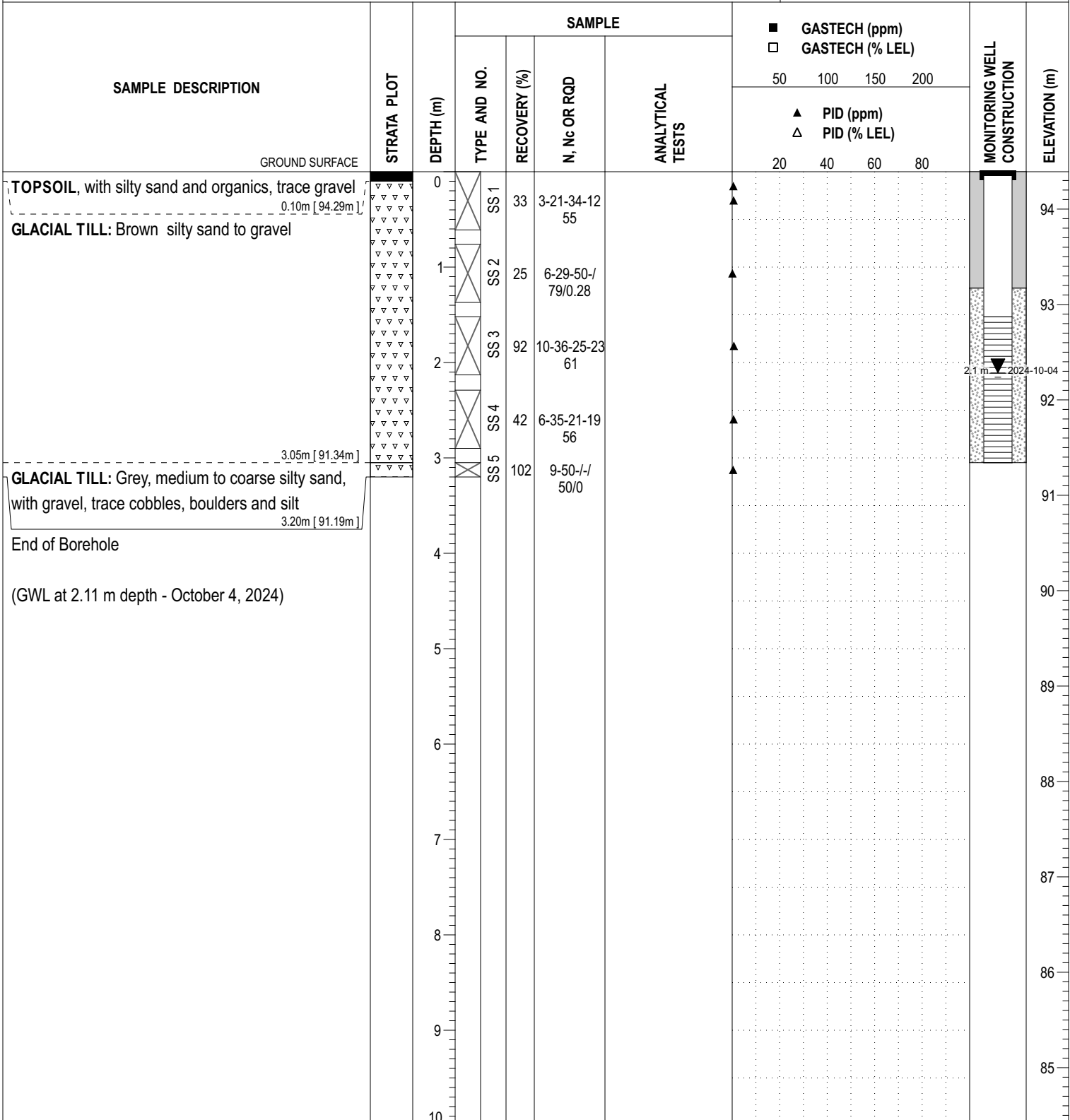
NORTHING: 5017864.71

ELEVATION: 94.39

PROJECT: Phase II Environmental Site Assessment

FILE NO. : PE6552

BORINGS BY:
REMARKS:
DATE: October 01, 2024

HOLE NO. : BH5-24


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COORD. SYS.: UTM ZONE 18N **EASTING:** 453709.21

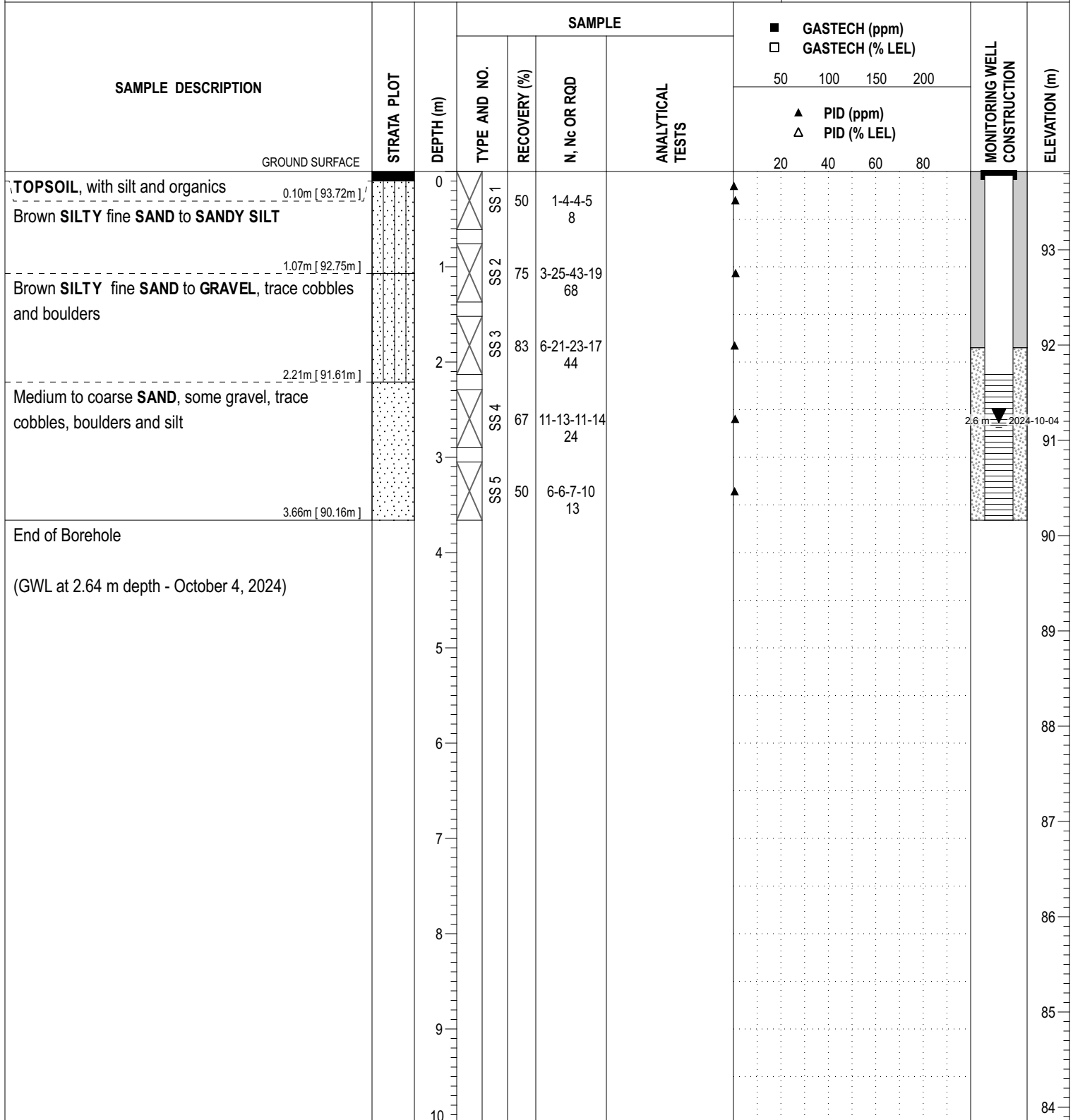
NORTHING: 5017888.09

ELEVATION: 93.82

PROJECT: Phase II Environmental Site Assessment

FILE NO. : PE6552

BORINGS BY:
REMARKS:
DATE: October 01, 2024

HOLE NO. : BH6-24


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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)

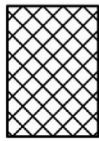
STRATA PLOT



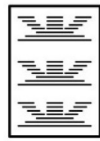
Topsoil



Asphalt



Fill



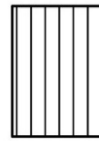
Peat



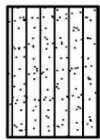
Sand



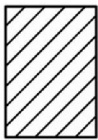
Silty Sand



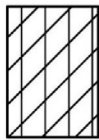
Silt



Sandy Silt



Clay



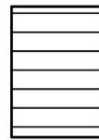
Silty Clay



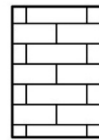
Clayey Silty Sand



Glacial Till



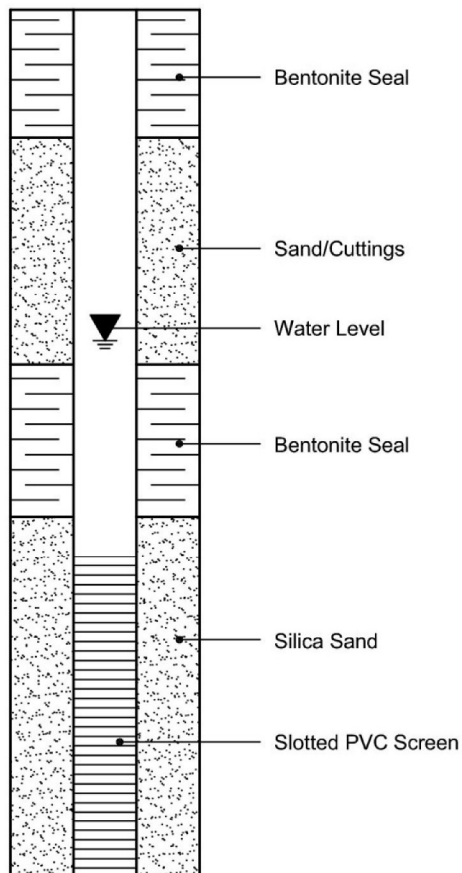
Shale



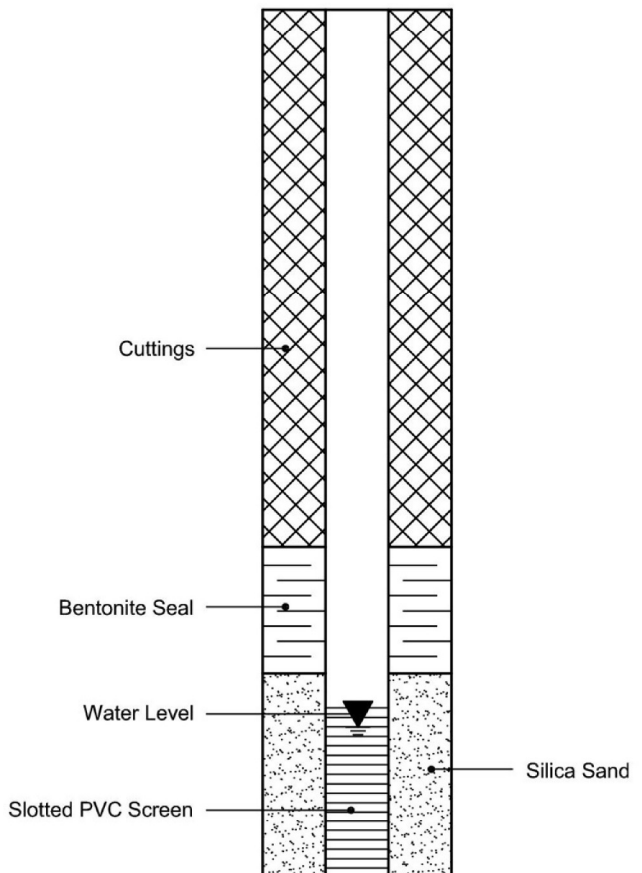
Bedrock

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: Mark Bujaki

Client PO: 60412
Project: PE6552

Custody:

Report Date: 20-Jun-2024

Order Date: 11-Jun-2024

Revised Report

Order #: 2424308

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

Paracel ID	Client ID
2424308-01	TP1-G2
2424308-02	TP2-G4
2424308-03	TP3-G1
2424308-04	TP4-G1
2424308-05	TP6-G2
2424308-06	TP7-G4

Approved By:



Mark Foto, M.Sc.

Lab Supervisor

Certificate of Analysis

Report Date: 20-Jun-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 11-Jun-2024

Client PO: 60412

Project Description: PE6552

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	13-Jun-24	13-Jun-24
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	20-Jun-24	20-Jun-24
PHC F1	CWS Tier 1 - P&T GC-FID	13-Jun-24	13-Jun-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	13-Jun-24	14-Jun-24
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	14-Jun-24	14-Jun-24
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	13-Jun-24	15-Jun-24
Solids, %	CWS Tier 1 - Gravimetric	13-Jun-24	14-Jun-24

Certificate of Analysis

Report Date: 20-Jun-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 11-Jun-2024

Client PO: 60412

Project Description: PE6552

Client ID:	TP1-G2	TP2-G4	TP3-G1	TP4-G1	-	-
Sample Date:	10-Jun-24 09:00	10-Jun-24 09:00	10-Jun-24 09:00	10-Jun-24 09:00	-	-
Sample ID:	2424308-01	2424308-02	2424308-03	2424308-04	-	-
Matrix:	Soil	Soil	Soil	Soil	-	-
MDL/Units						

Physical Characteristics

% Solids	0.1 % by Wt.	82.1	92.4	89.8	84.6	-	-
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General Inorganics

pH	0.05 pH Units	6.53	7.25	-	-	-	-
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Metals

Antimony	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Arsenic	1.0 ug/g	8.3	2.7	2.6	3.5	-	-
Barium	1.0 ug/g	59.1	25.1	204	92.7	-	-
Beryllium	0.5 ug/g	0.8	<0.5	<0.5	0.5	-	-
Boron	5.0 ug/g	7.2	<5.0	5.8	5.8	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Chromium	5.0 ug/g	24.7	12.3	22.6	24.2	-	-
Cobalt	1.0 ug/g	9.0	5.9	6.4	7.4	-	-
Copper	5.0 ug/g	21.5	13.0	14.2	19.4	-	-
Lead	1.0 ug/g	13.7	4.8	20.4	31.0	-	-
Molybdenum	1.0 ug/g	3.6	1.1	<1.0	<1.0	-	-
Nickel	5.0 ug/g	19.2	10.0	14.0	15.0	-	-
Selenium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Silver	0.3 ug/g	<0.3	<0.3	<0.3	<0.3	-	-
Thallium	1.0 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Uranium	1.0 ug/g	1.4	<1.0	<1.0	<1.0	-	-
Vanadium	10.0 ug/g	36.6	24.3	30.3	34.4	-	-
Zinc	20.0 ug/g	54.4	22.4	45.8	56.5	-	-

Volatiles

Benzene	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-

Certificate of Analysis

Report Date: 20-Jun-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 11-Jun-2024

Client PO: 60412

Project Description: PE6552

Client ID:	TP1-G2	TP2-G4	TP3-G1	TP4-G1	-	-
Sample Date:	10-Jun-24 09:00	10-Jun-24 09:00	10-Jun-24 09:00	10-Jun-24 09:00	-	-
Sample ID:	2424308-01	2424308-02	2424308-03	2424308-04	-	-
Matrix:	Soil	Soil	Soil	Soil	-	-
MDL/Units						

Volatiles

Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene-d8	Surrogate	114%	109%	111%	114%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	<8	20	10	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	<6	28	22	-	-

Semi-Volatiles

Acenaphthene	0.02 ug/g	-	-	0.03	0.02	-	-
Acenaphthylene	0.02 ug/g	-	-	0.04	0.03	-	-
Anthracene	0.02 ug/g	-	-	0.12	0.09	-	-
Benzo [a] anthracene	0.02 ug/g	-	-	0.25	0.19	-	-
Benzo [a] pyrene	0.02 ug/g	-	-	0.18	0.14	-	-
Benzo [b] fluoranthene	0.02 ug/g	-	-	0.21	0.15	-	-
Benzo [g,h,i] perylene	0.02 ug/g	-	-	0.14	0.10	-	-
Benzo [k] fluoranthene	0.02 ug/g	-	-	0.14	0.07	-	-
Chrysene	0.02 ug/g	-	-	0.21	0.14	-	-
Dibenzo [a,h] anthracene	0.02 ug/g	-	-	0.03	0.02	-	-
Fluoranthene	0.02 ug/g	-	-	0.65	0.46	-	-
Fluorene	0.02 ug/g	-	-	0.03	0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	-	-	0.11	0.08	-	-
1-Methylnaphthalene	0.02 ug/g	-	-	<0.02	<0.02	-	-

Certificate of Analysis

Report Date: 20-Jun-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 11-Jun-2024

Client PO: 60412

Project Description: PE6552

Client ID:	TP1-G2	TP2-G4	TP3-G1	TP4-G1		
Sample Date:	10-Jun-24 09:00	10-Jun-24 09:00	10-Jun-24 09:00	10-Jun-24 09:00	-	-
Sample ID:	2424308-01	2424308-02	2424308-03	2424308-04		
Matrix:	Soil	Soil	Soil	Soil		
MDL/Units						

Semi-Volatiles

2-Methylnaphthalene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g	-	-	<0.04	<0.04	-	-
Naphthalene	0.01 ug/g	-	-	<0.01	<0.01	-	-
Phenanthrene	0.02 ug/g	-	-	0.40	0.25	-	-
Pyrene	0.02 ug/g	-	-	0.48	0.35	-	-
2-Fluorobiphenyl	Surrogate	-	-	73.7%	71.2%	-	-
Terphenyl-d14	Surrogate	-	-	90.2%	87.1%	-	-

Certificate of Analysis

Report Date: 20-Jun-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 11-Jun-2024

Client PO: 60412

Project Description: PE6552

Client ID:	TP6-G2	TP7-G4			
Sample Date:	10-Jun-24 09:00	10-Jun-24 09:00			-
Sample ID:	2424308-05	2424308-06			-
Matrix:	Soil	Soil			
MDL/Units					

Physical Characteristics

% Solids	0.1 % by Wt.	79.2	85.0	-	-	-	-
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Metals

Antimony	1.0 ug/g	<1.0	<1.0	-	-	-	-
Arsenic	1.0 ug/g	4.0	3.1	-	-	-	-
Barium	1.0 ug/g	80.2	44.4	-	-	-	-
Beryllium	0.5 ug/g	0.6	<0.5	-	-	-	-
Boron	5.0 ug/g	<5.0	5.2	-	-	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	-	-	-	-
Chromium	5.0 ug/g	27.8	16.2	-	-	-	-
Cobalt	1.0 ug/g	6.9	6.2	-	-	-	-
Copper	5.0 ug/g	10.3	16.6	-	-	-	-
Lead	1.0 ug/g	9.7	4.6	-	-	-	-
Molybdenum	1.0 ug/g	<1.0	<1.0	-	-	-	-
Nickel	5.0 ug/g	14.9	11.9	-	-	-	-
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	45.8	30.0	-	-	-	-
Zinc	20.0 ug/g	61.8	21.9	-	-	-	-

Volatiles

Benzene	0.02 ug/g	<0.02	<0.02	-	-	-	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	-	-	-	-
Toluene	0.05 ug/g	<0.05	<0.05	-	-	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	-	-	-	-

Certificate of Analysis

Report Date: 20-Jun-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 11-Jun-2024

Client PO: 60412

Project Description: PE6552

Client ID:	TP6-G2	TP7-G4			
Sample Date:	10-Jun-24 09:00	10-Jun-24 09:00			
Sample ID:	2424308-05	2424308-06			
Matrix:	Soil	Soil			
MDL/Units					

Volatiles

o-Xylene	0.05 ug/g	<0.05	<0.05	-	-	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	-	-	-	-
Toluene-d8	Surrogate	118%	113%	-	-	-	-

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	-	-	-	-

Certificate of Analysis

Report Date: 20-Jun-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 11-Jun-2024

Client PO: 60412

Project Description: PE6552

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	ND	5.0	ug/g					
Cobalt	ND	1.0	ug/g					
Copper	ND	5.0	ug/g					
Lead	ND	1.0	ug/g					
Molybdenum	ND	1.0	ug/g					
Nickel	ND	5.0	ug/g					
Selenium	ND	1.0	ug/g					
Silver	ND	0.3	ug/g					
Thallium	ND	1.0	ug/g					
Uranium	ND	1.0	ug/g					
Vanadium	ND	10.0	ug/g					
Zinc	ND	20.0	ug/g					
Semi-Volatiles								
Acenaphthene	ND	0.02	ug/g					
Acenaphthylene	ND	0.02	ug/g					
Anthracene	ND	0.02	ug/g					
Benzo [a] anthracene	ND	0.02	ug/g					
Benzo [a] pyrene	ND	0.02	ug/g					
Benzo [b] fluoranthene	ND	0.02	ug/g					
Benzo [g,h,i] perylene	ND	0.02	ug/g					
Benzo [k] fluoranthene	ND	0.02	ug/g					

Certificate of Analysis

Report Date: 20-Jun-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 11-Jun-2024

Client PO: 60412

Project Description: PE6552

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Chrysene	ND	0.02	ug/g					
Dibenzo [a,h] anthracene	ND	0.02	ug/g					
Fluoranthene	ND	0.02	ug/g					
Fluorene	ND	0.02	ug/g					
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g					
1-Methylnaphthalene	ND	0.02	ug/g					
2-Methylnaphthalene	ND	0.02	ug/g					
Methylnaphthalene (1&2)	ND	0.04	ug/g					
Naphthalene	ND	0.01	ug/g					
Phenanthrene	ND	0.02	ug/g					
Pyrene	ND	0.02	ug/g					
Surrogate: 2-Fluorobiphenyl	1.01		%	75.5	50-140			
Surrogate: Terphenyl-d14	1.33		%	99.7	50-140			
Volatiles								
Benzene	ND	0.02	ug/g					
Ethylbenzene	ND	0.05	ug/g					
Toluene	ND	0.05	ug/g					
m,p-Xylenes	ND	0.05	ug/g					
o-Xylene	ND	0.05	ug/g					
Xylenes, total	ND	0.05	ug/g					
Surrogate: Toluene-d8	8.60		%	107	50-140			

Certificate of Analysis

Report Date: 20-Jun-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 11-Jun-2024

Client PO: 60412

Project Description: PE6552

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	6.57	0.05	pH Units	6.53			0.6	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	22	7	ug/g	22			0.4	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	3.8	1.0	ug/g	3.7			2.2	30	
Barium	157	1.0	ug/g	166			5.8	30	
Beryllium	0.7	0.5	ug/g	0.7			9.6	30	
Boron	5.7	5.0	ug/g	5.9			2.2	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium	41.3	5.0	ug/g	45.5			9.6	30	
Cobalt	11.8	1.0	ug/g	13.2			11.2	30	
Copper	22.1	5.0	ug/g	24.8			11.2	30	
Lead	8.4	1.0	ug/g	8.4			0.1	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	24.0	5.0	ug/g	26.5			10.1	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	52.5	10.0	ug/g	59.0			11.7	30	
Zinc	69.0	20.0	ug/g	76.8			10.7	30	
Physical Characteristics									
% Solids	72.4	0.1	% by Wt.	71.9			0.8	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g	ND			NC	40	

Certificate of Analysis

Report Date: 20-Jun-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 11-Jun-2024

Client PO: 60412

Project Description: PE6552

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] pyrene	ND	0.02	ug/g	ND			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Benzo [g,h,i] perylene	ND	0.02	ug/g	ND			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g	ND			NC	40	
Chrysene	ND	0.02	ug/g	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g	ND			NC	40	
Fluoranthene	ND	0.02	ug/g	ND			NC	40	
Fluorene	ND	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g	ND			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g	ND			NC	40	
Naphthalene	ND	0.01	ug/g	ND			NC	40	
Phenanthrene	ND	0.02	ug/g	ND			NC	40	
Pyrene	ND	0.02	ug/g	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	0.978		%		66.5	50-140			
Surrogate: Terphenyl-d14	1.33		%		90.7	50-140			
Volatiles									
Benzene	ND	0.02	ug/g	ND			NC	50	
Ethylbenzene	0.143	0.05	ug/g	0.099			36.1	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
m,p-Xylenes	0.234	0.05	ug/g	0.163			35.8	50	
o-Xylene	0.071	0.05	ug/g	ND			NC	50	
Surrogate: Toluene-d8	10.3		%		112	50-140			

Certificate of Analysis

Report Date: 20-Jun-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 11-Jun-2024

Client PO: 60412

Project Description: PE6552

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	193	7	ug/g	ND	96.7	85-115			
F2 PHCs (C10-C16)	76	4	ug/g	ND	78.4	60-140			
F3 PHCs (C16-C34)	226	8	ug/g	ND	94.6	60-140			
F4 PHCs (C34-C50)	148	6	ug/g	ND	97.7	60-140			
Metals									
Arsenic	48.0	1.0	ug/g	1.5	92.9	70-130			
Barium	67.1	1.0	ug/g	20.3	93.6	70-130			
Beryllium	48.3	0.5	ug/g	ND	96.1	70-130			
Boron	47.5	5.0	ug/g	ND	90.3	70-130			
Cadmium	44.1	0.5	ug/g	ND	88.2	70-130			
Chromium	65.1	5.0	ug/g	18.2	93.8	70-130			
Cobalt	51.8	1.0	ug/g	5.3	93.1	70-130			
Copper	53.0	5.0	ug/g	9.9	86.2	70-130			
Lead	51.2	1.0	ug/g	3.4	95.7	70-130			
Molybdenum	47.2	1.0	ug/g	ND	93.9	70-130			
Nickel	55.5	5.0	ug/g	10.6	89.8	70-130			
Selenium	46.6	1.0	ug/g	ND	92.9	70-130			
Silver	38.1	0.3	ug/g	ND	76.2	70-130			
Thallium	45.9	1.0	ug/g	ND	91.5	70-130			
Uranium	50.5	1.0	ug/g	ND	100	70-130			
Vanadium	69.7	10.0	ug/g	23.6	92.2	70-130			
Zinc	71.9	20.0	ug/g	30.7	82.3	70-130			
Semi-Volatiles									
Acenaphthene	0.182	0.02	ug/g	ND	99.2	50-140			
Acenaphthylene	0.194	0.02	ug/g	ND	106	50-140			
Anthracene	0.200	0.02	ug/g	ND	109	50-140			
Benzo [a] anthracene	0.163	0.02	ug/g	ND	88.5	50-140			
Benzo [a] pyrene	0.127	0.02	ug/g	ND	69.2	50-140			
Benzo [b] fluoranthene	0.143	0.02	ug/g	ND	77.6	50-140			
Benzo [g,h,i] perylene	0.135	0.02	ug/g	ND	73.3	50-140			

Certificate of Analysis

Report Date: 20-Jun-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 11-Jun-2024

Client PO: 60412

Project Description: PE6552

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [k] fluoranthene	0.196	0.02	ug/g	ND	107	50-140			
Chrysene	0.162	0.02	ug/g	ND	88.1	50-140			
Dibenzo [a,h] anthracene	0.134	0.02	ug/g	ND	72.6	50-140			
Fluoranthene	0.205	0.02	ug/g	ND	111	50-140			
Fluorene	0.162	0.02	ug/g	ND	88.1	50-140			
Indeno [1,2,3-cd] pyrene	0.121	0.02	ug/g	ND	66.0	50-140			
1-Methylnaphthalene	0.149	0.02	ug/g	ND	80.7	50-140			
2-Methylnaphthalene	0.146	0.02	ug/g	ND	79.6	50-140			
Naphthalene	0.167	0.01	ug/g	ND	90.5	50-140			
Phenanthrene	0.177	0.02	ug/g	ND	96.3	50-140			
Pyrene	0.208	0.02	ug/g	ND	113	50-140			
Surrogate: 2-Fluorobiphenyl	1.03		%		69.6	50-140			
Surrogate: Terphenyl-d14	1.40		%		95.2	50-140			
Volatiles									
Benzene	4.52	0.02	ug/g	ND	113	60-130			
Ethylbenzene	4.41	0.05	ug/g	ND	110	60-130			
Toluene	4.50	0.05	ug/g	ND	112	60-130			
m,p-Xylenes	7.77	0.05	ug/g	ND	97.1	60-130			
o-Xylene	3.94	0.05	ug/g	ND	98.4	60-130			
Surrogate: Toluene-d8	7.70		%		96.2	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 60412

Report Date: 20-Jun-2024

Order Date: 11-Jun-2024

Project Description: PE6552

Qualifier Notes:

Sample Data Revisions:

None

Work Order Revisions / Comments:

Revision 1 - Revised report includes additional pH data.

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.

pH Verified: ☐

By:

Certificate of Analysis

Paterson Group Consulting Engineers (Ottawa)

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

Client PO: 61449
Project: PE6552
Custody:

Report Date: 7-Oct-2024

Order Date: 2-Oct-2024

Order #: 2440370

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

Paracel ID	Client ID
2440370-01	BH4-24-SS2
2440370-02	BH5-24-SS3
2440370-03	BH6-24-SS4
2440370-04	DUP1-24 (BH4-24-SS2)

Approved By:



Mark Foto, M.Sc.

Lab Supervisor

Certificate of Analysis

Report Date: 07-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 2-Oct-2024

Client PO: 61449

Project Description: PE6552

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	3-Oct-24	3-Oct-24
PHC F1	CWS Tier 1 - P&T GC-FID	3-Oct-24	3-Oct-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	3-Oct-24	5-Oct-24
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	3-Oct-24	3-Oct-24
Solids, %	CWS Tier 1 - Gravimetric	3-Oct-24	4-Oct-24

Certificate of Analysis

Report Date: 07-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 2-Oct-2024

Client PO: 61449

Project Description: PE6552

Client ID:	BH4-24-SS2	BH5-24-SS3	BH6-24-SS4	DUP1-24 (BH4-24-SS2)	
Sample Date:	01-Oct-24 09:00	01-Oct-24 09:00	01-Oct-24 09:00	01-Oct-24 09:00	-
Sample ID:	2440370-01	2440370-02	2440370-03	2440370-04	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Physical Characteristics

% Solids	0.1 % by Wt.	80.2	93.6	91.0	80.4	-	-
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General Inorganics

pH	0.05 pH Units	7.20	-	7.93	-	-	-
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Volatiles

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

Certificate of Analysis

Report Date: 07-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 2-Oct-2024

Client PO: 61449

Project Description: PE6552

Client ID:	BH4-24-SS2	BH5-24-SS3	BH6-24-SS4	DUP1-24 (BH4-24-SS2)	
Sample Date:	01-Oct-24 09:00	01-Oct-24 09:00	01-Oct-24 09:00	01-Oct-24 09:00	-
Sample ID:	2440370-01	2440370-02	2440370-03	2440370-04	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

trans-1,3-Dichloropropylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
1,3-Dichloropropene, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Ethylbenzene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Hexane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g	<0.50	<0.50	<0.50	<0.50	-	-
Methyl Isobutyl Ketone	0.50 ug/g	<0.50	<0.50	<0.50	<0.50	-	-
Methyl tert-butyl ether	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Methylene Chloride	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Styrene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Tetrachloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Toluene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
1,1,1-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
1,1,2-Trichloroethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Trichloroethylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Trichlorofluoromethane	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Vinyl chloride	0.02 ug/g	<0.02	<0.02	<0.02	<0.02	-	-
m,p-Xylenes	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	<0.05	<0.05	<0.05	<0.05	-	-
Dibromofluoromethane	Surrogate	102%	95.6%	98.9%	108%	-	-
4-Bromofluorobenzene	Surrogate	115%	109%	111%	117%	-	-

Certificate of Analysis

Report Date: 07-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 2-Oct-2024

Client PO: 61449

Project Description: PE6552

Client ID:	BH4-24-SS2	BH5-24-SS3	BH6-24-SS4	DUP1-24 (BH4-24-SS2)	
Sample Date:	01-Oct-24 09:00	01-Oct-24 09:00	01-Oct-24 09:00	01-Oct-24 09:00	-
Sample ID:	2440370-01	2440370-02	2440370-03	2440370-04	-
Matrix:	Soil	Soil	Soil	Soil	
MDL/Units					

Volatiles

Toluene-d8	Surrogate	122%	113%	116%	124%	-	-
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Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	<8	<8	28	<8	-	-
F4 PHCs (C34-C50)	6 ug/g	<6	<6	8	<6	-	-

Certificate of Analysis

Report Date: 07-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 2-Oct-2024

Client PO: 61449

Project Description: PE6552

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					
Volatiles								
Acetone	ND	0.50	ug/g					
Benzene	ND	0.02	ug/g					
Bromodichloromethane	ND	0.05	ug/g					
Bromoform	ND	0.05	ug/g					
Bromomethane	ND	0.05	ug/g					
Carbon Tetrachloride	ND	0.05	ug/g					
Chlorobenzene	ND	0.05	ug/g					
Chloroform	ND	0.05	ug/g					
Dibromochloromethane	ND	0.05	ug/g					
Dichlorodifluoromethane	ND	0.05	ug/g					
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					

Certificate of Analysis

Report Date: 07-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 2-Oct-2024

Client PO: 61449

Project Description: PE6552

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl tert-butyl ether	ND	0.05	ug/g					
Methylene Chloride	ND	0.05	ug/g					
Styrene	ND	0.05	ug/g					
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g					
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g					
Tetrachloroethylene	ND	0.05	ug/g					
Toluene	ND	0.05	ug/g					
1,1,1-Trichloroethane	ND	0.05	ug/g					
1,1,2-Trichloroethane	ND	0.05	ug/g					
Trichloroethylene	ND	0.05	ug/g					
Trichlorofluoromethane	ND	0.05	ug/g					
Vinyl chloride	ND	0.02	ug/g					
m,p-Xylenes	ND	0.05	ug/g					
o-Xylene	ND	0.05	ug/g					
Xylenes, total	ND	0.05	ug/g					
Surrogate: 4-Bromofluorobenzene	8.41		%	105	50-140			
Surrogate: Dibromofluoromethane	6.38		%	79.8	50-140			
Surrogate: Toluene-d8	9.05		%	113	50-140			

Certificate of Analysis

Report Date: 07-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 2-Oct-2024

Client PO: 61449

Project Description: PE6552

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	6.35	0.05	pH Units	6.39			0.6	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	12	4	ug/g	15			26.1	30	
F3 PHCs (C16-C34)	51	8	ug/g	48			6.5	30	
F4 PHCs (C34-C50)	7	6	ug/g	9			16.4	30	
Physical Characteristics									
% Solids	95.0	0.1	% by Wt.	95.0			0.1	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	
cis-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	

Certificate of Analysis

Report Date: 07-Oct-2024

Client: **Paterson Group Consulting Engineers (Ottawa)**

Order Date: 2-Oct-2024

Client PO: 61449

Project Description: **PE6552**

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	8.93		%		107	50-140			
Surrogate: Dibromofluoromethane	7.85		%		94.1	50-140			
Surrogate: Toluene-d8	9.33		%		112	50-140			

Certificate of Analysis

Report Date: 07-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 2-Oct-2024

Client PO: 61449

Project Description: PE6552

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	193	7	ug/g	ND	112	85-115			
F2 PHCs (C10-C16)	105	4	ug/g	15	108	60-140			
F3 PHCs (C16-C34)	254	8	ug/g	48	101	60-140			
F4 PHCs (C34-C50)	124	6	ug/g	9	89.3	60-140			
Volatiles									
Acetone	6.91	0.50	ug/g	ND	69.1	50-140			
Benzene	2.70	0.02	ug/g	ND	67.4	60-130			
Bromodichloromethane	3.12	0.05	ug/g	ND	78.0	60-130			
Bromoform	2.69	0.05	ug/g	ND	67.2	60-130			
Bromomethane	3.61	0.05	ug/g	ND	90.2	50-140			
Carbon Tetrachloride	2.85	0.05	ug/g	ND	71.3	60-130			
Chlorobenzene	3.60	0.05	ug/g	ND	90.0	60-130			
Chloroform	2.75	0.05	ug/g	ND	68.7	60-130			
Dibromochloromethane	2.83	0.05	ug/g	ND	70.8	60-130			
Dichlorodifluoromethane	4.25	0.05	ug/g	ND	106	50-140			
1,2-Dichlorobenzene	3.15	0.05	ug/g	ND	78.8	60-130			
1,3-Dichlorobenzene	3.19	0.05	ug/g	ND	79.7	60-130			
1,4-Dichlorobenzene	3.11	0.05	ug/g	ND	77.7	60-130			
1,1-Dichloroethane	2.83	0.05	ug/g	ND	70.9	60-130			
1,2-Dichloroethane	3.30	0.05	ug/g	ND	82.4	60-130			
1,1-Dichloroethylene	3.31	0.05	ug/g	ND	82.8	60-130			
cis-1,2-Dichloroethylene	2.94	0.05	ug/g	ND	73.6	60-130			
trans-1,2-Dichloroethylene	3.02	0.05	ug/g	ND	75.6	60-130			
1,2-Dichloropropane	3.11	0.05	ug/g	ND	77.7	60-130			
cis-1,3-Dichloropropylene	3.50	0.05	ug/g	ND	87.5	60-130			
trans-1,3-Dichloropropylene	3.78	0.05	ug/g	ND	94.5	60-130			
Ethylbenzene	3.44	0.05	ug/g	ND	86.0	60-130			
Ethylene dibromide (dibromoethane, 1,2-)	2.81	0.05	ug/g	ND	70.2	60-130			
Hexane	3.24	0.05	ug/g	ND	81.0	60-130			
Methyl Ethyl Ketone (2-Butanone)	8.93	0.50	ug/g	ND	89.3	50-140			

Certificate of Analysis

Report Date: 07-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 2-Oct-2024

Client PO: 61449

Project Description: PE6552

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl Isobutyl Ketone	5.65	0.50	ug/g	ND	56.5	50-140			
Methyl tert-butyl ether	6.36	0.05	ug/g	ND	63.6	50-140			
Methylene Chloride	3.36	0.05	ug/g	ND	83.9	60-130			
Styrene	3.51	0.05	ug/g	ND	87.8	60-130			
1,1,1,2-Tetrachloroethane	2.61	0.05	ug/g	ND	65.4	60-130			
1,1,2,2-Tetrachloroethane	3.25	0.05	ug/g	ND	81.2	60-130			
Tetrachloroethylene	3.78	0.05	ug/g	ND	94.4	60-130			
Toluene	3.39	0.05	ug/g	ND	84.8	60-130			
1,1,1-Trichloroethane	2.77	0.05	ug/g	ND	69.2	60-130			
1,1,2-Trichloroethane	3.25	0.05	ug/g	ND	81.1	60-130			
Trichloroethylene	2.95	0.05	ug/g	ND	73.9	60-130			
Trichlorofluoromethane	3.88	0.05	ug/g	ND	97.0	50-140			
Vinyl chloride	3.23	0.02	ug/g	ND	80.8	50-140			
m,p-Xylenes	7.52	0.05	ug/g	ND	94.0	60-130			
o-Xylene	3.75	0.05	ug/g	ND	93.8	60-130			
Surrogate: 4-Bromofluorobenzene	8.30		%		104	50-140			
Surrogate: Dibromofluoromethane	6.42		%		80.2	50-140			
Surrogate: Toluene-d8	8.68		%		108	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers (Ottawa)

Client PO: 61449

Report Date: 07-Oct-2024

Order Date: 2-Oct-2024

Project Description: PE6552

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.



Client Name: Paterson Group	Project Ref: PE6552	Page 1 of 1
Contact Name: Mark D'Arcy	Quote #:	Turnaround Time ☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Address: 9 Auriga Drive	PO #: 61449	
Telephone:	E-mail: mdarcy@patersongroup.ca alupholz@patersongroup.ca	
Date Required: _____		

☒ REG 153/04 ☐ REG 406/19 ☐ Table 1 ☐ Res/Park ☐ Med/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ Table _____ For RSC: ☐ Yes ☐ No	Other Regulation ☐ REG 558 ☐ PWQO ☐ CCME ☐ MISA ☐ SU - Sani ☐ SU - Storm Mun: _____ ☐ Other: _____	Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)	Required Analysis <table border="1"> <tr> <th>PHCs F1-F4+BTEX</th> <th>VOCs</th> <th>PAHs</th> <th>Metals by ICP</th> <th>Hg</th> <th>CrVI</th> <th>B (HWS)</th> <th>pH</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> </tr> <tr> <td>☒</td> <td>☒</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☒</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> </tr> <tr> <td>☒</td> <td>☒</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> </tr> <tr> <td>☒</td> <td>☒</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☒</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> <td>☐</td> </tr> <tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> <tr><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td><td>☐</td></tr> </table>	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	pH									☒	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☒	☒	☐	☐	☐	☐	☐	☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐
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Comments:		Method of Delivery: Paracel Courier	
Relinquished By (Sign): Amelia Upholz	Received at Depot:	Received at Lab: SO	Verified By: SS
Relinquished By (Print): Amelia Upholz	Date/Time:	Date/Time: Oct 2, 2024 3:55p	Date/Time: 2 Oct 24' 1641
Date/Time: October 2, 2024	Temperature: _____ °C	Temperature: 17.6	pH Verified: NA By: _____

Certificate of Analysis

Paterson Group Consulting Engineers (Ottawa)

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Mark Bujaki

Client PO: 61481
Project: PE6552
Custody:

Report Date: 11-Oct-2024
Order Date: 7-Oct-2024

Order #: 2441093

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

Paracel ID	Client ID
2441093-01	BH4-24-GW1
2441093-02	BH5-24-GW1
2441093-03	BH6-24-GW1

Approved By:



Mark Foto, M.Sc.

Lab Supervisor

Certificate of Analysis

Report Date: 11-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 7-Oct-2024

Client PO: 61481

Project Description: PE6552

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	8-Oct-24	8-Oct-24
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	10-Oct-24	10-Oct-24
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	8-Oct-24	8-Oct-24

Certificate of Analysis

Report Date: 11-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 7-Oct-2024

Client PO: 61481

Project Description: PE6552

Client ID:	BH4-24-GW1	BH5-24-GW1	BH6-24-GW1	-	-
Sample Date:	04-Oct-24 09:00	04-Oct-24 09:00	04-Oct-24 09:00	-	-
Sample ID:	2441093-01	2441093-02	2441093-03	-	-
Matrix:	Ground Water	Ground Water	Ground Water	-	-
MDL/Units					

Volatiles

Acetone	5.0 ug/L	<5.0	<5.0	<5.0	-	-	-
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Chloroform	0.5 ug/L	1.0	<0.5	<0.5	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Ethylene dibromide (dibromoethane,	0.2 ug/L	<0.2	<0.2	<0.2	-	-	-
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	-	-	-

Certificate of Analysis

Report Date: 11-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 7-Oct-2024

Client PO: 61481

Project Description: PE6552

Client ID:	BH4-24-GW1	BH5-24-GW1	BH6-24-GW1	-	-
Sample Date:	04-Oct-24 09:00	04-Oct-24 09:00	04-Oct-24 09:00	-	-
Sample ID:	2441093-01	2441093-02	2441093-03	-	-
Matrix:	Ground Water	Ground Water	Ground Water	-	-
MDL/Units					

Volatiles

Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	-	-
Toluene-d8	Surrogate	113%	112%	112%	-	-
4-Bromofluorobenzene	Surrogate	95.0%	97.9%	94.6%	-	-
Dibromofluoromethane	Surrogate	105%	103%	111%	-	-

Hydrocarbons

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

Certificate of Analysis

Report Date: 11-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 7-Oct-2024

Client PO: 61481

Project Description: PE6552

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

Certificate of Analysis

Report Date: 11-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 7-Oct-2024

Client PO: 61481

Project Description: PE6552

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
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					
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	80.0		%	100	50-140			
Surrogate: Dibromofluoromethane	81.2		%	102	50-140			
Surrogate: Toluene-d8	87.1		%	109	50-140			

Certificate of Analysis

Report Date: 11-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 7-Oct-2024

Client PO: 61481

Project Description: PE6552

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	

Certificate of Analysis

Report Date: 11-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 7-Oct-2024

Client PO: 61481

Project Description: PE6552

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	74.7		%		93.4	50-140			
Surrogate: Dibromofluoromethane	87.3		%		109	50-140			
Surrogate: Toluene-d8	89.1		%		111	50-140			

Certificate of Analysis

Report Date: 11-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 7-Oct-2024

Client PO: 61481

Project Description: PE6552

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1960	25	ug/L	ND	114	85-115			
F2 PHCs (C10-C16)	2060	100	ug/L	ND	129	60-140			
F3 PHCs (C16-C34)	5240	100	ug/L	ND	134	60-140			
F4 PHCs (C34-C50)	3000	100	ug/L	ND	121	60-140			
Volatiles									
Acetone	103	5.0	ug/L	ND	103	50-140			
Benzene	43.4	0.5	ug/L	ND	108	60-130			
Bromodichloromethane	44.3	0.5	ug/L	ND	111	60-130			
Bromoform	30.0	0.5	ug/L	ND	75.0	60-130			
Bromomethane	30.9	0.5	ug/L	ND	77.3	50-140			
Carbon Tetrachloride	38.2	0.2	ug/L	ND	95.6	60-130			
Chlorobenzene	48.3	0.5	ug/L	ND	121	60-130			
Chloroform	47.4	0.5	ug/L	ND	118	60-130			
Dibromochloromethane	36.1	0.5	ug/L	ND	90.3	60-130			
Dichlorodifluoromethane	30.2	1.0	ug/L	ND	75.5	50-140			
1,2-Dichlorobenzene	43.2	0.5	ug/L	ND	108	60-130			
1,3-Dichlorobenzene	40.2	0.5	ug/L	ND	101	60-130			
1,4-Dichlorobenzene	45.0	0.5	ug/L	ND	112	60-130			
1,1-Dichloroethane	41.0	0.5	ug/L	ND	103	60-130			
1,2-Dichloroethane	45.5	0.5	ug/L	ND	114	60-130			
1,1-Dichloroethylene	42.6	0.5	ug/L	ND	107	60-130			
cis-1,2-Dichloroethylene	42.4	0.5	ug/L	ND	106	60-130			
trans-1,2-Dichloroethylene	43.2	0.5	ug/L	ND	108	60-130			
1,2-Dichloropropane	43.9	0.5	ug/L	ND	110	60-130			
cis-1,3-Dichloropropylene	34.3	0.5	ug/L	ND	85.8	60-130			
trans-1,3-Dichloropropylene	38.6	0.5	ug/L	ND	96.6	60-130			
Ethylbenzene	39.3	0.5	ug/L	ND	98.2	60-130			
Ethylene dibromide (dibromoethane, 1,2-)	40.3	0.2	ug/L	ND	101	60-130			
Hexane	40.7	1.0	ug/L	ND	102	60-130			
Methyl Ethyl Ketone (2-Butanone)	80.4	5.0	ug/L	ND	80.4	50-140			

Certificate of Analysis

Report Date: 11-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 7-Oct-2024

Client PO: 61481

Project Description: PE6552

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl Isobutyl Ketone	85.8	5.0	ug/L	ND	85.8	50-140			
Methyl tert-butyl ether	60.3	2.0	ug/L	ND	60.3	50-140			
Methylene Chloride	47.4	5.0	ug/L	ND	118	60-130			
Styrene	39.3	0.5	ug/L	ND	98.3	60-130			
1,1,1,2-Tetrachloroethane	42.5	0.5	ug/L	ND	106	60-130			
1,1,2,2-Tetrachloroethane	42.7	0.5	ug/L	ND	107	60-130			
Tetrachloroethylene	38.2	0.5	ug/L	ND	95.5	60-130			
Toluene	45.1	0.5	ug/L	ND	113	60-130			
1,1,1-Trichloroethane	38.7	0.5	ug/L	ND	96.8	60-130			
1,1,2-Trichloroethane	47.8	0.5	ug/L	ND	120	60-130			
Trichloroethylene	43.2	0.5	ug/L	ND	108	60-130			
Trichlorofluoromethane	42.2	1.0	ug/L	ND	105	60-130			
Vinyl chloride	38.6	0.5	ug/L	ND	96.6	50-140			
m,p-Xylenes	84.9	0.5	ug/L	ND	106	60-130			
o-Xylene	44.1	0.5	ug/L	ND	110	60-130			
Surrogate: 4-Bromofluorobenzene	72.2		%		90.2	50-140			
Surrogate: Dibromofluoromethane	88.1		%		110	50-140			
Surrogate: Toluene-d8	84.8		%		106	50-140			

Certificate of Analysis

Report Date: 11-Oct-2024

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 7-Oct-2024

Client PO: 61481

Project Description: PE6552

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.



Client Name: <u>Peterson</u>	Project Ref: <u>PE6552</u>	Page <u>1</u> of <u>1</u>
Contact Name: <u>Mark Bjeki</u>	Quote #:	Turnaround Time ☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular Date Required: _____
Address: <u>9 Ariga Dr.</u>	PO #: <u>61481</u>	
Telephone: <u>613-226-7381</u>	E-mail: <u>mbjeki@petersongroup.ca</u>	

☒ 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: _____				PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	PHCs F1-F4				
Sample ID/Location Name		Matrix	Air Volume	# of Containers	Sample Taken												
1	BH4-24-GW1	GW		3	Oct 4 2024		X						X				
2	BH5-24-GW1	GW		3	Oct 4 2024		X						X				
3	BAG-24-GW1	GW		3	Oct 4 2024		X						X				
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments:			Method of Delivery: <u>Paracel Courier</u>	
Relinquished By (Sign): <u>Mark Bjeki</u>	Received at Depot:	Received at Lab: <u>SS</u>	Verified By: <u>So</u>	
Relinquished By (Print): <u>Mark Bjeki</u>	Date/Time:	Date/Time: <u>7 Oct 24 1610</u>	Date/Time: <u>Oct 7, 2024 4:19 pm</u>	
Date/Time: <u>October 7th 2024</u>	Temperature: _____ °C	Temperature: <u>14.0</u>	pH Verified: ☐ By: _____	