

Phase II – Environmental Site Investigation

Part of 1850 Bantree Street
Ottawa, Ontario

Prepared for Harbour Environmental Group Ltd.

Report: PE6234-2

Date: September 29, 2023

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EXECUTIVE SUMMARY

Assessment

A Phase II-ESA was conducted for part of the property addressed 1850 Bantree Street, in the City of Ottawa, Ontario. The purpose of the Phase II-ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and were considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

An initial field program was carried out in February of 2023 and consisted of drilling 4 boreholes across the Phase II Property. The more recent field program consisted of drilling 2 additional boreholes and advancing 7 test pits across the Phase II property. All boreholes were completed with groundwater monitoring well installations to access the groundwater table. The general soil profile encountered during the field programs consisted of fill material, generally consisting of silty sand and gravel, followed by native glacial till overlying shale bedrock. The boreholes were terminated in bedrock at depths ranging from approximately 3.7 to 6.5m below grade. Test pits were terminated on bedrock at depths ranging from approximately 1.85 to 2.1m below grade. Visual and olfactory evidence of contamination was noted in the fill material at TP4; a piece of a former rail tie was also identified at this location. No other signs of contamination were noted during the field programs. Soil samples were obtained from the test holes and subject to an organic vapour screening.

Soil

Based on the vapour screening results in combination with visual and olfactory observations, a total of eight soil samples (including one duplicate) were submitted for laboratory analysis of metals, benzene, toluene, ethylbenzene xylenes (BTEX), volatile organic compounds (VOCs), petroleum hydrocarbons (PHCs, F1-F4), polycyclic aromatic hydrocarbons (PAHs), electrical conductivity (EC) and sodium adsorption ratio (SAR) and/or pH.

Based on analytical test results, parameters comply with the MECP Table 7 standards in all samples analysed, apart from metal (arsenic, copper, and lead) and PAH concentrations identified in soil Sample TP4-23-G1, as well as EC and SAR concentrations identified in soil Samples TP1-23-G1 and TP6-23-G2. Based on field observations, the metal and PAH exceedances identified at TP4-23-G1 are considered to be associated with the former rail line and are expected to be confined to the fill material. Exceedances of EC and/or SAR are expected to be associated with the use of road salts on adjacent properties and roadways and/or resulting from the former on-site snow disposal area and processing of liquid soils.

The pH identified in sample BH2-SS2 (11.37) marginally falls outside the acceptable range of 5 to 11. Based on 5 additional pH results which fall between 7 and 8, this pH reading is considered to be anomalous. The elevated result may be related to the onsite storage of crushed concrete and is not considered to be representative of the soil pH at the Phase II Property.

Groundwater

Groundwater samples from monitoring wells on the Phase II Property were collected during several separate monitoring events in February and March of 2023 (BH1 to BH4), and again in September 2023 (BH1-23 to BH3-23). Groundwater samples were submitted for laboratory analysis of BTEX, VOC, PHC (F₁-F₄), metal and/or chloride parameters.

During the February 2023 sampling event, several VOC parameters were identified above the selected MECP Table 7 standards for benzene, chloroform, and tetrachloroethylene, in groundwater Samples BH1-GW1, BH2-GW1, and BH3-GW1. The remaining VOC parameters complied with the selected MECP Table 7 Standards. Sodium and chloride concentrations in Samples BH1-GW1 and BH4-GW1 were also observed above the selected standards. Otherwise, parameters analysed complied with the MECP Table 7 standards in all groundwater samples analysed.

Given the elevated VOC concentrations identified during the initial 2023 sampling event, additional rounds of groundwater testing were conducted for VOCs. Benzene concentrations were non-detect during the second round of testing and the chloroform levels in BH2 complied with the MECP Table 7 standards. The tetrachloroethylene concentration in BH2 was observed to exceed the Table 7 Standard during the second round of testing although the concentration had decreased.

Following additional groundwater sampling events for tetrachloroethylene in BH2, the presence of tetrachloroethylene was observed to marginally exceed the MECP Table 7 Standard, however it is presumed anomalous and follows a decreasing trend.

Based on the results of the September 2023 groundwater sampling event, all parameters complied with MECP Table 7 standards in the groundwater samples analysed from BH1-23, BH2-23 and BH3-23.

Recommendations

Soil

The identified metals and PAH impacts within the fill material at TP4-23-G1 are considered to be marginal and isolated to the fill material in the immediate vicinity of TP4-23 (western portion of the Phase II Property).

The EC impacts identified in soil samples TP1-23-G1 and TP6-23-G2 are also considered to be isolated in the fill material in the vicinity of TP1-23 and TP6-23.

It is our understanding that the property will continue to operate as part of the excess soil management and recycling facility owned by Laurent Leblanc Ltd., as well as a liquid soil management facility which will be located on the southern portion of the Phase II Property and operated by Harbour Environmental Ltd.

It is our opinion that the identified metals, PAH and EC/SAR impacts do not pose a risk to the current or future on-site operations and can remain in place. It is our understanding that no excess soil has been generated as part of the construction of the liquid soils management facility. No further investigation and/or work is deemed necessary at this time.

Groundwater

Given the use of road salt on adjacent properties and roadways, in combination with the commercial use of the soil as a soils management facility, elevated sodium and chloride concentrations in the groundwater are not considered to pose a concern to the use of the site.

It is recommended that the monitoring wells installed on the Phase II Property be maintained for future monitoring purposes. The monitoring wells must be decommissioned in accordance with O.Reg 903 once they are no longer required.

1.0 INTRODUCTION

At the request of Harbour Environmental Group Ltd. Paterson Group (Paterson) conducted a Phase II-Environmental Site Assessment (Phase II-ESA) for the part of the property addressed 1850 Bantree Street, in the City of Ottawa, Ontario (herein referred to as the Phase II Property). The purpose of this Phase II-ESA has been to address areas of potential environmental concern (APECs) identified on the Phase II Property, during the recently completed Phase I-ESA by Paterson.

1.1 Site Description

Address: Part of 1850 Bantree Street, Ottawa, Ontario

Location: The Phase I Property is located on the south side of Bantree Street, approximately 100 m west of Edinburgh Place, in the City of Ottawa, Ontario. Refer to Figure 1 – Key Plan, appended to this report. For the purposes of this report, Bantree Street is considered to run in an east-west direction.

Latitude and Longitude: 45 ° 24' 15.153" N, 75 ° 36' 55.044" W

Site Description:

Configuration: Irregular

Site Area: 2.12 ha

Zoning: IH – Heavy Industrial Zone

1.2 Property Ownership

Paterson was engaged to conduct this Phase I ESA by Mr. Sean Yaehne of Harbour Environmental Group Ltd., who can be reached via his office phone number (403)-888-8321. Harbour Environmental Group Ltd. is leasing the southern portion of the Phase II Property, which is owned by Laurent Leblanc Ltd.

1.3 Current and Proposed Future Uses

The Phase II Property is currently part of a larger property operated as a commercial/light industrial excess soil management and recycling facility, with a scale house and stored equipment and materials on the western portion of the Phase II Property. It is our understanding that the property will continue to be used for commercial/light industrial purposes. A liquid soils treatment system will be operated on the southern portion of the Phase II Property.

1.4 Applicable Site Condition Standard

The soil and groundwater standards for the subject site were obtained from Table 7 of the document entitled "Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act", prepared by the Ontario Ministry of Environment and Climate Change (MECP), April 15, 2011. The MECP standards are based on the following considerations:

- Coarse-grained soil conditions
- Generic site conditions for shallow soils
- Non-Potable groundwater conditions
- Commercial/Industrial land use

Section 35 of O.Reg. 153/04 does not apply to the Phase II Property as the neighbouring properties are all serviced by the municipality.

A well is present on the property, however, the well is not used for potable purposes and no other potable well is in the area. The on-site well was installed for commercial purposes and is used for on-site operations. Thus, Table 7 MECP Standards is applicable to the property.

As such, Section 41 of the Regulation does not apply to the Phase II Property, as the Phase II Property is not within 30 m of an environmentally sensitive area, and the pH results for the surface soil is between 5 and 9, and the pH results for the subsurface soil are between 5 and 11. The pH results are further discussed in section 5.8.

Section 43.1 of O.Reg. 153/04 applies to the Phase II Property in that the property is considered to be a Shallow Soil property however, the property is not located within 30 m of a water body.

Coarse-grained soil standards were chosen as a conservative approach. Grain size analysis was not completed. The Phase II Property will continue to be used for light industrial purposes and as such, the MECP Table 7 Industrial Standards have been selected for the purpose of this Phase II-ESA.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is located on the south side of Bantree Street, approximately 100 m west of Edinburgh Place, in the City of Ottawa, Ontario. Refer to Figure 1 – Key Plan, appended to this report. For the purposes of this report, Bantree Street is considered to run in an east-west direction. According to the City of Ottawa website, the Phase II Property is situated in a heavy industrial zone with surrounding properties consisting of commercial and industrial land use.

The larger parcel of land of which the Phase II Property comprises a part of, is operated as a construction yard by Laurent Leblanc Ltd. with a trailer and scale house located on the northern portion of the Phase I Property. The southern portion of the Phase II Property is occupied by an inoperational liquid soils management facility, while the remainder of the subject land is used for storage of construction equipment and aggregate materials.

The site topography is relatively flat, while the regional topography appears to slope down towards the north/northeast, in the general direction of Green's Creek. The Phase II Property is relatively at grade with Bantree Street. Water drainage on the Phase II Property occurs primarily via infiltration to a drainage pipe system located along the eastern edge of the property. The drainage system consists of a 200 mm weeping pipe with sock which is overlain with clear stone followed by filter fabric and drainage sand.

2.2 Past Investigations

The following report was reviewed prior to conducting this assessment:

- 'Phase I Environmental Site Assessment, Part of 1850 Bantree Street – Ottawa, Ontario', prepared by Paterson, dated September 2023.

Based on the findings of the Phase I - ESA, six on-site and three off-site PCAs were considered to result in APECs on the Phase II Property. The identified APECs are as follows:

- APEC 1: Former Liquid Soils Treatment System
- APEC 2: Fill Material of Unknown Quality
- APEC 3: Former Snow Deposit
- APEC 4: Former Railway Lines
- APEC 5: Former Private Fuel Outlet and UST
- APEC 6: Existing Automotive Service Garage
- APEC 7: Existing Automotive Service Garage
- APEC 8: Former Diesel Spill
- APEC 9: Former and Current Use of the Phase I Property as a Construction Storage Yard

As a result of the identified APECs, Paterson recommended the completion of a Phase II-ESA to assess the environmental condition of the soil and groundwater on the Phase II Property.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted throughout the interim of September 4th to 6th, 2023.

The previously field investigation completed in conjunction with the initial assessment of the property was conducted on February 9th and 10th, 2023.

The field program consisted of drilling three boreholes, all of which were instrumented with groundwater monitoring wells, and advancing seven test pits. Test hole locations were selected to address the APECs identified in the Phase I-ESA. The boreholes were drilled to a maximum depth of approximately 6.4m below the ground surface (mbgs) and the test pits were terminated in the native glacial till at a maximum depth of approximately 2.4m.

Shale bedrock was encountered at a maximum depth of approximately 2.3 mbgs.

3.2 Media Investigated

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

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

- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)
- Petroleum Hydrocarbons (PHCs)
- Metals (including hydride-forming compounds – arsenic (As), antimony (Sb) and selenium (Se));
- Mercury (Hg) and hexavalent chromium (CrVI)
- Polycyclic Aromatic Hydrocarbons (PAHs)
- Volatile Organic Compounds (VOCs)
- Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR)

3.3 Phase I Conceptual Site Model

Geological mapping information for the Phase I Property was obtained from The Geological Survey of Canada – Urban Geology of the National Capital Area and reviewed as part of this assessment. Based on the available mapping information, the bedrock beneath the Phase I Property is reported to consist of limestone of the Carlsbad Formation, while the surficial geology reportedly consists of till overburden ranging in thickness from approximately 5 to 25 m.

Based on the previously completed subsurface investigation by Paterson earlier this year, the soil profile at the Phase I Property generally consisted of silty sand and gravel fill material overlying glacial till (silty clay soil matrix with gravel), followed by shale bedrock. Shale bedrock was encountered in all boreholes at depths ranging from approximately 1.40 to 1.80 meters below existing grade.

Buildings and Structures

No permanent structures currently exist on the Phase I Property.

The Phase I Property is currently occupied by a multi-phase liquid soil treatment facility. The facility was recently constructed and consists of a steel frame however, it is not yet operational and is not receiving/treating any waste. The northern portion of the Phase I Property is occupied by a scale and scale house.

The control/pump room for the treatment facility is located on the east side of the structure and was not accessible during the site visit. Two portable site trailers were also observed immediately to the west of the treatment facility. These trailers are to be serviced via a portable septic system once the facility is up and running.

Subsurface Structures and Utilities

The Phase II Property is situated in an area that is serviced by the municipality. Underground utility services on the subject land include hydro and electrical services.

No other subsurface structures were identified at the time of the site visit.

Water Bodies and Areas of Natural Significance

No areas of natural significance or water bodies were identified on the Phase I Property. The nearest water body with respect to the Phase I Property is Green's Creek located approximately 1 km to the east.

Drinking Water Wells

No drinking water wells are located on the Phase I Property.

Monitoring Well Records

Four monitoring wells were installed on the Phase I Property following the completion of a subsurface investigation by Paterson earlier this year.

Neighbouring Land Use

Neighbouring land use within the Phase I Study Area consists of a mixture of commercial and light industrial use. The adjacent properties to the east/southeast addressed 2570 and 2596 (also listed as 2584) Edinburgh Place are currently occupied by automotive service garages. Based on their close proximity and cross gradient orientations with respect to the Phase I Property, the automotive service garages are considered to represent PCAs that result in APECs on the Phase I Property.

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

Based on the findings of the Phase I ESA, the following PCAs (as listed in Column A, Table 2 of O.Reg.153/04) were considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

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 Former Liquid Soils Treatment System	Eastern portion of the Phase I Property	N/A	On-site	BTEX PHCs (F ₁ -F ₄) VOCs	Soil Groundwater
APEC 2 Fill Material of Unknown Quality	Entire Phase I Property	"Item 30 – Importation of Fill Material of Unknown Quality"	On-site	Metals CrVI, Hg BTEX PHCs (F ₁ -F ₄) EC/SAR	Soil
APEC 3 Former Snow Deposit	Southern portion of the Phase I Property	N/A	On-site	EC/SAR	Soil
APEC 4 Former Railway Lines	Central and western portion of the Phase I Property	"Item 46 – Rail Yards, Tracks and Spurs"	On-site	PAHs Metals Hg, CrVI	Soil
APEC 5 Former Private Fuel Outlet and UST	Northeastern portion of the Phase I Property	"Item 28 – Gasoline and Associated Products Storage in Tanks"	Off-site	BTEX PHCs (F ₁ -F ₄)	Groundwater
APEC 6 Existing Automotive Service Garage	Eastern/southeastern portion of the Phase I Property	"Item 10 – Commercial Autobody Shops"	Off-site	BTEX PHCs (F ₁ -F ₄) VOCs	Groundwater
APEC 7 Existing Automotive Service Garage	Eastern portion of the Phase I Property	"Item 10 – Commercial Autobody Shops"	Off-site	BTEX PHCs (F ₁ -F ₄) VOCs	Groundwater
APEC 8 Former Diesel Spill	Northern portion of the Phase I Property	N/A	On-site	BTEX PHCs (F ₁ -F ₄)	Soil

Table 1 - Areas of Potential Environmental Concern					
Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I Property	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 9 Former and Current Use of Phase I Property as a Construction Yard	Entire Phase I Property	N/A	On-site	BTEX PHCs (F ₁ -F ₄)	Soil Groundwater

Contaminants of Potential Concern

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

- Metals (including arsenic, selenium and antimony), mercury (Hg) and hexavalent chromium (Cr VI)
- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX);
- Petroleum Hydrocarbons (PHCs F₁-F₄);
- Volatile Organic Compounds (VOCs)
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR)

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of the Phase I-ESA is considered to be sufficient to conclude that there are PCAs that have resulted in APECs on the Phase I Property.

A variety of independent sources were consulted as part of this assessment, 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

Physical impediments encountered during the Phase II-ESA field program include underground utilities, structures, and on-site operations which limited the location of BH1-23 and BH2-23.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The initial subsurface investigation was completed on February 9 and 10, 2023. The subsurface investigation completed as part of the current assessment was conducted on September 5 and September 6, 2023.

Three boreholes were drilled to a maximum depth of 6.4m, all of which were instrumented with groundwater monitoring wells.

Seven test pits were also advanced to a maximum depth of 2.42m across the Phase II Property in conjunction with a geotechnical investigation.

The boreholes and test pits were strategically placed to address APECs identified in the Phase I-ESA.

The boreholes were drilled with a low clearance drill rig operated by George Downing Estate Drilling of Hawkesbury, Ontario, under full-time supervision of Paterson personnel. The test pits were completed with excavation machinery provided and operated by Laurent Leblanc Ltd. The borehole and test pit locations are indicated on the attached Drawing PE6234-3 - Test Hole Location Plan.

4.2 Soil Sampling

A total of 8 soil samples were obtained from the boreholes by means of grab sampling from auger flights/auger samples and split spoon sampling. Split spoon samples were taken at approximate 0.76 m intervals. Rock core samples were collected with the use of coring equipment. A total of 33 soil samples were obtained from the test pits by means of grab sampling. The depths at which split spoon, auger flight and rock core samples were obtained from the boreholes, and depths from which grab samples were obtained from the test pits are shown as “SS”, “AU”, “RC” and “G” respectively on the Soil Profile and Test Data Sheets.

The borehole and test pit profiles generally consist of a layer of fill comprised of silty sand, crushed stone, gravel, occasional cobbles and/or clay, underlain by native glacial till consisting of a compact brown silty sand matrix with gravel, clay, and some shale fragments. Remnants of a railway spur line were observed in TP4-23 at an approximate depth of 0.3 mbs.

Shale bedrock was encountered within the boreholes at a maximum depth of 2.34m in BH2-23.

Borehole and test pit locations are shown on Drawing PE6234-3 – Test Hole Location Plan.

4.3 Field Screening Measurements

Soil samples recovered at the time of sampling were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to room temperature prior to conducting the vapour survey. Allowing the samples to stabilize to room temperature ensures consistency of readings between samples.

To measure the soil vapours, the analyser probe is inserted into the nominal headspace above the soil sample. A photoionization detector (PID) was used to measure the volatile organic vapour concentrations.

The sample is agitated/manipulated gently as the measurement is taken. The peak reading registered within the first 15 seconds is recorded as the vapour measurement.

The maximum vapour reading measured was encountered in the soil with TP4-23 and was 21.1 ppm. Based on observations made at the time of the subsurface investigation, the elevated reading is considered to be a result of the railway line remnants that were encountered within test pit TP4-23.

These results were not considered to be indicative of potential significant contamination from volatile compounds. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

The remnants of an old railway line were encountered in TP4-23 and the fill material in this test pits exhibited a PAH odour.

4.4 Groundwater Monitoring Well Installation

Three monitoring wells were installed on the Phase II Property as part of the current subsurface investigation. Four monitoring wells were installed on the Phase II Property as part of a previously completed subsurface investigation. The monitoring wells consisted of 32-mm Schedule 40 threaded PVC risers and screens.

Monitoring well construction details are listed in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

Borehole locations and elevations were surveyed geodetically by Paterson personnel.

Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1-23	68.9	5.39	2.4-5.4	2-5.4	0-2	Flushmount
BH2-23	69.41	4.88	1.9-4.9	1.6-4.9	0-1.6	Flushmount
BH1	68.77	3.66	2.10-3.66	1.8-3.66	0-1.8	Stick-Up
BH2	68.89	5.43	2.43-5.43	1.8-5.43	0-1.8	Stick-Up
BH3	68.90	5.50	2.50-5.50	1.8-5.50	0-1.8	Stick-Up
BH4	71.04	6.15	3.15-6.5	3.1-6.15	0-3.1	Stick-Up

4.5 Groundwater Sampling

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

4.6 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan appended to this report, the following soil and groundwater samples submitted as part of the current assessment, as well as analyzed parameters are presented in Tables 4 and 5, respectively.

TABLE 4 – Analyzed Parameters for Submitted Soil Samples								
Sample ID	Sample Depth & Stratigraphic Unit	Parameter						Rationale
		Metals	BTEX	PHCS F ₁ -F ₄	PAHS	EC/SAR	VOCs	
BH1-23-SS2	0.76 – 1.37 m Silty Sand (Fill Material)					X	X	Assess fill material of unknown quality, former liquid soil treatment facility and former snow dump
TP1-23-G1	0.4-0.5m Silty Sand (Fill Material)		X	X		X		Assess fill material of unknown quality and former snow dump
TP1-23-G3	1.5 – 1.6 m Silty Sand (Fill Material)	X	X	X	X	X		Assess fill material of unknown quality
TP2-23-G3	1.6 – 1.7 m Silty Sand (Fill Material)	X	X	X	X			Assess potential soil impacts resulting from off-site automotive service garage
TP4-23-G1	0.4 – 0.5 m Silty Sand (Fill Material)	X	X	X	X			Assess fill material of unknown quality and former railway spur line
TP6-23-G2	0.9 – 1.0 m Silty Sand (Fill Material)	X		X	X		X	Assess fill material of unknown quality
TP7-23-G2	0.7 – 0.8 m Silty Sand (Fill Material)	X	X	X				Assess fill material of unknown quality and former fuel oil spill
DUP1-23 (Duplicate of TP1-23-G3)	1.5 – 1.6 m Silty Sand (Fill Material)	X						Assess fill material of unknown quality
BH1-SS2	0.76-1.37 Silty Sand (Fill Material)	X		X	X		X	Assess fill material of unknown quality, construction yard and former liquid soil treatment facility
BH2-SS2	0.76-1.37 Silty Sand (Fill Material)	X		X	X		X	Assess fill material of unknown quality, construction yard and former liquid soil treatment facility
BH3-SS3	1.52-2.13 Glacial Till (Native)	X		X	X		X	Assess fill material of unknown quality, construction yard and former liquid soil treatment facility

TABLE 5 - Testing Parameters for Submitted Groundwater Samples						
Sample ID	Sample Depth & Stratigraphic Unit	Parameter				Rationale
		PHCs F ₁ -F ₄	VOCs	Metals	PAHs	
BH1-23-GW1	2.4-5.4 Shale Bedrock		X			Assess potential groundwater impacts resulting from off-site automotive service garages
BH2-23-GW1	1.9-4.9 Shale Bedrock		X			Assess potential groundwater impacts resulting from former off-site private fuel outlet and UST
BH1-GW1	2.10-3.66 Shale Bedrock	X	X	X	X	General Coverage
BH1-GW2	2.10-3.66 Shale Bedrock			X		Further Assess Elevated Concentration
BH2-GW1	2.43-5.43 Shale Bedrock	X	X	X	X	General Coverage
BH2-GW2	2.43-5.43 Shale Bedrock		X			Further Assess Elevated Concentrations
BH2-GW3	2.43-5.43 Shale Bedrock		X			Further Assess Elevated Concentration
BH3-GW1	2.50-5.50 Shale Bedrock	X	X	X	X	General Coverage
BH3-GW2	2.50-5.50 Shale Bedrock		X			Further Assess Elevated Concentration

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

4.7 Residue Management

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

4.8 Elevation Surveying

The ground surface elevations at each borehole location were surveyed by Paterson personnel using a high-precision GPS unit.

4.9 Quality Assurance and Quality Control Measures

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.

A summary of quality assurance and quality control (QA/QC) measures, including sampling containers, preservation, labelling, handling, and custody, equipment cleaning procedures, and field quality control measurements is provided in the Sampling and Analysis Plan in Appendix 1.

5.0 REVIEW AND EVALUATION

5.1 Geology

The borehole and test pit profiles generally consist of a layer of fill comprised of silty sand, crushed stone, gravel, occasional cobbles and/or clay.

The fill material was underlain by native glacial till consisting of a compact brown silty sand matrix with gravel, clay, and some shale fragments.

Shale bedrock was encountered within the boreholes at a maximum depth of 2.34m in BH2-23.

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

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling event on September 5, 2023, using an electronic water level meter. Groundwater levels were recorded from the monitoring wells installed in BH2, BH3, BH4, BH1-23, BH2-23 and BH3-23. Groundwater levels are summarized below in Table 6.

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1-23	68.9	2.05	66.85	September 13, 2023
BH2-23	69.41	3.10	66.31	September 13, 2023
BH2	68.89	2.40	66.49	September 13, 2023
BH3	68.90	3.78	65.12	September 13, 2023
BH4	71.04	5.44	65.60	September 13, 2023

Based on the groundwater elevations measured during the sampling events, groundwater contour mapping was completed.

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

BH1 was inaccessible at the time of the current assessment and as such, a groundwater level could not be obtained during the groundwater sampling event.

5.3 Fine-Coarse Soil Texture

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

5.4 Soil: Field Screening

Field screening of the soil samples collected during drilling resulted in vapour readings ranging from 1.4 to 20.1 ppm. The PID readings are not considered to be indicative of contamination. The field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

5.5 Soil Quality

Based on the findings of the field screening in combination with sample depth and location, seven soil samples, including one duplicate sample, were submitted for analysis of metals, PHCs (F1-F4), BTEX, PAHs and/or EC/SAR and VOCs. The results of the analytical testing completed on the Phase II Property are presented in Tables 1A to 1E in Appendix 1. The laboratory Certificates of Analysis are also provided in Appendix 1.

It should be noted that the results of a subsurface investigation completed on the Phase II Property earlier this year have been included as part of the current assessment.

Metals

Based on analytical test results, metal parameters comply with the selected MECP Table 7 Standards in all samples analysed, with three exceptions. The arsenic, copper and lead concentrations identified in soil sample TP4-23-G1 (7.7 µg/g, 143 µg/g and 156 µg/g, respectively) exceeds the selected MECP Table 7 standard of 120 µg/g. The location of samples tested for metals in the soil are shown on Drawing PE6234-4– Analytical Testing Plan – Soil.

PAHs

Based on the analytical test results, PAH parameters identified comply with the selected MECP Table 7 standards in all samples analysed, apart from several parameters identified in soil Sample TP4-23-G1, which marginally exceed the Table 7 standards: acenaphthylene (0.23 µg/g vs. the standard of 0.15 µg/g), benzo[a]pyrene (0.34 µg/g vs. the standard of 0.3 µg/g) and dibenzo[a,h]anthracene (0.12 µg/g vs. the standard of is 0.1 µg/g).

The location of samples tested for PAHs in the soil are shown on PE6234-4 – Analytical Testing Plan – Soil.

PHCs (F₁-F₄)

Apart from Sample TP2-23-G3, PHC Fractions F₃ and F₄ were identified in all samples analysed. Identified concentrations were below the MECP Table 7 standards. The location of samples tested for PHCs in the soil are shown on Drawing PE6234-4 – Analytical Testing Plan – Soil.

BTEX and VOCs

No BTEX or VOC parameters were identified in any of the samples analysed apart from Sample TP4-23-G1, where BTEX parameters were identified at concentrations below the MECP Table 7 standards. The location of samples tested for BTEX in the soil are shown on Drawing PE6234-4 – Analytical Testing Plan – Soil.

EC/SAR

Based on the analytical test results, EC/SAR parameters identified comply with the selected MECP Table 7 standards in all samples analysed, apart from the EC concentrations identified in soil samples TP1-23-G1 and TP6-23-G2, which exceed the Table 7 standards.

The maximum parameter concentrations identified within the soil samples collected during the current assessment are listed below in Table 7.

TABLE 7: Maximum Concentrations – Soil			
Parameter	Maximum Concentration (µg/g)	Soil Sample	Depth Interval (m BGS)
Antimony	7.7	TP4-23-G1	0.4-0.5
Arsenic	17.3	TP4-23-G1	0.4-0.5
Barium	150	TP7-23-G2	0.7-0.8
Beryllium	0.8	TP2-23-G3	1.6-1.7
Boron	15.6	TP7-23-G2	0.7-0.8
Chromium (IV)	0.2	TP2-23-G3	1.6-1.7
Chromium	27.2	TP7-23-G2	0.7-0.8
Cobalt	12.4	TP2-23-G3	1.6-1.7
Copper	143	TP4-23-G1	0.4-0.5
Lead	156	TP4-23-G1	0.4-0.5
Mercury	0.1	TP4-23-G1	0.4-0.5
Molybdenum	3.2	TP4-23-G1	0.4-0.5
Nickel	34.9	TP4-23-G1	0.4-0.5
Vanadium	34	DUP1-23	1.5-1.6
Zinc	116	TP7-23-G2	0.7-0.8
PHC F ₃	294	TP4-23-G1	0.4-0.5
PHC F ₄	328	TP4-23-G1	0.4-0.5
Toluene	0.20	BH4-SS2	0.76-1.37
Xylenes	0.70	BH4-SS2	0.76-1.37
Acenaphthylene	0.23	TP4-23-G1	0.4-0.5
Anthracene	0.35	TP4-23-G1	0.4-0.5
Benzo[a]anthracene	0.23	TP4-23-G1	0.4-0.5
Benzo[a]pyrene	0.34	TP4-23-G1	0.4-0.5
Benzo[b]fluoranthene	0.79	TP4-23-G1	0.4-0.5
Benzo[g,h,i]perylene	1.17	TP4-23-G1	0.4-0.5
Benzo[k]fluoranthene	0.30	TP4-23-G1	0.4-0.5
Chrysene	0.33	TP4-23-G1	0.4-0.5

TABLE 7: Maximum Concentrations – Soil			
Parameter	Maximum Concentration (µg/g)	Soil Sample	Depth Interval (m BGS)
Dibenzo[a,h]anthracene	0.12	TP4-23-G1	0.4-0.5
Fluoranthene	0.40	TP4-23-G1	0.4-0.5
Indeno [1,2,3-cd] pyrene	0.58	TP4-23-G1	0.4-0.5
1-Methylnaphthalene	0.19	TP4-23-G1	0.4-0.5
2-Methylnaphthalene	0.25	TP4-23-G1	0.4-0.5
Methylnaphthalene (1&2)	0.44	TP4-23-G1	0.4-0.5
Naphthalene	0.13	TP4-23-G1	0.4-0.5
Phenanthrene	0.27	TP4-23-G1	0.4-0.5
Pyrene	0.34	TP4-23-G1	0.4-0.5
EC	2220	TP6-23-G2	0.9-1.0
SAR	8.80	TP1-23-G1	0.4-0.5

Notes:

- **Bold and Underlined** – Results exceed the selected MECP standard

5.6 Groundwater Quality

Two groundwater samples from monitoring wells installed in BH1-23 and BH2-23, were submitted for laboratory analysis of PHCs, VOCs and/or metals as part of the current assessment.

It should be noted that the results of a subsurface investigation completed on the Phase II Property earlier this year have been included as part of the current assessment.

The results of the analytical testing are presented in Tables 2A to 2D in Appendix 1. The laboratory Certificates of Analysis are provided in Appendix 1.

PHCs (F₁-F₄)

No PHC parameters were identified in the groundwater samples analysed. As such, the results comply with the selected MECP Table 7 standards. The location of the samples tested for PHCs in the groundwater are shown on Drawing PE6234-5– Analytical Testing Plan – Groundwater.

VOCs

All of the analyzed VOC parameters were in compliance with the selected MECP Table 7 standards with three exceptions. The benzene, chloroform and tetrachloroethylene concentrations identified in groundwater samples BH1-GW1, BH2-GW1 and BH3-GW1 exceeded the selected MECP Table 7 Standards.

Additional rounds of groundwater testing were conducted for VOCs. Benzene concentrations were non-detect during the second round of testing and the chloroform levels in BH2 complied with the selected MECP Table 7 standards. The tetrachloroethylene concentration in BH2 was observed to exceed the selected MECP Table 7 standard during the second round of testing although the concentration had decreased. Following additional groundwater sampling events for tetrachloroethylene in BH2, the presence of tetrachloroethylene is considered to be anomalous, and the concentrations indicated a decreasing trend.

The location of the samples tested for VOC in the groundwater are shown on Drawing PE6234-5–Analytical Testing Plan – Groundwater.

Metals

All of the analyzed metal parameters are in compliance with the selected MECP Table 7 standards with two exceptions. Sodium and chloride concentrations in Samples BH1-GW1 and BH4-GW1 were observed above the selected standards. The remaining metal and chloride parameters comply with the MECP Table 7 Standards.

The sodium and chloride exceedances may be related to the former snow deposit area but are also considered to be related to the use of road salts on adjacent and neighbouring properties and roadways. As such, the sodium and chloride exceedances are not considered to pose a concern to the use of the site.

The location of the samples tested for metals in the groundwater are shown on Drawing PE6234-5–Analytical Testing Plan – Groundwater.

PAHs

All of the analyzed PAH parameters were in compliance with the selected MECP Table 7 standards.

The maximum parameter concentrations identified within the groundwater samples collected during the current assessment are listed below in Table 8.

TABLE 8: Maximum Concentrations – Groundwater			
Parameter	Maximum Concentration (µg/g)	Groundwater Sample	Depth Interval (m BGS)
Antimony	5.3	BH2-GW1	2.43-5.43
Arsenic	6	BH2-GW1	2.43-5.43
Barium	946	BH1-GW1	2.50-5.50
Beryllium	233	BH3-23-GW1	3.4-6.4
Boron	195	BH3-GW1	3.4-6.4
Cadmium	3.5	BH3-23-GW1	3.4-6.4
Chromium	0.5	BH3-23-GW1	3.4-6.4
Chromium (VI)	4.6	BH3-23-GW1	3.4-6.4
Cobalt	5	BH3-23-GW1	3.4-6.4
Copper	3.5	BH3-23-GW1	3.4-6.4
Lead	0.5	BH3-23-GW1	3.4-6.4
Molybdenum	99.4	BH2-GW1	2.43-5.43
Nickel	5	BH3-23-GW1	3.4-6.4
Sodium	<u>2,420,000</u>	BH1-GW1	2.10-3.66
Thallium	0.3	BH1-GW1	2.10-3.66
Uranium	5.2	BH3-23-GW1	3.4-6.4
Vanadium	3.1	BH2-GW1	2.43-5.43
Zinc	12	BH4-GW1	3.15-6.15
Chloride	6170	BH1-GW1	2.10-3.66
Acetone	<u>2.5</u>	BH1-GW1	2.10-3.66
Chloroform	<u>2.2</u>	BH2-GW1	2.43-5.43
Methyl Ethyl Ketone (2-Butanone)	20.8	BH1-GW1	2.10-3.66
Tetrachloroethylene	<u>3.6</u>	BH2-GW1	2.43-5.43
Toluene	2.3	BH1-GW1	2.10-3.66
Anthracene	0.03	BH1-GW1	2.10-3.66
Fluoranthene	0.07	BH1-GW1	2.10-3.66
Phenanthrene	0.13	BH1-GW1	2.10-3.66
Pyrene	0.05	BH1-GW1	2.10-3.66

Notes:

- **Bold and Underlined** – Results exceed the selected MECP standards

5.7 Quality Assurance and Quality Control Results

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

One duplicate soil sample was collected from TP1-23-G3 (DUP1-23) and was submitted for metals.

The duplicate sample 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.

Both the duplicate and original sample had relatively low concentrations of the detected metals parameters and the calculated RPD did not exceed 20% with two exceptions. The calculated RPD between the duplicate and original sample values for boron (7 µg/g and 9 µg/g) and molybdenum (1.3 µg/g and 2.4 µg/g) were 59.5% and 34.3% respectively. Since the detected boron and molybdenum concentrations were low in both the duplicate and original sample, the higher RPD for these parameters are not considered to be indicative of inaccurate data.

The RPD calculations for the original and duplicate sample are provided below in Table 9.

Table 9 QA/QC Calculations – Soil					
Parameter	MDL (µg/L)	TP1-23-G3	DUP1-23	RPD (%)	QA/QC Result (Target: <20% RPD)
Antimony	1.0	nd	nd	0	Meets Target
Arsenic	1.0	4.9	5.0	2	Meets Target
Barium	1.0	81.7	85.8	4.89	Meets Target
Beryllium	0.5	0.7	0.7	0	Meets Target
Boron	5.0	7.0	9.9	34.3	Does Not Meet Target
Cadmium	0.5	nd	nd	0	Meets Target
Chromium	5.0	nd	nd	0	Meets Target
Cobalt	1.0	25.3	27.8	9.42	Meets Target
Copper	5.0	11.5	12.2	5.9	Meets Target
Lead	1.0	30.0	29.8	0.6	Meets Target
Molybdenum	1.0	13.2	14.3	8	Meets Target
Nickel	5.0	nd	nd	0	Meets Target
Selenium	1.0	1.3	2.4	59.5	Does Not Meet Target
Silver	0.3	34.9	34.9	0	Meets Target
Thallium	1.0	nd	nd	0	Meets Target
Uranium	1.0	nd	nd	0	Meets Target
Vanadium	10.0	nd	nd	0	Meets Target
Zinc	20.0	nd	nd	0	Meets Target
Notes:					
<input type="checkbox"/> MDL – Method Detection Limit <input type="checkbox"/> nd – not detected above the MDL					

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

5.8 Phase II Conceptual Site Model

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

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

Based on the results of the previously completed Phase I ESA, nine PCAs were considered to result in APECs on the Phase II Property. The identified APECs on the Phase II Property are as follows:

- APEC 1: Liquid Soils Treatment System (N/A)
- APEC 2: Fill material of unknown quality (PCA #30)
- APEC 3: Contractor Yard (PCA N/A)
- APEC 4: Former Spur Lines (PCA #46)
- APEC 5: Former private fuel outlet and underground storage tank (PCA #28)
- APEC 6: Existing automotive service garage (PCA #10)
- APEC 7: Existing automotive service garage (PCA #10)
- APEC 8: Former diesel fuel spill (N/A)
- APEC 9: Former snow deposit area (N/A)

Contaminants of Potential Concern

The following CPCs were identified with respect to the Phase II Property:

- Metals (including arsenic, selenium and antimony), mercury (Hg) and hexavalent chromium (CrVI)
- Benzene, Toluene, Ethylbenzene, Xylenes (BTEX);
- Petroleum Hydrocarbons (PHCs F₁-F₄);
- Volatile Organic Compounds (VOCs)
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Electrical Conductivity (EC) and Sodium Adsorption Ratio (SAR)

Subsurface Structures and Utilities

The Phase II Property is situated in an area serviced by the municipality. Underground utility services on the Phase II Property include hydro and electrical cables.

The commercial well and previously installed monitoring wells located throughout the Phase II Property, former sedimentation pond, as well as the drainage system located along the eastern portion of the Phase II Property are the only subsurface structures located on the property.

Physical Setting

Site Stratigraphy

Groundwater was encountered at a maximum depth of 4.15 mbgs in BH3-23.

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

- Fill material consisting of brown silty sand with gravel, crushed stone, cobbles and/or clay ranging from approximately 0.75 to 1.7 m below the existing ground surface.
- Glacial till comprised of a silty sand matrix with clay, gravel, shale and occasional cobbles was encountered at a maximum depth of 1.7 mbgs
- Shale bedrock was encountered at depths ranging from 1.07 to 2.34 mbgs

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

Hydrogeological Characteristics

Groundwater was encountered within the overburden at depths ranging from 2.05 to 3.10 m. Based on the groundwater monitoring event, groundwater is interpreted to flow to the north beneath the Phase II Property.

Approximate Depth to Bedrock

Bedrock was encountered in the boreholes advanced on the Phase II Property at depths ranging from 2.05 to 2.34 mbgs

Approximate Depth to Water Table

The depth to the water table at the Phase II Property varies between approximately 2.05 to 4.15 m below existing grade.

Sections 41 and 43.1 of the Regulation

Although a pH value of 11.37 was identified in one of the soil samples submitted as part of the initial subsurface investigation, it is considered to be anomalous and the result of the storage of crushed concrete on the Phase II Property.

As such, Section 41 of the Regulation does not apply to the Phase II Property, as the Phase II Property is not within 30 m of an environmentally sensitive area, and the majority of the pH results for the surface soil is between 5 and 9, and the majority of the pH results for the subsurface soil is between 5 and 11.

Section 43.1 of O.Reg. 153/04 applies to the Phase II Property in that the property is considered to be a Shallow Soil property however, the property is not located within 30 m of a water body.

Fill Placement

Fill material consisting of brown silty sand with gravel, crushed stone, cobbles and/or clay was encountered in all of the test pits and boreholes advanced on the Phase II Property. The fill material of unknown quality identified on the Phase II Property was considered to represent an APEC.

Existing Buildings and Structures

The Phase II Property is occupied by a scale and scale house located in the northern portion of the property. The southern portion of the Phase II Property is occupied by a liquid soils treatment facility that is not currently in operation.

Proposed Buildings and Other Structures

The proposed site development for the Phase II Property will consist of the aforementioned liquid soils treatment facility.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of this Phase II - ESA, the fill material in the immediate vicinity of the TP4-23 (western portion of the Phase II Property) exceeded the MEPC Table 7 Industrial standards for arsenic, lead, copper and several PAH parameters. Based on the findings of the Phase II – ESA, the identified metals and PAH impacts are considered to be limited in extent and is isolated to the fill material in the immediate vicinity of TP4-23.

The electrical conductivity concentrations identified in soil samples TP1-23-G1 and TP6-23-G2 exceed the selected MECP Table 7 Industrial standards. Based on the findings of the Phase II ESA, the EC impacts are considered to be limited in extent and are isolated to the fill material in the vicinity of TP1-23-G1 and TP6-23-G2.

Types of Contaminants

Based on the findings of this Phase II ESA, the fill material in the immediate vicinity of TP4-23 (western portion of the Phase II Property) exceeds the MECP Table 7 Industrial Standards for arsenic, copper, lead and several PAH parameters (acenaphthylene, benzo[a]pyrene and dibenzo[a,h]anthracene).

Contaminated Media

Based on the findings of this Phase II ESA, the fill material in the immediate vicinity of TP4-23 (western portion of the Phase II Property) exceeds the MECP Table 7 Industrial Standards for lead and several PAH parameters.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of this Phase II ESA, the fill material in the immediate vicinity of TP4-23 (western portion of the Phase II Property) exceeds the MECP Table 7 Industrial Standards for lead and several PAH parameters. The identified impacted fill material is considered to be a result of the presence of the partially removed railway on the Phase II Property.

Distribution and Migration of Contaminants

Based on the findings of this Phase II ESA, the fill material in the immediate vicinity of TP4-23 (western portion of the Phase II Property) exceeds the MECP Table 7 Industrial Standards for arsenic, copper, lead, and several PAH parameters.

The identified arsenic, copper, lead and PAH impacts are considered to be limited in extent and are isolated to the fill material within the immediate vicinity of TP4-23.

Based on the low solubility of metals and PAHs in combination with their location well above the water table the potential for migration of contaminants is considered to be negligible.

Discharge of Contaminants

Metal and PAH concentrations are expected to be associated with the former rail line on the Phase II Property and/or fill material that may have been imported during the decommissioning of the rail line.

Climatic and Meteorological Conditions

In general, climatic, and meteorological conditions have the potential to affect contaminant distribution.

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

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

Potential for Vapour Intrusion

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

6.0 CONCLUSIONS

Assessment

A Phase II-ESA was conducted for part of the property addressed 1850 Bantree Street, in the City of Ottawa, Ontario. The purpose of the Phase II-ESA was to address potentially contaminating activities (PCAs) and their resulting areas of potential environmental concern (APECs) that were identified during the Phase I-ESA also completed by Paterson.

An initial field program was carried out in February of 2023 and consisted of drilling 4 boreholes across the Phase II Property. The more recent field program consisted of drilling 2 additional boreholes and advancing 7 test pits across the Phase II property. Boreholes and test pits were located to address the aforementioned APECs. All boreholes were completed with groundwater monitoring well installations to access the groundwater table.

Soil

A total of eight soil samples (including one duplicate) were submitted for analysis of metals, benzene, toluene, ethylbenzene xylenes (BTEX), petroleum hydrocarbons (PHCs, F1-F4) and/or polycyclic aromatic hydrocarbons (PAHs).

All of the analyzed metal parameters are in compliance with the selected MECP Table 7 Standards with three exceptions. The arsenic, copper and lead concentrations identified in soil sample TP4-23-G1 exceeded the selected MECP Table 7 standards.

All of the analyzed PAH parameter concentrations are in compliance with the selected MECP Table 7 standards, with the exception of acenaphthylene (0.23 µg/g and standard is 0.15 µg/g), benzo[a]pyrene (0.34 µg/g and standard is 0.3 µg/g) and dibenzo[a,h] anthracene (0.12 µg/g and standard is .01 µg/g). in soil sample TP4-23-G1. It should be noted that the identified.

All of the analyzed PHC and BTEX parameters are in compliance with the selected MECP Table 7 Standards.

Based on the analytical test results, EC/SAR parameters identified comply with the selected MECP Table 7 standards in all samples analysed, apart from the EC concentrations identified in soil samples TP1-23-G1 and TP6-23-G2, which exceed the Table 7 standards.

Groundwater

Previous groundwater samples had been collected from the Phase II Property in February of 2023.

Groundwater samples from monitoring wells installed in BH1-23, BH2-23 and BH3-23 were collected on September 13, 2023, and were submitted for laboratory analysis of PHCs (F1-F4), VOCs and/or metals. All groundwater results comply with the selected MECP Table 7 Industrial standards.

The groundwater samples were submitted for analysis of metals, PHCs (F1-F4), VOCs (volatile organic compounds), and chloride parameters. No PHC concentrations were detected in the groundwater samples submitted for analysis. The PHC results were in compliance with the selected MECP Table 7 standards.

Several VOC parameters were identified above the selected MECP Table 7 standards for benzene, chloroform, and tetrachloroethylene, in groundwater samples BH1-GW1, BH2-GW1, and BH3-GW1. The remaining VOC parameters were in compliance with the selected MECP Table 7 Standards.

Additional rounds of groundwater testing were conducted for VOCs as a result of the previously identified exceedances. Benzene concentrations were non-detect during the second round of testing and the chloroform levels in BH2 complied with the MECP Table 7 standards. The tetrachloroethylene concentration in BH2 was observed to exceed the Table 7 Standard during the second round of testing although the concentration had decreased.

Following additional groundwater sampling events for tetrachloroethylene in BH2, the presence of tetrachloroethylene was observed to marginally exceed the MECP Table 7 Standard, however it is presumed anomalous and follows a decreasing trend.

Sodium and chloride concentrations in Samples BH1-GW1 and BH4-GW1 were observed above the selected standards.

Recommendations

Soil

The identified metals and PAH impacts within the fill material at TP4-23-G1 are considered to be marginal and isolated to the fill material in the immediate vicinity of TP4-23 (western portion of the Phase II Property).

The EC impacts identified in soil samples TP1-23-G1 and TP6-23-G2 are also considered to be isolated in the fill material in the vicinity of TP1-23 and TP6-23. It is our understanding that the property will continue to operate as a construction yard with the liquid soil treatment facility becoming operational once approvals have been issued.

It is our opinion that the identified metals, PAH and EC impacts do not pose a risk to the current or future on-site operations and does not require any action. No further investigation and/or work is deemed necessary at this time.

Groundwater

The identified sodium and chloride exceedances may be related to the former snow deposit area but are also considered to be related to the use of road salts on adjacent and neighbouring properties and roadways. As such, the sodium and chloride exceedances are not considered to pose a concern to the use of the site.

It is recommended that the monitoring wells installed on the Phase II Property be maintained for future monitoring. The monitoring wells must be decommissioned in accordance with O.Reg 903 once they are no longer required.

7.0 STATEMENT OF LIMITATIONS

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

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

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

This report was prepared for the sole use of Harbour Environmental Group Ltd. Notification from Harbour Group Environmental Group Ltd. and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.



Samuel Berube, EIT.



Karyn Munch, P.Eng., Q.P.ESA



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FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE6234-3 – TEST HOLE LOCATION PLAN

DRAWING PE6234-4 – ANALYTICAL TESTING PLAN – SOIL

DRAWING PE6234-4A – CROSS-SECTION A – A' – SOIL

**DRAWING PE6234-5 – ANALYTICAL TESTING PLAN –
GROUNDWATER**

DRAWING PE6234-5A – CROSS-SECTION A – A' – GROUNDWATER

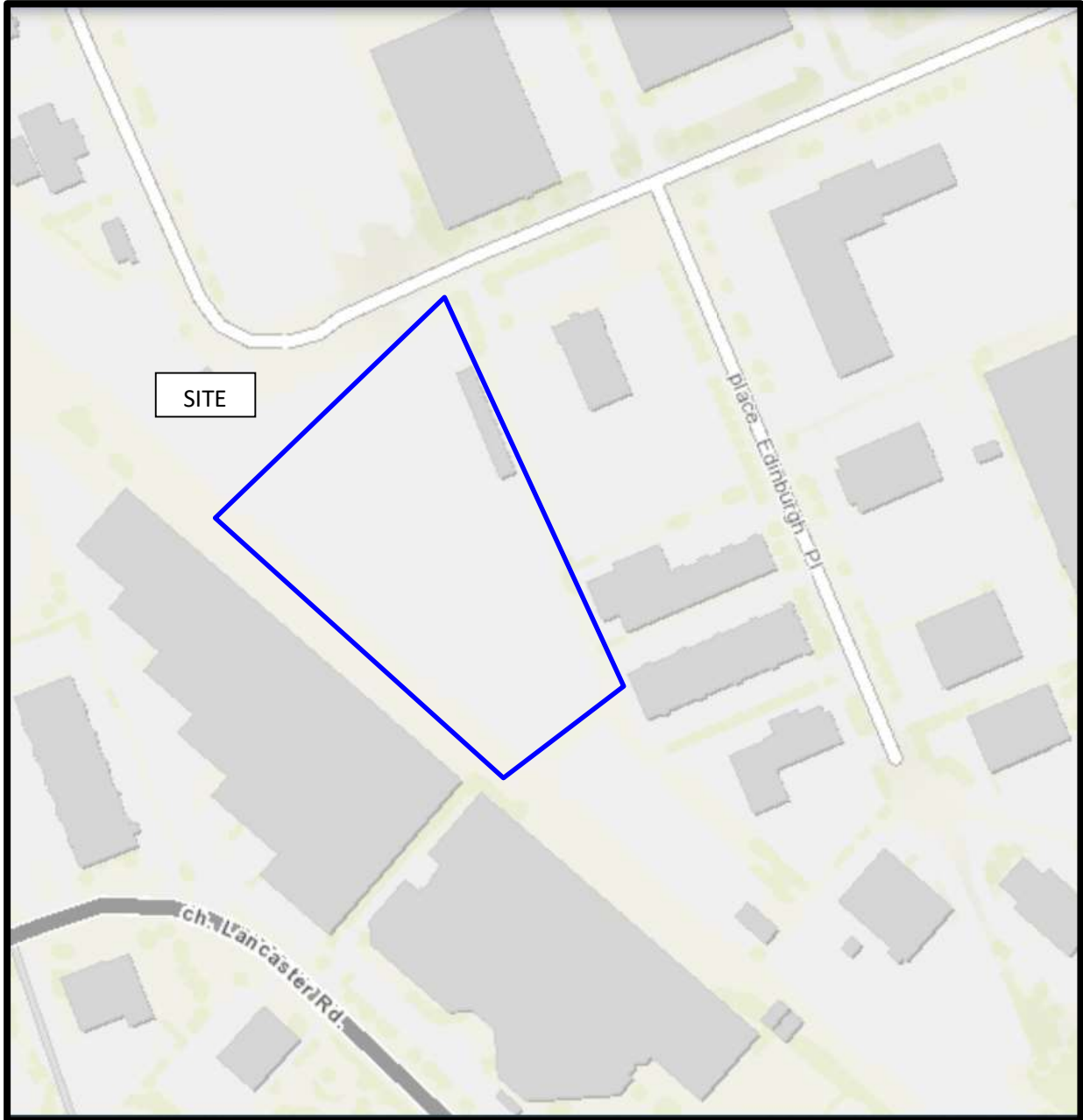
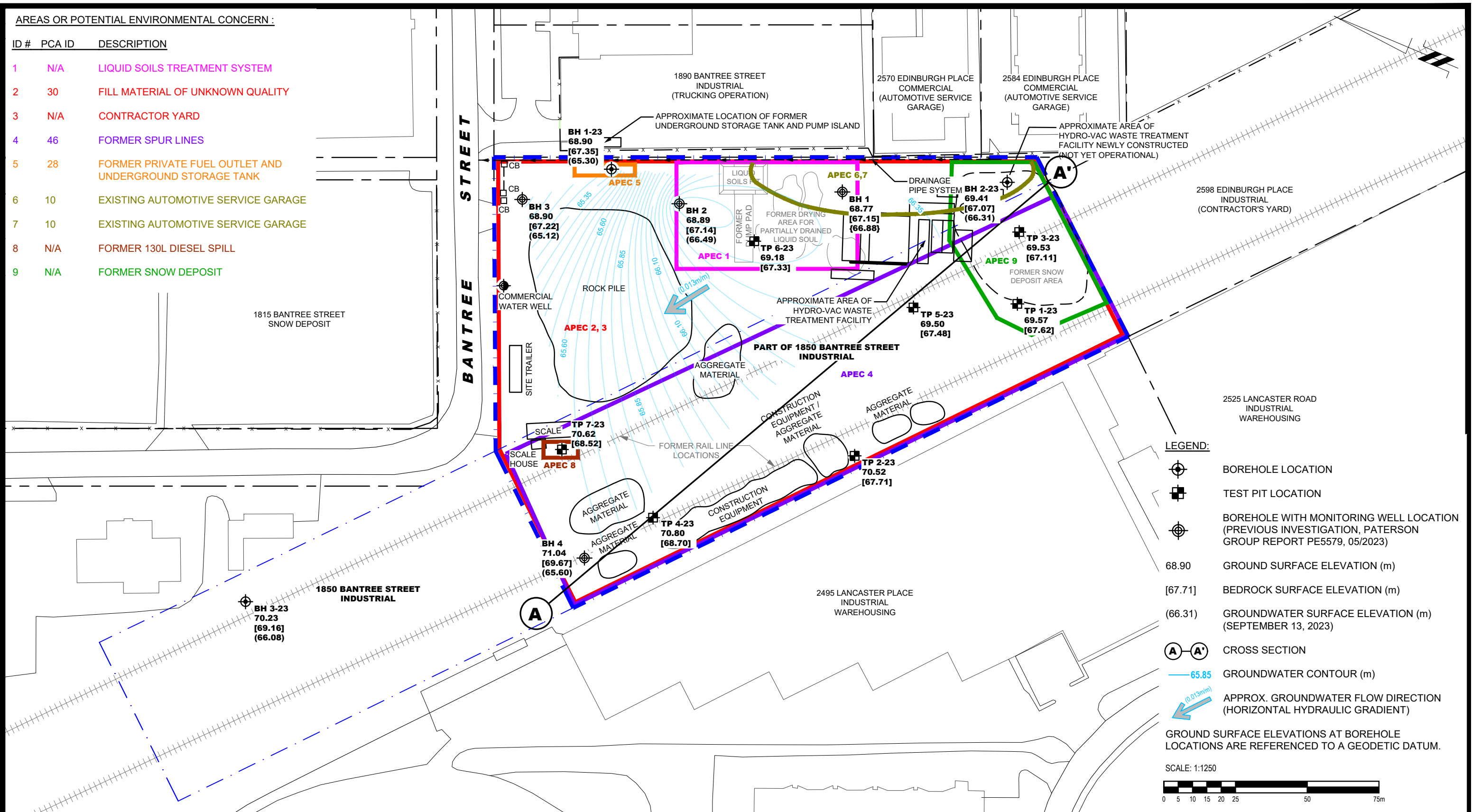


FIGURE 2
Key Plan

AREAS OR POTENTIAL ENVIRONMENTAL CONCERN :

ID #	PCA ID	DESCRIPTION
1	N/A	LIQUID SOILS TREATMENT SYSTEM
2	30	FILL MATERIAL OF UNKNOWN QUALITY
3	N/A	CONTRACTOR YARD
4	46	FORMER SPUR LINES
5	28	FORMER PRIVATE FUEL OUTLET AND UNDERGROUND STORAGE TANK
6	10	EXISTING AUTOMOTIVE SERVICE GARAGE
7	10	EXISTING AUTOMOTIVE SERVICE GARAGE
8	N/A	FORMER 130L DIESEL SPILL
9	N/A	FORMER SNOW DEPOSIT



LEGEND:

- BOREHOLE LOCATION
- TEST PIT LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION (PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PE5579, 05/2023)
- 68.90 GROUND SURFACE ELEVATION (m)
- [67.71] BEDROCK SURFACE ELEVATION (m)
- (66.31) GROUNDWATER SURFACE ELEVATION (m) (SEPTEMBER 13, 2023)
- A-A'** CROSS SECTION
- 65.85 GROUNDWATER CONTOUR (m)
- APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

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

SCALE: 1:1250

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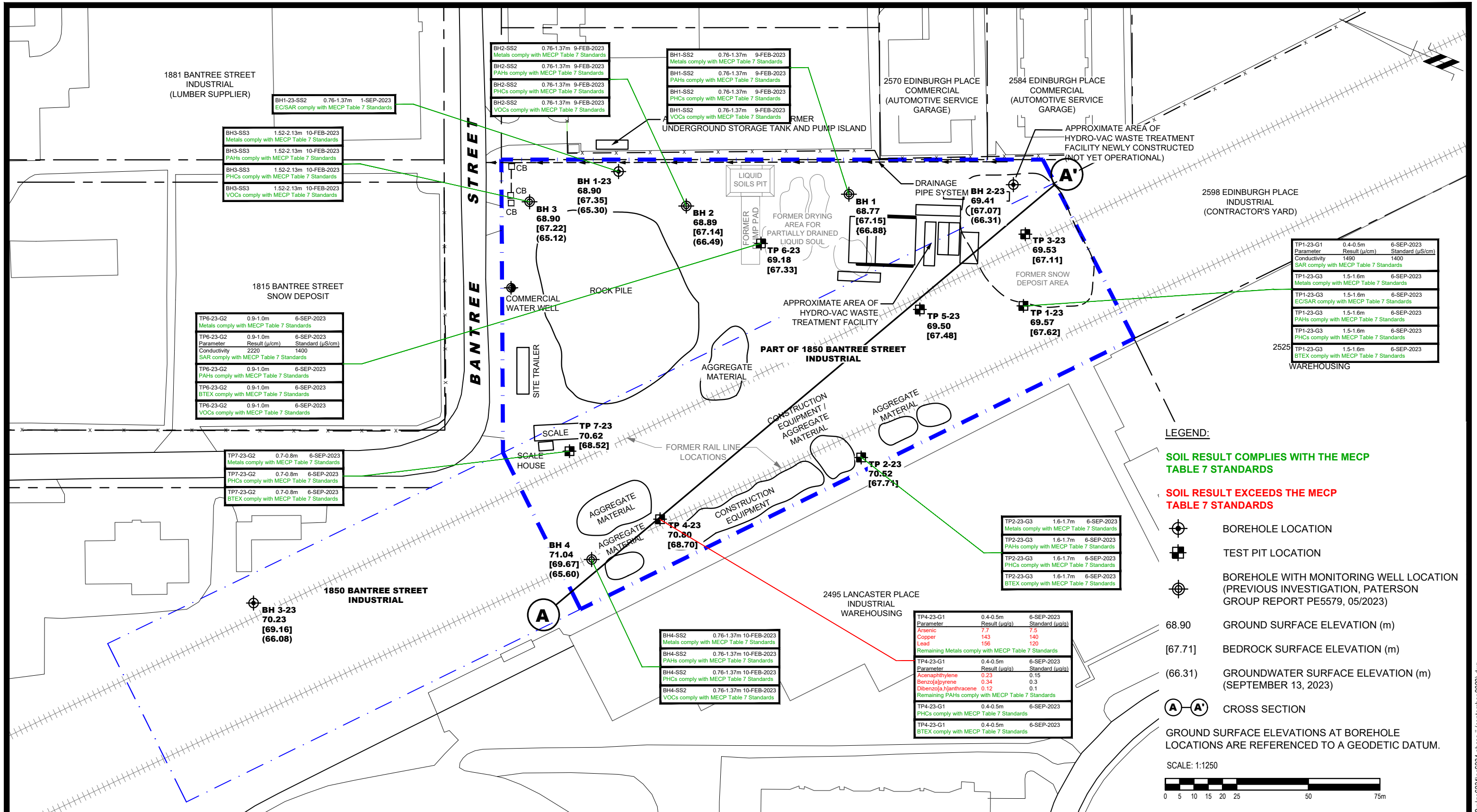
NO.	REVISIONS	DATE	INITIAL

HARBOUR ENVIRONMENTAL GROUP LTD.
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1850 BANTREE STREET

OTTAWA, ONTARIO

TEST HOLE LOCATION PLAN

Scale:	1:1250	Date:	10/2023
Drawn by:	YA	Report No.:	PE6234-2
Checked by:	SB	Dwg. No.:	PE6234-3
Approved by:	KM	Revision No.:	



BH3-SS3	1.52-2.13m	10-FEB-2023	Metals comply with MECP Table 7 Standards
BH3-SS3	1.52-2.13m	10-FEB-2023	PAHs comply with MECP Table 7 Standards
BH3-SS3	1.52-2.13m	10-FEB-2023	PHCs comply with MECP Table 7 Standards
BH3-SS3	1.52-2.13m	10-FEB-2023	VOCs comply with MECP Table 7 Standards

TP6-23-G2	0.9-1.0m	6-SEP-2023	Metals comply with MECP Table 7 Standards
TP6-23-G2	0.9-1.0m	6-SEP-2023	Parameter Result (µ/cm) Standard (µS/cm)
Conductivity	2220	1400	
SAR	comply with MECP Table 7 Standards		
TP6-23-G2	0.9-1.0m	6-SEP-2023	PAHs comply with MECP Table 7 Standards
TP6-23-G2	0.9-1.0m	6-SEP-2023	BTEX comply with MECP Table 7 Standards
TP6-23-G2	0.9-1.0m	6-SEP-2023	VOCs comply with MECP Table 7 Standards

TP7-23-G2	0.7-0.8m	6-SEP-2023	Metals comply with MECP Table 7 Standards
TP7-23-G2	0.7-0.8m	6-SEP-2023	PHCs comply with MECP Table 7 Standards
TP7-23-G2	0.7-0.8m	6-SEP-2023	BTEX comply with MECP Table 7 Standards

BH2-SS2	0.76-1.37m	9-FEB-2023	Metals comply with MECP Table 7 Standards
BH2-SS2	0.76-1.37m	9-FEB-2023	PAHs comply with MECP Table 7 Standards
BH2-SS2	0.76-1.37m	9-FEB-2023	PHCs comply with MECP Table 7 Standards
BH2-SS2	0.76-1.37m	9-FEB-2023	VOCs comply with MECP Table 7 Standards

BH1-SS2	0.76-1.37m	9-FEB-2023	Metals comply with MECP Table 7 Standards
BH1-SS2	0.76-1.37m	9-FEB-2023	PAHs comply with MECP Table 7 Standards
BH1-SS2	0.76-1.37m	9-FEB-2023	PHCs comply with MECP Table 7 Standards
BH1-SS2	0.76-1.37m	9-FEB-2023	VOCs comply with MECP Table 7 Standards

BH4-SS2	0.76-1.37m	10-FEB-2023	Metals comply with MECP Table 7 Standards
BH4-SS2	0.76-1.37m	10-FEB-2023	PAHs comply with MECP Table 7 Standards
BH4-SS2	0.76-1.37m	10-FEB-2023	PHCs comply with MECP Table 7 Standards
BH4-SS2	0.76-1.37m	10-FEB-2023	VOCs comply with MECP Table 7 Standards

TP2-23-G3	1.6-1.7m	6-SEP-2023	Metals comply with MECP Table 7 Standards
TP2-23-G3	1.6-1.7m	6-SEP-2023	PAHs comply with MECP Table 7 Standards
TP2-23-G3	1.6-1.7m	6-SEP-2023	PHCs comply with MECP Table 7 Standards
TP2-23-G3	1.6-1.7m	6-SEP-2023	BTEX comply with MECP Table 7 Standards

TP4-23-G1	0.4-0.5m	6-SEP-2023	Parameter Result (µg/g) Standard (µg/g)
Arsenic	7.7	7.5	
Copper	143	140	
Lead	156	120	
Remaining Metals	comply with MECP Table 7 Standards		
TP4-23-G1	0.4-0.5m	6-SEP-2023	Parameter Result (µg/g) Standard (µg/g)
Acenaphthylene	0.23	0.15	
Benzo[a]pyrene	0.34	0.3	
Dibenzo[a,h]anthracene	0.12	0.1	
Remaining PAHs	comply with MECP Table 7 Standards		
TP4-23-G1	0.4-0.5m	6-SEP-2023	PHCs comply with MECP Table 7 Standards
TP4-23-G1	0.4-0.5m	6-SEP-2023	BTEX comply with MECP Table 7 Standards

TP1-23-G1	0.4-0.5m	6-SEP-2023	Parameter Result (µ/cm) Standard (µS/cm)
Conductivity	1490	1400	
SAR	comply with MECP Table 7 Standards		
TP1-23-G3	1.5-1.6m	6-SEP-2023	Metals comply with MECP Table 7 Standards
TP1-23-G3	1.5-1.6m	6-SEP-2023	EC/SAR comply with MECP Table 7 Standards
TP1-23-G3	1.5-1.6m	6-SEP-2023	PAHs comply with MECP Table 7 Standards
TP1-23-G3	1.5-1.6m	6-SEP-2023	PHCs comply with MECP Table 7 Standards
TP1-23-G3	1.5-1.6m	6-SEP-2023	BTEX comply with MECP Table 7 Standards

LEGEND:

- BOREHOLE LOCATION
- TEST PIT LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION (PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PE5579, 05/2023)
- 68.90 GROUND SURFACE ELEVATION (m)
- [67.71] BEDROCK SURFACE ELEVATION (m)
- (66.31) GROUNDWATER SURFACE ELEVATION (m) (SEPTEMBER 13, 2023)
- A** **A'** CROSS SECTION

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

SCALE: 1:1250

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NO.	REVISIONS	DATE	INITIAL

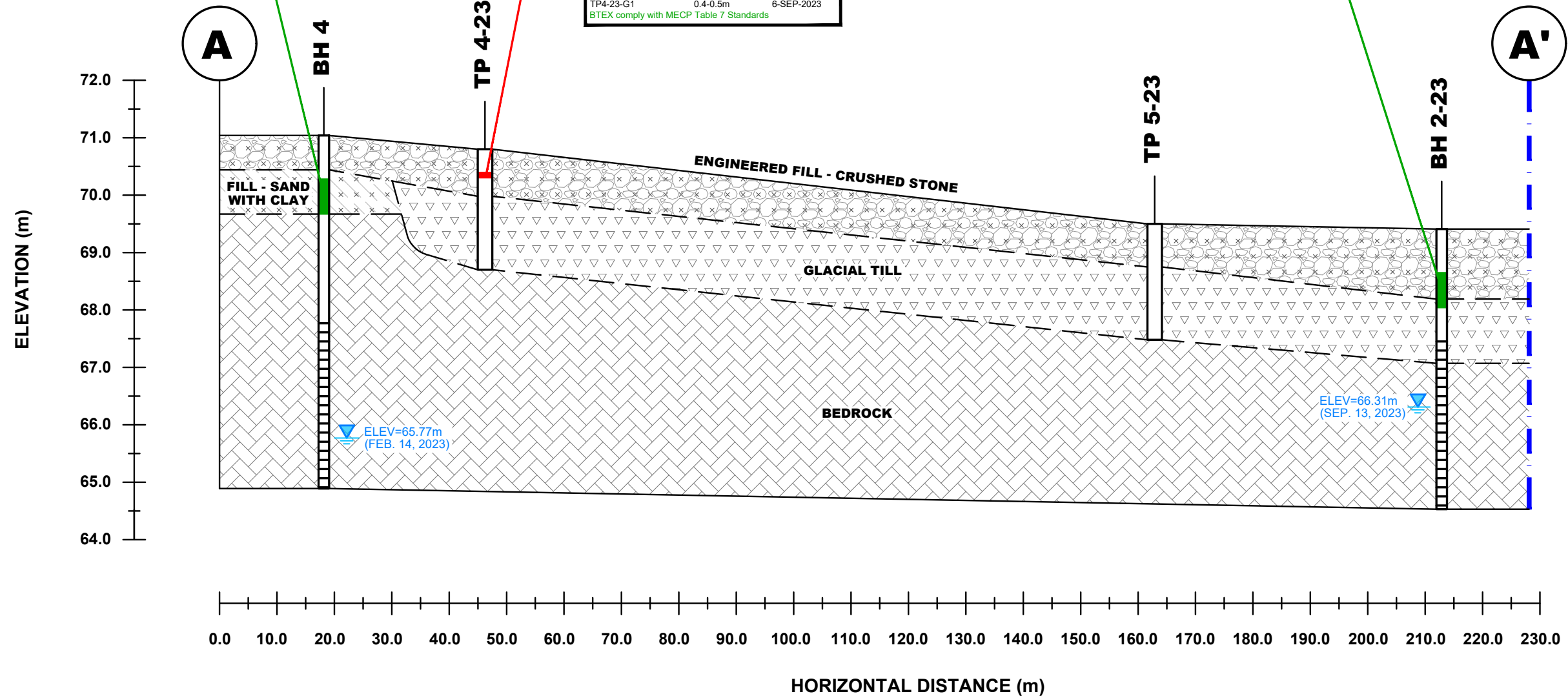
HARBOUR ENVIRONMENTAL GROUP LTD.
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
PART OF 1850 BANTREE STREET
 OTTAWA, ONTARIO
ANALYTICAL TESTING PLAN - SOIL

Scale:	1:1250	Date:	10/2023
Drawn by:	YA	Report No.:	PE6234-2
Checked by:	SB	Dwg. No.:	PE6234-4
Approved by:	KM	Revision No.:	

BH4-SS2	0.76-1.37m	10-FEB-2023
Metals comply with MECP Table 7 Standards		
BH4-SS2	0.76-1.37m	10-FEB-2023
PAHs comply with MECP Table 7 Standards		
BH4-SS2	0.76-1.37m	10-FEB-2023
PHCs comply with MECP Table 7 Standards		
BH4-SS2	0.76-1.37m	10-FEB-2023
VOCs comply with MECP Table 7 Standards		

TP4-23-G1	0.4-0.5m	6-SEP-2023
Parameter	Result (µg/g)	Standard (µg/g)
Arsenic	7.7	7.5
Copper	143	140
Lead	156	120
Remaining Metals comply with MECP Table 7 Standards		
TP4-23-G1	0.4-0.5m	6-SEP-2023
Parameter	Result (µg/g)	Standard (µg/g)
Acenaphthylene	0.23	0.15
Benzo[a]pyrene	0.34	0.3
Dibenzo[a,h]anthracene	0.12	0.1
Remaining PAHs comply with MECP Table 7 Standards		
TP4-23-G1	0.4-0.5m	6-SEP-2023
PHCs comply with MECP Table 7 Standards		
TP4-23-G1	0.4-0.5m	6-SEP-2023
BTEX comply with MECP Table 7 Standards		

BH2-SS2	0.76-1.37m	9-FEB-2023
Metals comply with MECP Table 7 Standards		
BH2-SS2	0.76-1.37m	9-FEB-2023
PAHs comply with MECP Table 7 Standards		
BH2-SS2	0.76-1.37m	9-FEB-2023
PHCs comply with MECP Table 7 Standards		
BH2-SS2	0.76-1.37m	9-FEB-2023
VOCs comply with MECP Table 7 Standards		



SOIL RESULT COMPLIES WITH THE MECP TABLE 7 STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 7 STANDARDS

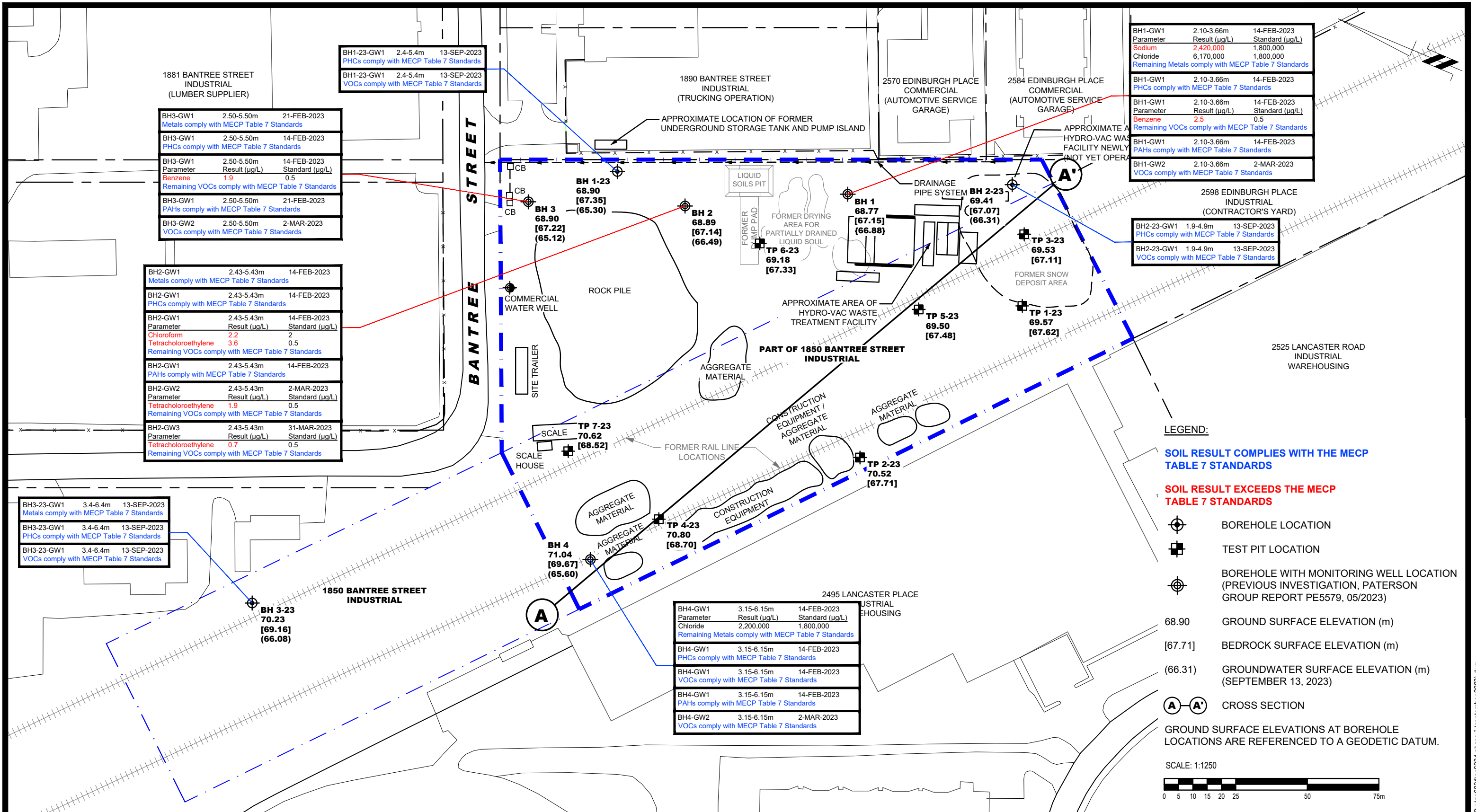


NO.	REVISIONS	DATE	INITIAL

HARBOUR ENVIRONMENTAL GROUP LTD.
 PHASE II - ENVIRONMENTAL SITE ASSESSMENT
 PART OF 1850 BANTREE STREET
 OTTAWA, ONTARIO

CROSS SECTION - SOIL

Scale:	AS SHOWN	Date:	10/2023
Drawn by:	YA	Report No.:	PE6234-2
Checked by:	SB	Dwg. No.:	PE6234-4A
Approved by:	KM	Revision No.:	



BH1-GW1	2.10-3.66m	14-FEB-2023
Parameter	Result (µg/L)	Standard (µg/L)
Sodium	2,420,000	1,800,000
Chloride	6,170,000	1,800,000
Remaining Metals comply with MECP Table 7 Standards		
BH1-GW1	2.10-3.66m	14-FEB-2023
Parameter	Result (µg/L)	Standard (µg/L)
Benzene	2.5	0.5
Remaining VOCs comply with MECP Table 7 Standards		
BH1-GW1	2.10-3.66m	14-FEB-2023
PAHs comply with MECP Table 7 Standards		
BH1-GW2	2.10-3.66m	2-MAR-2023
VOCs comply with MECP Table 7 Standards		

BH3-GW1	2.50-5.50m	21-FEB-2023
Metals comply with MECP Table 7 Standards		
BH3-GW1	2.50-5.50m	14-FEB-2023
PHCs comply with MECP Table 7 Standards		
BH3-GW1	2.50-5.50m	14-FEB-2023
Parameter	Result (µg/L)	Standard (µg/L)
Benzene	1.9	0.5
Remaining VOCs comply with MECP Table 7 Standards		
BH3-GW1	2.50-5.50m	21-FEB-2023
PAHs comply with MECP Table 7 Standards		
BH3-GW2	2.50-5.50m	2-MAR-2023
VOCs comply with MECP Table 7 Standards		

BH2-GW1	2.43-5.43m	14-FEB-2023
Metals comply with MECP Table 7 Standards		
BH2-GW1	2.43-5.43m	14-FEB-2023
PHCs comply with MECP Table 7 Standards		
BH2-GW1	2.43-5.43m	14-FEB-2023
Parameter	Result (µg/L)	Standard (µg/L)
Chloroform	2.2	2
Tetrachloroethylene	3.6	0.5
Remaining VOCs comply with MECP Table 7 Standards		
BH2-GW1	2.43-5.43m	14-FEB-2023
PAHs comply with MECP Table 7 Standards		
BH2-GW2	2.43-5.43m	2-MAR-2023
Parameter	Result (µg/L)	Standard (µg/L)
Tetrachloroethylene	1.9	0.5
Remaining VOCs comply with MECP Table 7 Standards		
BH2-GW3	2.43-5.43m	31-MAR-2023
Parameter	Result (µg/L)	Standard (µg/L)
Tetrachloroethylene	0.7	0.5
Remaining VOCs comply with MECP Table 7 Standards		

BH3-23-GW1	3.4-6.4m	13-SEP-2023
Metals comply with MECP Table 7 Standards		
BH3-23-GW1	3.4-6.4m	13-SEP-2023
PHCs comply with MECP Table 7 Standards		
BH3-23-GW1	3.4-6.4m	13-SEP-2023
VOCs comply with MECP Table 7 Standards		

BH4-GW1	3.15-6.15m	14-FEB-2023
Parameter	Result (µg/L)	Standard (µg/L)
Chloride	2,200,000	1,800,000
Remaining Metals comply with MECP Table 7 Standards		
BH4-GW1	3.15-6.15m	14-FEB-2023
PHCs comply with MECP Table 7 Standards		
BH4-GW1	3.15-6.15m	14-FEB-2023
VOCs comply with MECP Table 7 Standards		
BH4-GW1	3.15-6.15m	14-FEB-2023
PAHs comply with MECP Table 7 Standards		
BH4-GW2	3.15-6.15m	2-MAR-2023
VOCs comply with MECP Table 7 Standards		

LEGEND:

- BOREHOLE LOCATION
- TEST PIT LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION (PREVIOUS INVESTIGATION, PATERSON GROUP REPORT PE5579, 05/2023)
- 68.90 GROUND SURFACE ELEVATION (m)
- [67.71] BEDROCK SURFACE ELEVATION (m)
- (66.31) GROUNDWATER SURFACE ELEVATION (m) (SEPTEMBER 13, 2023)
- A-A'** CROSS SECTION

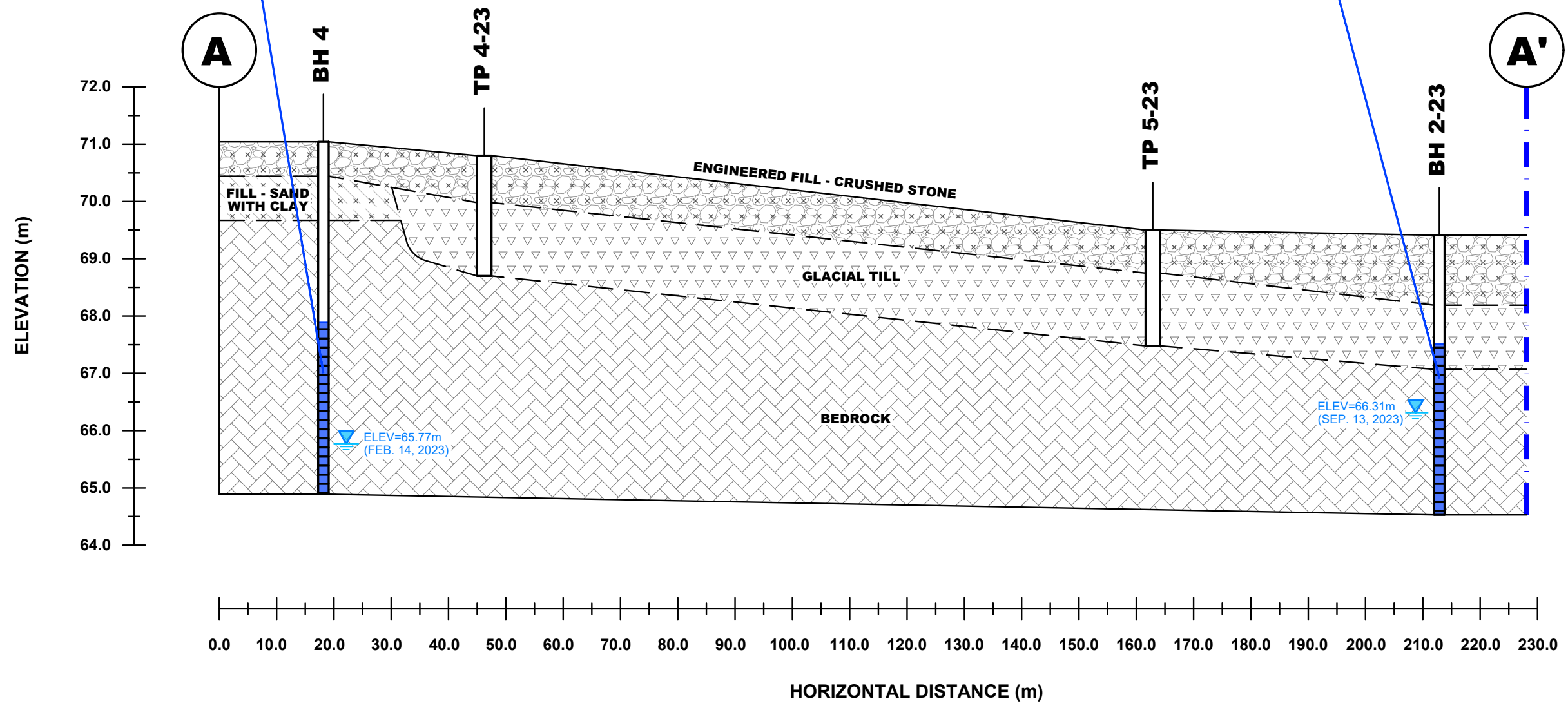
GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.

SCALE: 1:1250

 9 AURIGA DRIVE OTTAWA, ON K2E 7T9 TEL: (613) 226-7381							
	HARBOUR ENVIRONMENTAL GROUP LTD. PHASE II - ENVIRONMENTAL SITE ASSESSMENT PART OF 1850 BANTREE STREET	OTTAWA, Title:	ONTARIO	Scale: 1:1250 Drawn by: YA Checked by: SB Approved by: KM	Date: 10/2023 Report No.: PE6234-2 Dwg. No.: PE6234-5 Revision No.:		
ANALYTICAL TESTING PLAN - GROUNDWATER							

BH4-GW1	3.15-6.15m	14-FEB-2023
Parameter	Result (µg/L)	Standard (µg/L)
Chloride	2,200,000	1,800,000
Remaining Metals comply with MECP Table 7 Standards		
BH4-GW1	3.15-6.15m	14-FEB-2023
PHCs comply with MECP Table 7 Standards		
BH4-GW1	3.15-6.15m	14-FEB-2023
VOCs comply with MECP Table 7 Standards		
BH4-GW1	3.15-6.15m	14-FEB-2023
PAHs comply with MECP Table 7 Standards		
BH4-GW2	3.15-6.15m	2-MAR-2023
VOCs comply with MECP Table 7 Standards		

BH2-23-GW1	1.9-4.9m	13-SEP-2023
PHCs comply with MECP Table 7 Standards		
BH2-23-GW1	1.9-4.9m	13-SEP-2023
VOCs comply with MECP Table 7 Standards		



GROUNDWATER RESULT COMPLIES WITH THE MECP TABLE 7 STANDARDS

GROUNDWATER RESULT EXCEEDS THE MECP TABLE 7 STANDARDS



NO.	REVISIONS	DATE	INITIAL

HARBOUR ENVIRONMENTAL GROUP LTD.
 PHASE II - ENVIRONMENTAL SITE ASSESSMENT
 PART OF 1850 BANTREE STREET
 OTTAWA, ONTARIO
CROSS SECTION - GROUNDWATER

Scale:	AS SHOWN	Date:	10/2023
Drawn by:	YA	Report No.:	PE6234-2
Checked by:	SB	Dwg. No.:	PE6234-5A
Approved by:	KM	Revision No.:	

APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ANALYTICAL TEST RESULTS

LABORATORY CERTIFICATES OF ANALYSIS

Sampling & Analysis Plan

Part of 1850 Bantree Street
Ottawa, Ontario

Prepared for Harbour Environmental Group Ltd.

Report: PE6234-SAP
August 25, 2023



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1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Harbour Environmental Group Ltd., to conduct a Phase II – Environmental Site Assessment (Phase II-ESA) for part of the property addressed 1850 Bantree Street, in the City of Ottawa, Ontario.

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

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-23	Northern portion of the Phase II Property; to assess potential impacts resulting from the former presence of a private fuel outlet and UST on the adjacent property to the west.	3-6.5 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH2-23	Eastern portion of the Phase II Property; to assess potential impacts resulting from existing automotive service garages on the adjacent properties to the east/southeast.	3-6.5 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH3-23	Eastern portion of the Phase II Property; to assess potential impacts resulting from on-site activities and an off-site automotive service garage.	3-6.5 m; to intercept the groundwater table for the purpose of installing a monitoring well.
TP1-23	Southern portion of the Phase I Property; to assess potential impacts resulting from the presence of fill material of unknown quality and former snow dump on property.	2-3m to advance through the fill material into the native overburden.
TP2-23	Western portion of the Phase I Property; to assess potential impacts resulting from the presence of fill material of unknown quality and former railway spur line.	2-3 m to advance through the fill material into the native overburden.
TP3-23	Eastern portion of the Phase II Property, to assess potential impacts resulting from the presence of fill material of unknown quality and former snow deposit	2-3 m to advance through the fill material into the native overburden.
TP4-23	Northwestern portion of the Phase II Property, to assess potential impacts resulting from the presence of fill material of unknown quality and former railway spur line.	2-3 m to advance through the fill material into the native overburden.
TP5-23	Southern portion of the Phase II Property, to assess potential impacts resulting from the presence of fill material of unknown quality and former snow deposit area.	2-3 m to advance through the fill material into the native overburden.
TP6-23	Eastern portion of the Phase II Property, to assess potential impacts resulting from the presence of fill material of unknown quality and former snow deposit area	2-3 m to advance through the fill material into the native overburden.
TP7-23	Northern portion of the Phase II Property, to assess the potential impacts resulting from a historical 130L fuel oil spill and the presence of fill material of unknown quality.	2-3 m to advance through the fill material into the native overburden.

BH1	Eastern portion of the Phase II Property, to assess the potential impacts resulting from a former liquid soil treatment system	3-6.5 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH2	Northeastern portion of the Phase II Property, to assess the potential impacts resulting from a former liquid soil treatment system	3-6.5 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH3	Northern portion of the Phase II Property, to assess the potential impacts resulting from a former liquid soil treatment system	3-6.5 m; to intercept the groundwater table for the purpose of installing a monitoring well.
BH4	Western portion of the Phase II Property, to assess the potential impacts resulting from a former liquid soil treatment system	3-6.5 m; to intercept the groundwater table for the purpose of installing a monitoring well.

Borehole locations are shown on Drawing PE6234-3 – Test Hole Location Plan, appended to the main report.

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

Following the borehole drilling, groundwater monitoring wells will be installed in all three boreholes to allow for the collection of groundwater samples.

2.0 ANALYTICAL TESTING PROGRAM

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

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

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

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

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

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

Drilling Procedure

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

- Continuous split spoon samples (every 0.6 m or 2') or semi-continuous (every 0.76 m or 2'6") are required.
- Make sure samples are well sealed in plastic bags with no holes prior to screening and are kept cool but unfrozen.
- If sampling for VOCs, BTEX, or PHCs F₁, a soil core from each soil sample, which may be analyzed, must be taken and placed in the laboratory-provided methanol vial.
- Note all and any odours or discolouration of samples.
- Split spoon samplers must be washed between samples.
- If obvious contamination is encountered, continue sampling until vertical extent of contamination is delineated.
- As a general rule, environmental boreholes should be deep enough to intercept the groundwater table (unless this is impossible/impractical - call project manager to discuss).
- If at all possible, soil samples should be submitted to a preliminary screening procedure on site, either using a RKI Eagle, PID, etc. depending on type of suspected contamination.

Spoon Washing Procedure

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

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

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

Screening Procedure

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

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

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

3.2 Monitoring Well Installation Procedure

Equipment

- 5' x 2" threaded sections of Schedule 40 PVC slotted well screen (5' x 1 1/4" if installing in cored hole in bedrock)
- 5' x 2" threaded sections of Schedule 40 PVC riser pipe (5' x 1 1/4" if installing in cored hole in bedrock)
- Threaded end-cap
- Slip-cap or J-plug
- Asphalt cold patch or concrete
- Silica Sand
- Bentonite chips (Holeplug)
- Steel flushmount casing

Procedure

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

3.3 Monitoring Well Sampling Procedure

Equipment

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

Sampling Procedure

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

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

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

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

5.0 DATA QUALITY OBJECTIVES

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

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

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

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

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

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS

Physical impediments to the Sampling and Analysis plan may include:

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

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

DATUM Geodetic

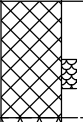



REMARKS

BORINGS BY Track-Mount Power Auger

DATE February 9, 2023

FILE NO.
PE5579

HOLE NO.
BH 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %				
GROUND SURFACE								20	40	60	80		
FILL: Brown silty sand with gravel		AU	1			0	68.77						
GLACIAL TILL: Brown silty clay, some sand, trace gravel and shale		SS	2	100	28	1	67.77						
- grey by 1.6m depth		SS	3	100	50+								
BEDROCK: Weathered shale						2	66.77						
						3	65.77						
End of Borehole (GWL @ 1.89m - Feb. 14, 2023)													

100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

DATUM Geodetic

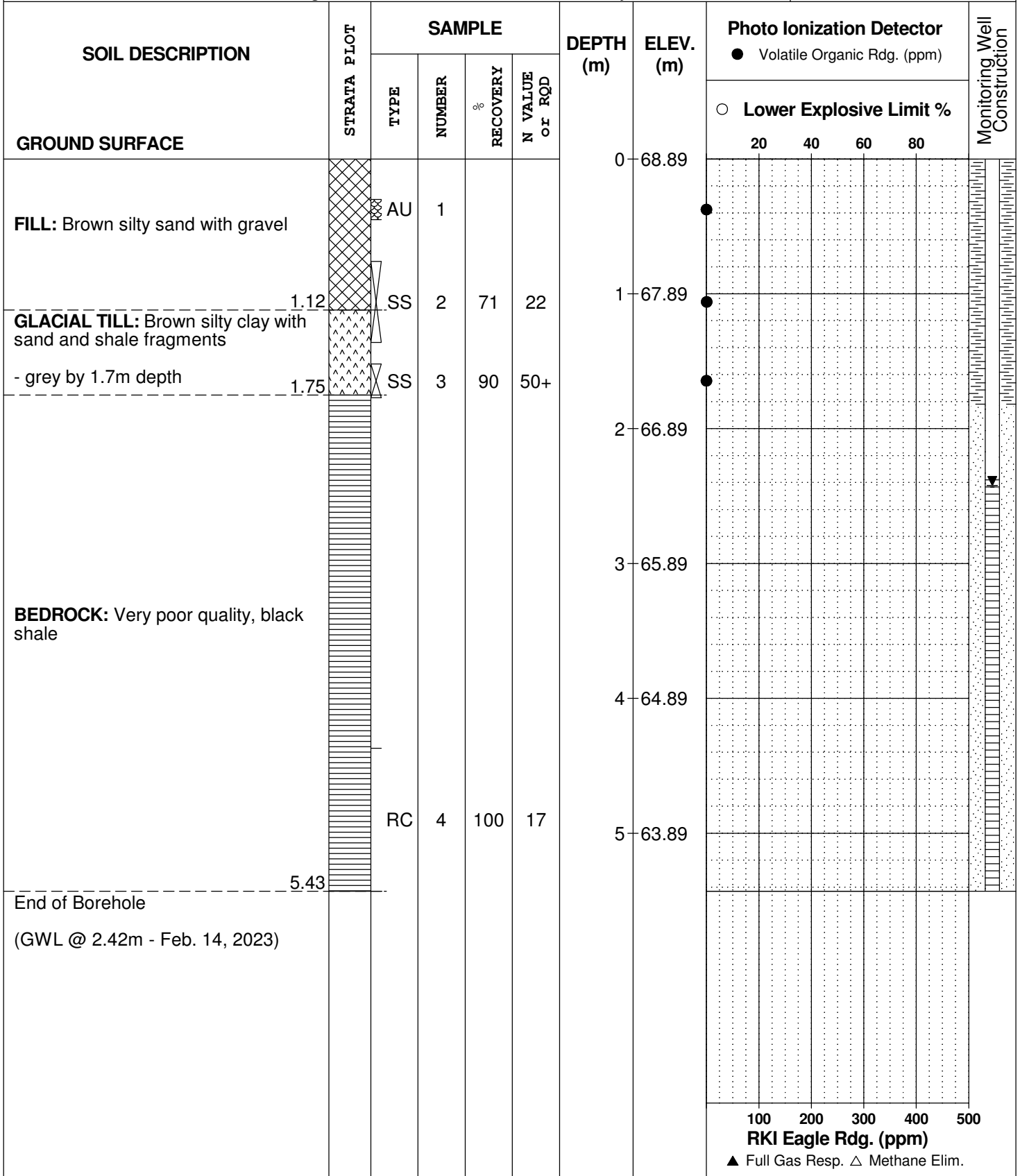
REMARKS

BORINGS BY Track-Mount Power Auger

DATE February 9, 2023

FILE NO.
PE5579

HOLE NO.
BH 2



DATUM Geodetic

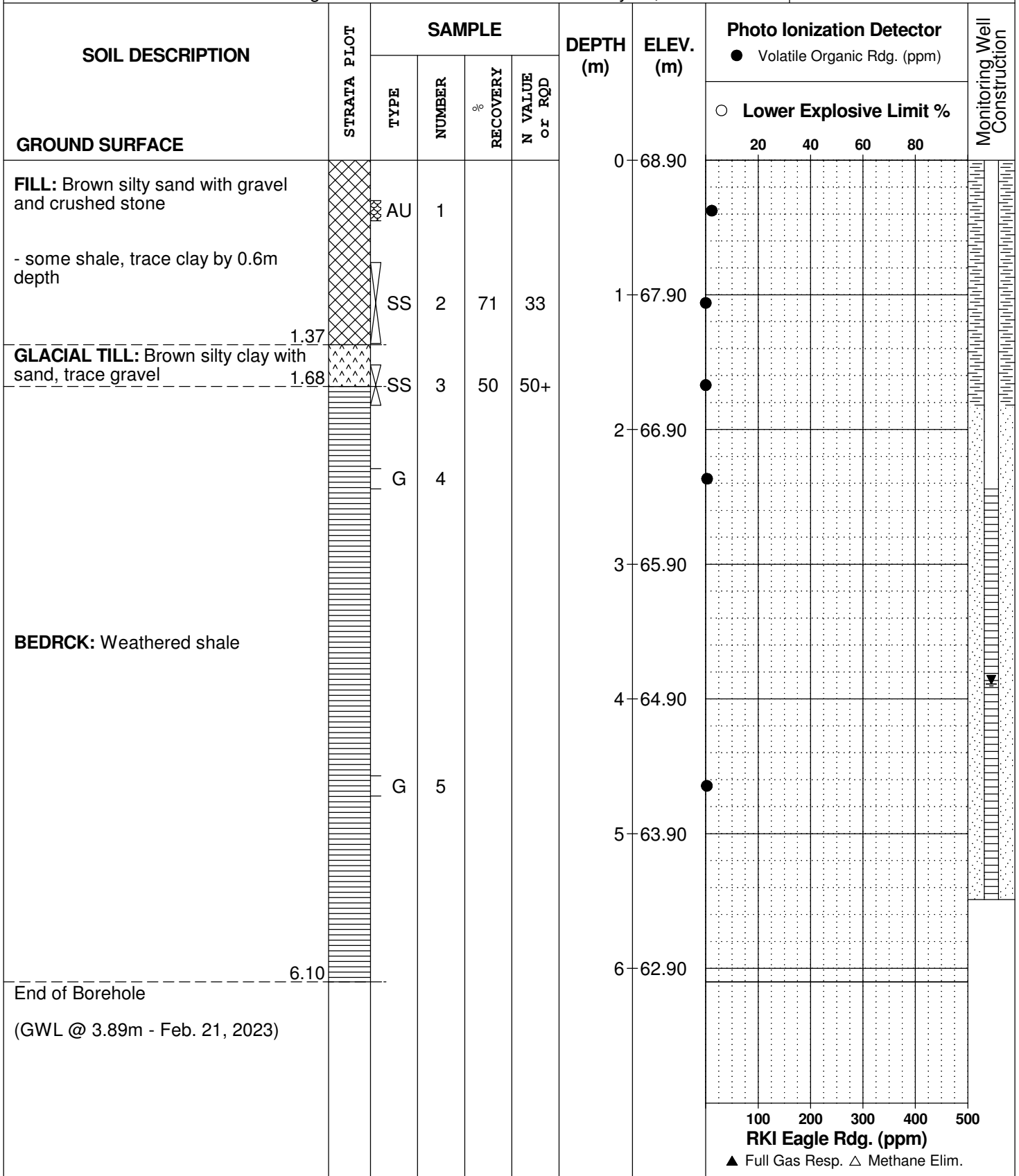
REMARKS

BORINGS BY Track-Mount Power Auger

DATE February 10, 2023

FILE NO.
PE5579

HOLE NO.
BH 3



DATUM Geodetic

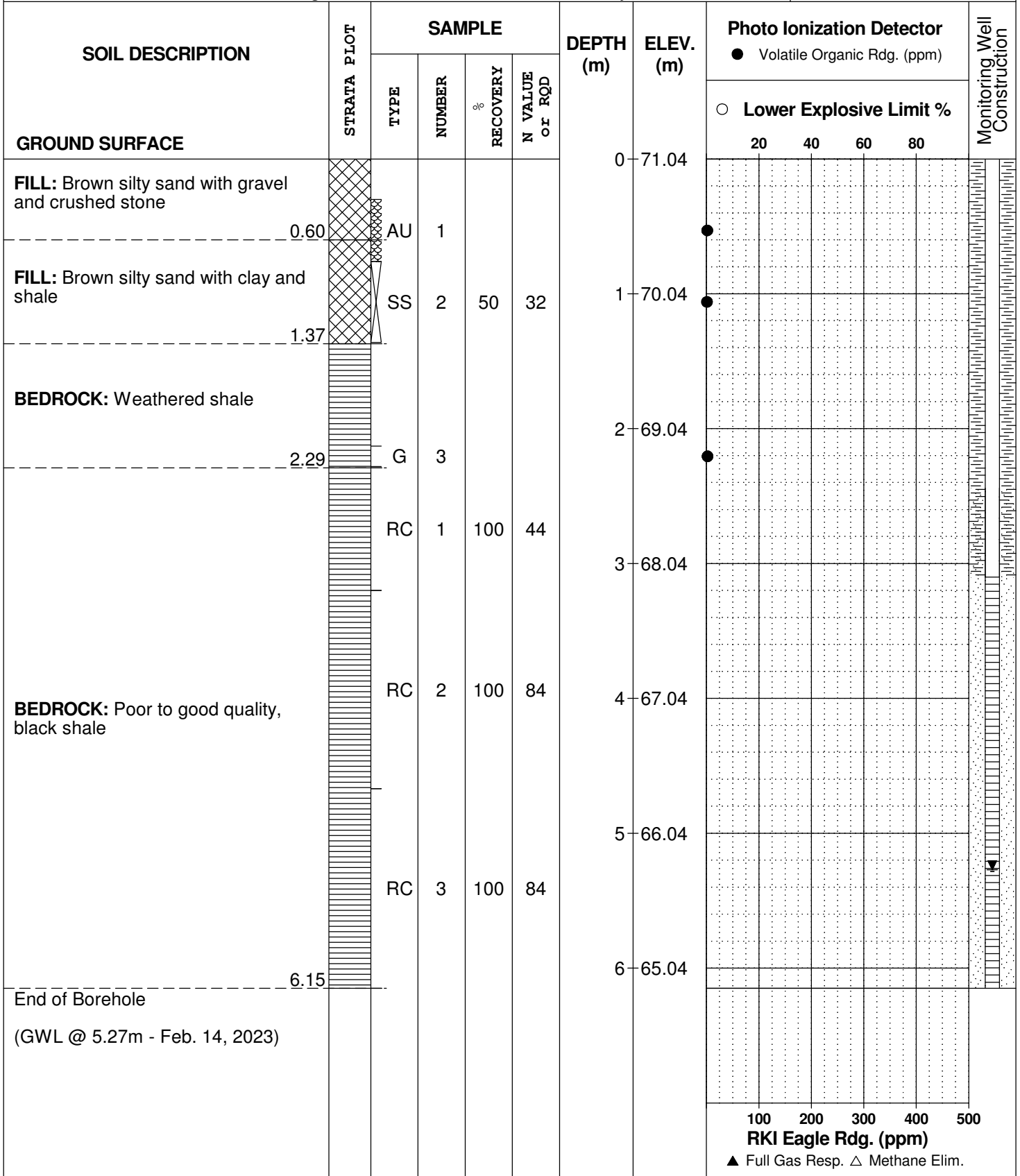
REMARKS

BORINGS BY Track-Mount Power Auger

DATE February 10, 2023

FILE NO.
PE5579

HOLE NO.
BH 4



DATUM: Geodetic **EASTING:** 374150.642 **NORTHING:** 5029624.042 **ELEVATION:** 69.41

PROJECT: Proposed Hydrovac Slurry Processing Facility-copy

FILE NO. PE6234

BORINGS BY: CME 55 Low Clearance Power Auger

REMARKS:

DATE: September 5, 2023

HOLE NO. BH 2-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	ANALYTICAL TESTS	DEPTH (m)	PID (ppm)				Gas Tech (ppm)				Monitoring Well Construction
		No.	Type					0	16.67	33.33	50	0	50	100	150	
Ground Surface	EL 69.41 m						0									
FILL: Brown silty sand with gravel and crushed stone, occasional cobbles		AU1	●				0	8.8								
	1.22 m EL 68.19 m	SS2	▽	67	17		1	6.7								
GLACIAL TILL: Compact, brown silty sand with clay, occasional shale fragments		SS3	▽	83	27		2	6.8								
	2.34 m EL 67.07 m	SS4	▽	33	50+		2	3.5								
BEDROCK: Very poor to poor quality, black shale							3									
	4.88 m EL 64.53 m						4									
End of Borehole (GWL @ 3.10m - Sep. 13, 2023)							5									
							6									
							7									
							8									

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SOIL PROFILE AND TEST DATA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT

185 Bantree Street, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 374042.118 **NORTHING:** 5029636.097 **ELEVATION:** 70.52

PROJECT: Proposed Hydrovac Slurry Processing Facility-copy

FILE NO. PE6234

BORINGS BY: Excavator

REMARKS:

DATE: September 6, 2023

HOLE NO. TP 2-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	ANALYTICAL TESTS	DEPTH (m)	PID (ppm)				Gas Tech (ppm)				Monitoring Well Construction		
		No.	Type					0	16.67	33.33	50	0	50	100	150		200	
Ground Surface	EL 70.52 m						0											
FILL: Brown silty sand with gravel and crushed stone		G1	[#]				0.4											No Data
0.81 m EL 69.71 m		G2	[#]				10.8											
FILL: Brown silty sand with gravel and organics																		
1.6 m EL 68.92 m		G3	[#]				20.4											
FILL: Brown silty clay with sand, some gravel																		
1.76 m EL 68.76 m		G4	[#]				8.2											
GLACIAL TILL: Brown silty sand with gravel, some clay and shale fragments, occasional cobbles																		
2.81 m EL 67.71 m		G5	[#]				7.5											
End of Test Pit																		
Test pit terminated on bedrock surface at 2.81m depth.																		
(TP dry upon completion)																		

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SOIL PROFILE AND TEST DATA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT

185 Bantree Street, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 374136.292 **NORTHING:** 5029613.479 **ELEVATION:** 69.53

PROJECT: Proposed Hydrovac Slurry Processing Facility-copy

FILE NO. PE6234

BORINGS BY: Excavator

REMARKS:

DATE: September 6, 2023

HOLE NO. TP 3-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	ANALYTICAL TESTS	DEPTH (m)	PID (ppm)				Gas Tech (ppm)				Monitoring Well Construction		
		No.	Type					0	16.67	33.33	50	0	50	100	150		200	
Ground Surface							0											
FILL: Brown silty sand with gravel and crushed stone		G1	[#]				0											No Data
		G2	[#]				1											
GLACIAL TILL: Compact, brown silty sand with gravel and clay, some shale fragments		G3	[#]															
		G4	[#]				2											
		G5	[#]															
End of Test Pit							3											
Test pit terminated on bedrock surface at 2.42m depth.																		
(TP dry upon completion)																		
							4											

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SOIL PROFILE AND TEST DATA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT

185 Bantree Street, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 373995.008 **NORTHING:** 5029692.514 **ELEVATION:** 70.8

PROJECT: Proposed Hydrovac Slurry Processing Facility-copy

FILE NO. PE6234

BORINGS BY: Excavator

REMARKS:

DATE: September 6, 2023

HOLE NO. TP 4-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	ANALYTICAL TESTS	DEPTH (m)	PID (ppm)				Gas Tech (ppm)				Monitoring Well Construction		
		No.	Type					0	16.67	33.33	50.0	0	50	100	150		200	
Ground Surface	EL 70.8 m						0											
FILL: Brown silty sand with crushed stone		G1	[#]				0											No Data
	0.82 m EL 69.98 m	G2	[#]				0.82											No Data
GLACIAL TILL: Compact, brown silty sand with clay and gravel, some shale, occasional cobbles		G3	[#]				1.0											No Data
		G4	[#]				1.5											No Data
		G5	[#]				2.1											No Data
End of Test Pit	2.1 m EL 68.7 m						2.1											No Data
Test pit terminated on bedrock surface at 2.10m depth. (TP dry upon completion)							2.10											No Data

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SOIL PROFILE AND TEST DATA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT

185 Bantree Street, Ottawa, Ontario

DATUM: Geodetic **EASTING:** 373988.473 **NORTHING:** 5029730.994 **ELEVATION:** 70.62

PROJECT: Proposed Hydrovac Slurry Processing Facility-copy

FILE NO. PE6234

BORINGS BY: Excavator

REMARKS:

DATE: September 6, 2023

HOLE NO. TP 7-23

SAMPLE DESCRIPTION	STRATA PLOT	SAMPLE		SAMPLE % RECOVERY	N VALUE or RQD	ANALYTICAL TESTS	DEPTH (m)	PID (ppm)				Gas Tech (ppm)				Monitoring Well Construction	
		No.	Type					0	16.67	33.33	50.0	0	50	100	150		200
Ground Surface							0										
	EL 70.62 m																
FILL: Brown silty sand gravel and crushed stone		G1	[#]				0.24										No Data
		G2	[#]				10.4										
	0.85 m EL 69.77 m	G3	[#]				14.2										
GLACIAL TILL: Compact, brown silty sand with gravel, some clay and shale fragments, occasional cobbles		G4	[#]				11.8										
		G5	[#]				10.7										
	2.1 m EL 68.52 m																
End of Test Pit																	
Test pit terminated on bedrock surface at 2.10m depth.																	
(TP dry upon completion)																	

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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)
D _{xx}	-	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
D ₁₀	-	Grain size at which 10% of the soil is finer (effective grain size)
D ₆₀	-	Grain size at which 60% of the soil is finer
C _c	-	Concavity coefficient = $(D_{30})^2 / (D_{10} \times D_{60})$
C _u	-	Uniformity coefficient = D_{60} / D_{10}

C_c and C_u are used to assess the grading of sands and gravels:

Well-graded gravels have: $1 < C_c < 3$ and $C_u > 4$

Well-graded sands have: $1 < C_c < 3$ and $C_u > 6$

Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.

C_c and C_u 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
C _{cr}	-	Recompression index (in effect at pressures below p' _c)
C _c	-	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
W _o	-	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)

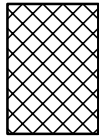
STRATA PLOT



Topsoil



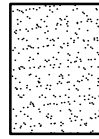
Asphalt



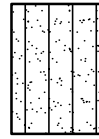
Fill



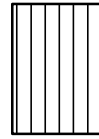
Peat



Sand



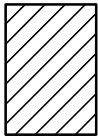
Silty Sand



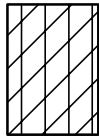
Silt



Sandy Silt



Clay



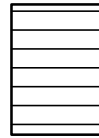
Silty Clay



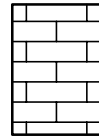
Clayey Silty Sand



Glacial Till



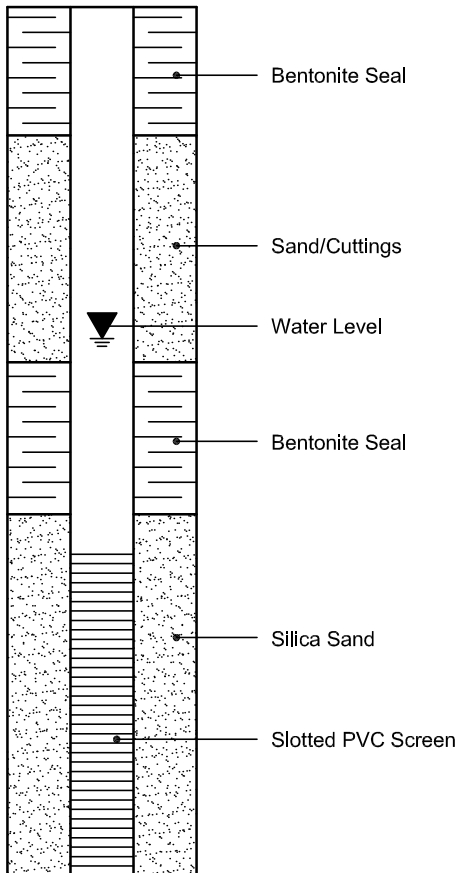
Shale



Bedrock

MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION

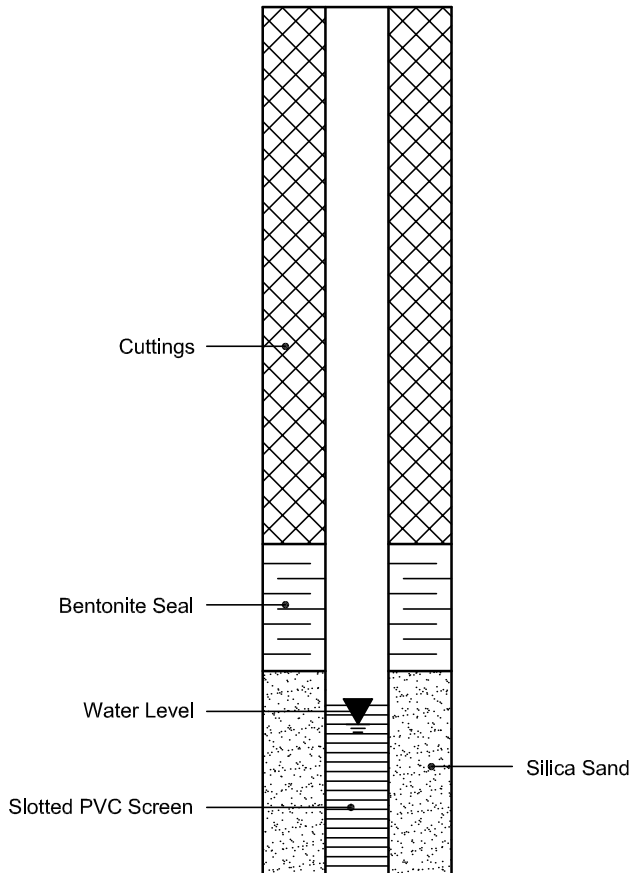


Table 1A: Soil Analytical Test Results: Metals and Inorganics

Parameter	Units	MDL	Regulation	Sample											
				BH1-23-SS2	TP1-23-G1	TP1-23-G3	TP2-23-G3	TP4-23-G1	TP6-23-G2	TP7-23-G2	DUP1-23	BH1-SS2	BH2-SS2	BH3-SS3	BH4-SS2
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 7 Industrial, coarse	09/01/2023	09/06/2023	09/06/2023	09/06/2023	09/06/2023	09/06/2023	09/06/2023	09/06/2023	02/09/2023	02/09/2023	02/10/2023	02/10/2023
Sample Depth	m			0.76-1.37	0.4-0.5	1.5-1.6	1.6-1.7	0.4-0.5	0.9-1.0	0.7-0.8	1.5-1.6	0.76-1.37	0.76-1.37	1.52-2.13	0.76-1.37
General Inorganics															
SAR	N/A	0.01	12 N/A	3.98	8.80	8.07	N/A	N/A	5.85	N/A	N/A	N/A	N/A	N/A	N/A
Conductivity	uS/cm	5	1.4 mS/cm (1400 uS/cm)	738	1490	1350	N/A	N/A	2220	N/A	N/A	N/A	N/A	N/A	N/A
pH	pH Units	0.05		N/A	N/A	7.57	N/A	N/A	N/A	7.42	N/A	7.86	11.37	7.94	8.14
Metals															
Antimony	ug/g dry	1.0	40 ug/g dry	N/A	N/A	ND (1.0)	ND (1.0)	7.7	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Arsenic	ug/g dry	1.0	18 ug/g dry	N/A	N/A	4.9	6.1	17.3	8.1	5.2	5.0	5.6	6.0	4.4	3.8
Barium	ug/g dry	1.0	670 ug/g dry	N/A	N/A	81.7	67.2	98.4	72.6	150	85.8	93.5	74.7	79.5	56.2
Beryllium	ug/g dry	0.5	8 ug/g dry	N/A	N/A	0.7	0.8	ND (0.5)	0.6	0.7	0.7	0.6	0.6	0.6	ND (0.5)
Boron	ug/g dry	5.0	120 ug/g dry	N/A	N/A	7.0	7.5	7.1	12.4	15.6	9.9	9.1	8.2	8.4	ND (5.0)
Cadmium	ug/g dry	0.5	1.9 ug/g dry	N/A	N/A	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chromium (VI)	ug/g dry	0.2	8 ug/g dry	N/A	N/A	ND (0.2)	0.2	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Chromium	ug/g dry	5.0	160 ug/g dry	N/A	N/A	25.3	23.6	26.1	23.7	27.2	27.8	20.9	19.5	24.0	15.5
Cobalt	ug/g dry	1.0	80 ug/g dry	N/A	N/A	11.5	12.4	8.5	8.0	11.5	12.2	12.4	8.8	11.1	5.2
Copper	ug/g dry	5.0	230 ug/g dry	N/A	N/A	30.0	32.4	143	17.5	43.1	29.8	28.4	22.2	50.4	20.6
Lead	ug/g dry	1.0	120 ug/g dry	N/A	N/A	13.2	9.9	156	15.3	43.9	14.3	9.6	7.8	4.2	13.2
Mercury	ug/g dry	0.1	3.9 ug/g dry	N/A	N/A	ND (0.1)	ND (0.1)	0.1	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Molybdenum	ug/g dry	1.0	40 ug/g dry	N/A	N/A	1.3	1.6	3.2	1.8	2.0	2.4	1.5	1.1	ND (1.0)	ND (1.0)
Nickel	ug/g dry	5.0	270 ug/g dry	N/A	N/A	34.9	33.8	32.5	19.8	26.1	34.9	30.6	23.3	24.3	12.1
Selenium	ug/g dry	1.0	5.5 ug/g dry	N/A	N/A	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Silver	ug/g dry	0.3	40 ug/g dry	N/A	N/A	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)
Thallium	ug/g dry	1.0	3.3 ug/g dry	N/A	N/A	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Uranium	ug/g dry	1.0	33 ug/g dry	N/A	N/A	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vanadium	ug/g dry	10.0	86 ug/g dry	N/A	N/A	34.0	31.5	26.8	29.6	32.0	40.1	28.3	22.9	27.3	19.3
Zinc	ug/g dry	20.0	340 ug/g dry	N/A	N/A	58.3	54.2	68.1	48.6	116	60.3	49.7	43.8	44.6	28.0



Table 1B: Soil Analytical Test Results: PAHs

PE6234

Phase II ESA

1850 Bantree Street

Parameter	Units	MDL	Regulation	Sample							
				TP1-23-G3	TP2-23-G3	TP4-23-G1	TP6-23-G2	BH1-SS2	BH2-SS2	BH3-SS3	BH4-SS2
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 7 Industrial, coarse	09/06/2023	09/06/2023	09/06/2023	09/06/2023	02/09/2023	02/09/2023	02/10/2023	02/10/2023
Sample Depth	m			1.5-1.6	1.6-1.7	0.4-0.5	0.9-1.0	0.76-1.37	0.76-1.37	1.52-2.13	0.76-1.37
Semi-Volatiles											
Acenaphthene	ug/g dry	1.0	96 ug/g dry	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Acenaphthylene	ug/g dry	1.0	0.15 ug/g dry	ND (0.02)	ND (0.02)	0.23	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.03
Anthracene	ug/g dry	1.0	0.67 ug/g dry	ND (0.02)	ND (0.02)	0.35	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.04
Benzo[a]anthracene	ug/g dry	0.5	0.96 ug/g dry	ND (0.02)	ND (0.02)	0.23	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.10
Benzo[a]pyrene	ug/g dry	5.0	0.3 ug/g dry	ND (0.02)	ND (0.02)	0.34	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.12
Benzo[b]fluoranthene	ug/g dry	0.5	0.96 ug/g dry	ND (0.02)	ND (0.02)	0.79	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.22
Benzo[g,h,i]perylene	ug/g dry	0.2	9.6 ug/g dry	ND (0.02)	ND (0.02)	1.17	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.09
Benzo[k]fluoranthene	ug/g dry	5.0	0.96 ug/g dry	ND (0.02)	ND (0.02)	0.30	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.10
Chrysene	ug/g dry	1.0	9.6 ug/g dry	ND (0.02)	ND (0.02)	0.33	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.13
Dibenzo[a,h]anthracene	ug/g dry	5.0	0.1 ug/g dry	ND (0.02)	ND (0.02)	0.12	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.02
Fluoranthene	ug/g dry	1.0	9.6 ug/g dry	ND (0.02)	ND (0.02)	0.4	0.03	ND (0.02)	ND (0.02)	ND (0.02)	0.15
Fluorene	ug/g dry	0.1	62 ug/g dry	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)
Indeno [1,2,3-cd] pyrene	ug/g dry	1.0	0.76 ug/g dry	ND (0.02)	ND (0.02)	0.58	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.08
1-Methylnaphthalene	ug/g dry	5.0	76 ug/g dry	ND (0.02)	ND (0.02)	0.19	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.08
2-Methylnaphthalene	ug/g dry	1.0	76 ug/g dry	ND (0.02)	ND (0.02)	0.25	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.11
Methylnaphthalene (1&2)	ug/g dry	0.3	76 ug/g dry	ND (0.04)	ND (0.04)	0.44	ND (0.04)	ND (0.04)	ND (0.04)	ND (0.04)	0.20
Naphthalene	ug/g dry	1.0	9.6 ug/g dry	ND (0.01)	ND (0.01)	0.13	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	0.08
Phenanthrene	ug/g dry	1.0	12 ug/g dry	ND (0.02)	ND (0.02)	0.27	ND (0.02)	ND (0.02)	ND (0.02)	ND (0.02)	0.07
Pyrene	ug/g dry	10.0	96 ug/g dry	ND (0.02)	ND (0.02)	0.34	0.02	ND (0.02)	ND (0.02)	ND (0.02)	0.16



Table 1C: Soil Analytical Test Results: PHCs

PE6234
Phase II ESA
1850 Bantree Street

Parameter	Units	MDL	Regulation	Sample								
				TP1-23-G3	TP2-23-G3	TP4-23-G1	TP6-23-G2	TP7-23-G2	BH1-SS2	BH2-SS2	BH3-SS3	BH4-SS2
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 7 Industrial, coarse	09/06/2023	09/06/2023	09/06/2023	09/06/2023	09/06/2023	02/09/2023	02/09/2023	02/10/2023	02/10/2023
Sample Depth	m			1.5-1.6	1.6-1.7	0.4-0.5	0.9-1.0	0.7-0.8	0.76-1.37	0.76-1.37	1.52-2.13	0.76-1.37
Hydrocarbons												
F1 PHCs (C6-C10)	ug/g dry	7	55 ug/g dry	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	230 ug/g dry	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	1700 ug/g dry	16	ND (8)	294	102	139	ND (8)	44	32	37
F4 PHCs (C34-C50)	ug/g dry	6	3300 ug/g dry	40	ND (6)	328	166	130	ND (6)	49	55	60
F4G PHCs (gravimetric)	ug/g dry	50	3300 ug/g dry	N/A	N/A	608	488	251	N/A	N/A	N/A	N/A



Table 1D: Soil Analytical Test Results: BTEX

PE6234
Phase II ESA
1850 Bantree Street

Parameter	Units	MDL	Regulation	Sample			
				TP1-23-G3	TP2-23-G3	TP4-23-G1	TP7-23-G2
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 7 Industrial, coarse	09/06/2023	09/06/2023	09/06/2023	09/06/2023
Sample Depth	m			1.5-1.6	1.6-1.7	0.4-0.5	0.7-0.8
BTEX							
Benzene	ug/g dry	0.02	0.32 ug/g dry	ND (0.02)	ND (0.02)	0.12	ND (0.02)
Ethylbenzene	ug/g dry	0.05	9.5 ug/g dry	ND (0.05)	ND (0.05)	0.08	ND (0.05)
Toluene	ug/g dry	0.05	68 ug/g dry	ND (0.05)	ND (0.05)	0.39	ND (0.05)
m/p-Xylene	ug/g dry	0.05		ND (0.05)	ND (0.05)	0.24	ND (0.05)
o-Xylene	ug/g dry	0.05		ND (0.05)	ND (0.05)	0.18	ND (0.05)
Xylenes, total	ug/g dry	0.05	26 ug/g dry	ND (0.05)	ND (0.05)	0.42	ND (0.05)



Table 2A: Groundwater Analytical Test Results: Metals and Inorganics

PE6234

Phase II ESA
1850 Bantree Street

Parameter	Units	MDL	Regulation	Sample				
				BH3-23-GW1	BH1-GW1	BH2-GW1	BH3-GW1	BH4-GW1
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 7 Non-Potable Groundwater, coarse	09/13/2023	09/13/2023	09/13/2023	02/21/2023	02/14/2023
Sample Depth	m			3.4-6.4	2.10-3.66	2.43-5.43	2.50-5.50	3.15-6.15
Anions								
Chloride	mg/L	1	1800000 ug/L (1800 mg/L)	N/A	6170	428	1320	2200
Metals								
Mercury	ug/L	0.1	0.1 ug/L	N/A	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Antimony	ug/L	0.5	16000 ug/L	2.3	1.9	5.3	2.4	0.7
Arsenic	ug/L	1	1500 ug/L	1	2	6	4	2
Barium	ug/L	1	23000 ug/L	212	946	173	229	318
Beryllium	ug/L	0.5	53 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Boron	ug/L	10	36000 ug/L	233	58	46	195	108
Cadmium	ug/L	0.1	2.1 ug/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Chromium	ug/L	1	640 ug/L	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
Chromium (VI)	ug/L	10	110 ug/L	N/A	ND (10)	ND (10)	ND (10)	ND (10)
Cobalt	ug/L	0.5	52 ug/L	2.2	1.3	ND (0.5)	0.7	ND (0.5)
Copper	ug/L	0.5	69 ug/L	3.5	1.2	1.3	1.8	ND (0.5)
Lead	ug/L	0.1	20 ug/L	0.5	0.2	0.2	0.2	ND (0.1)
Molybdenum	ug/L	0.5	7300 ug/L	4.6	13.8	99.4	17.7	5.0
Nickel	ug/L	1	390 ug/L	5	3	2	5	ND (1)
Selenium	ug/L	1	50 ug/L	ND (1)	ND (1)	ND (1)	ND (1)	ND (1)
Silver	ug/L	0.1	1.2 ug/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)
Sodium	ug/L	200	1800000 ug/L	382000	2420000	324000	612000	680000
Thallium	ug/L	0.1	400 ug/L	0.2	0.3	ND (0.1)	ND (0.1)	ND (0.1)
Uranium	ug/L	0.1	330 ug/L	5.2	4.8	1.3	4.0	1.1
Vanadium	ug/L	0.5	200 ug/L	0.9	ND (0.5)	3.1	0.6	0.5
Zinc	ug/L	5	890 ug/L	ND (5)	ND (5)	ND (5)	ND (5)	12



Table 2A: Groundwater Analytical Test Results: PAHs

PE6234

Phase II ESA

1850 Bantree Street

Parameter	Units	MDL	Regulation	Sample			
				BH1-GW1	BH2-GW1	BH4-GW1	BH3-GW1
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 7 Non-Potable Groundwater, coarse	02/14/2023	02/14/2023	02/14/2023	02/21/2023
Sample Depth	m			2.10-3.66	2.43-5.43	3.15-6.15	2.50-5.50
Semi-Volatiles							
Acenaphthene	ug/L	0.05	17 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Acenaphthylene	ug/L	0.05	1 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Anthracene	ug/L	0.01	1 ug/L	0.03	ND (0.01)	ND (0.01)	ND (0.01)
Benzo[a]anthracene	ug/L	0.01	1.8 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Benzo[a]pyrene	ug/L	0.01	0.81 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)
Benzo[b]fluoranthene	ug/L	0.05	0.75 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Benzo[g,h,i]perylene	ug/L	0.05	0.2 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Benzo[k]fluoranthene	ug/L	0.05	0.4 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Chrysene	ug/L	0.05	0.7 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Dibenzo[a,h]anthracene	ug/L	0.05	0.4 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Fluoranthene	ug/L	0.01	44 ug/L	0.07	ND (0.01)	ND (0.01)	ND (0.01)
Fluorene	ug/L	0.05	290 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Indeno [1,2,3-cd] pyrene	ug/L	0.05	0.2 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1-Methylnaphthalene	ug/L	0.05	1500 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
2-Methylnaphthalene	ug/L	0.05	1500 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Methylnaphthalene (1&2)	ug/L	0.10	1500 ug/L	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)
Naphthalene	ug/L	0.05	7 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Phenanthrene	ug/L	0.05	380 ug/L	0.13	ND (0.05)	ND (0.05)	ND (0.05)
Pyrene	ug/L	0.01	5.7 ug/L	0.05	ND (0.01)	ND (0.01)	ND (0.01)

Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 56822
Project: PE5579
Custody:

Report Date: 22-Feb-2023
Order Date: 15-Feb-2023

Order #: 2307291

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

Parcel ID	Client ID
2307291-01	BH1-23-GW1
2307291-02	BH2-23-GW1
2307291-03	BH3-23-GW1
2307291-04	BH4-23-GW1
2307291-05	DUP1-GW1

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	16-Feb-23	16-Feb-23
Chromium, hexavalent - water	MOE E3056 - colourimetric	22-Feb-23	22-Feb-23
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	17-Feb-23	17-Feb-23
Metals, ICP-MS	EPA 200.8 - ICP-MS	17-Feb-23	17-Feb-23
PHC F1	CWS Tier 1 - P&T GC-FID	16-Feb-23	16-Feb-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	17-Feb-23	17-Feb-23
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	17-Feb-23	17-Feb-23
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	16-Feb-23	16-Feb-23

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

Client ID:	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	BH4-23-GW1
Sample Date:	14-Feb-23 13:00	14-Feb-23 12:20	14-Feb-23 11:40	14-Feb-23 11:00
Sample ID:	2307291-01	2307291-02	2307291-03	2307291-04
MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water

Anions

Anion	MDL/Units	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	BH4-23-GW1
Chloride	1 mg/L	6170	428	-	2200

Metals

Element	MDL/Units	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	BH4-23-GW1
Mercury	0.1 ug/L	<0.1	<0.1	-	<0.1
Antimony	0.5 ug/L	1.9	5.3	-	0.7
Arsenic	1 ug/L	2	6	-	2
Barium	1 ug/L	946	173	-	318
Beryllium	0.5 ug/L	<0.5	<0.5	-	<0.5
Boron	10 ug/L	58	46	-	108
Cadmium	0.1 ug/L	<0.1	<0.1	-	<0.1
Chromium	1 ug/L	<1	<1	-	<1
Chromium (VI)	10 ug/L	<10	<10	-	<10
Cobalt	0.5 ug/L	1.3	<0.5	-	<0.5
Copper	0.5 ug/L	1.2	1.3	-	<0.5
Lead	0.1 ug/L	0.2	0.2	-	<0.1
Molybdenum	0.5 ug/L	13.8	99.4	-	5.0
Nickel	1 ug/L	3	2	-	<1
Selenium	1 ug/L	<1	<1	-	<1
Silver	0.1 ug/L	<0.1	<0.1	-	<0.1
Sodium	200 ug/L	2420000	324000	-	680000
Thallium	0.1 ug/L	0.3	<0.1	-	<0.1
Uranium	0.1 ug/L	4.8	1.3	-	1.1
Vanadium	0.5 ug/L	<0.5	3.1	-	0.5
Zinc	5 ug/L	<5	<5	-	12

Volatiles

Compound	MDL/Units	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	BH4-23-GW1
Acetone	5.0 ug/L	168	54.5	215	<5.0
Benzene	0.5 ug/L	2.5	<0.5	1.9	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	2.2	<0.5	0.7
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

	Client ID:	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	BH4-23-GW1
	Sample Date:	14-Feb-23 13:00	14-Feb-23 12:20	14-Feb-23 11:40	14-Feb-23 11:00
	Sample ID:	2307291-01	2307291-02	2307291-03	2307291-04
	MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	20.8	5.7	14.7	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	3.6	<0.5	<0.5
Toluene	0.5 ug/L	2.3	<0.5	2.1	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	101%	104%	105%	104%
Dibromofluoromethane	Surrogate	108%	108%	113%	110%
Toluene-d8	Surrogate	106%	106%	105%	105%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

	Client ID:	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	BH4-23-GW1
	Sample Date:	14-Feb-23 13:00	14-Feb-23 12:20	14-Feb-23 11:40	14-Feb-23 11:00
	Sample ID:	2307291-01	2307291-02	2307291-03	2307291-04
	MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100

Semi-Volatiles

Acenaphthene	0.05 ug/L	<0.05	<0.05	-	<0.05
Acenaphthylene	0.05 ug/L	<0.05	<0.05	-	<0.05
Anthracene	0.01 ug/L	0.03	<0.01	-	<0.01
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01	-	<0.01
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01	-	<0.01
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05	-	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	-	<0.05
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	-	<0.05
Chrysene	0.05 ug/L	<0.05	<0.05	-	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	-	<0.05
Fluoranthene	0.01 ug/L	0.07	<0.01	-	<0.01
Fluorene	0.05 ug/L	<0.05	<0.05	-	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	-	<0.05
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	<0.05
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	-	<0.10
Naphthalene	0.05 ug/L	<0.05	<0.05	-	<0.05
Phenanthrene	0.05 ug/L	0.13	<0.05	-	<0.05
Pyrene	0.01 ug/L	0.05	<0.01	-	<0.01
2-Fluorobiphenyl	Surrogate	103%	94.0%	-	85.8%
Terphenyl-d14	Surrogate	135%	120%	-	123%

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

Client ID:	DUP1-GW1	-	-	-
Sample Date:	14-Feb-23 00:00	-	-	-
Sample ID:	2307291-05	-	-	-
MDL/Units	Ground Water	-	-	-

Anions

Chloride	1 mg/L	6110	-	-	-
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Metals

Mercury	0.1 ug/L	<0.1	-	-	-
Antimony	0.5 ug/L	1.4	-	-	-
Arsenic	1 ug/L	2	-	-	-
Barium	1 ug/L	750	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-
Boron	10 ug/L	51	-	-	-
Cadmium	0.1 ug/L	<0.1	-	-	-
Chromium	1 ug/L	<1	-	-	-
Chromium (VI)	10 ug/L	<10	-	-	-
Cobalt	0.5 ug/L	1.1	-	-	-
Copper	0.5 ug/L	1.0	-	-	-
Lead	0.1 ug/L	<0.1	-	-	-
Molybdenum	0.5 ug/L	12.4	-	-	-
Nickel	1 ug/L	3	-	-	-
Selenium	1 ug/L	<1	-	-	-
Silver	0.1 ug/L	<0.1	-	-	-
Sodium	200 ug/L	2490000	-	-	-
Thallium	0.1 ug/L	0.3	-	-	-
Uranium	0.1 ug/L	4.2	-	-	-
Vanadium	0.5 ug/L	<0.5	-	-	-
Zinc	5 ug/L	<5	-	-	-

Volatiles

Acetone	5.0 ug/L	122	-	-	-
Benzene	0.5 ug/L	2.1	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

	MDL/Units	Client ID: Sample Date: Sample ID: Ground Water	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	DUP1-GW1 14-Feb-23 00:00 2307291-05	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Ethylene dibromide (dibromoethane, 1	0.2 ug/L	<0.2	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	12.6	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	2.1	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	102%	-	-	-
Dibromofluoromethane	Surrogate	90.2%	-	-	-
Toluene-d8	Surrogate	106%	-	-	-

Hydrocarbons

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

	Client ID:	DUP1-GW1	-	-	-
	Sample Date:	14-Feb-23 00:00	-	-	-
	Sample ID:	2307291-05	-	-	-
	MDL/Units	Ground Water	-	-	-
F1 PHCs (C6-C10)	25 ug/L	<25	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-

Semi-Volatiles

Acenaphthene	0.05 ug/L	<0.05	-	-	-
Acenaphthylene	0.05 ug/L	<0.05	-	-	-
Anthracene	0.01 ug/L	<0.01	-	-	-
Benzo [a] anthracene	0.01 ug/L	<0.01	-	-	-
Benzo [a] pyrene	0.01 ug/L	<0.01	-	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05	-	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	-	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05	-	-	-
Chrysene	0.05 ug/L	<0.05	-	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	-	-	-
Fluoranthene	0.01 ug/L	0.02	-	-	-
Fluorene	0.05 ug/L	<0.05	-	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	-	-	-
1-Methylnaphthalene	0.05 ug/L	<0.05	-	-	-
2-Methylnaphthalene	0.05 ug/L	<0.05	-	-	-
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	-	-	-
Naphthalene	0.05 ug/L	<0.05	-	-	-
Phenanthrene	0.05 ug/L	<0.05	-	-	-
Pyrene	0.01 ug/L	0.02	-	-	-
2-Fluorobiphenyl	Surrogate	92.3%	-	-	-
Terphenyl-d14	Surrogate	125%	-	-	-

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Metals									
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	16.8		ug/L		84.1	50-140			
Surrogate: Terphenyl-d14	23.4		ug/L		117	50-140			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
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	80.1		ug/L		100	50-140			
Surrogate: Dibromofluoromethane	66.4		ug/L		83.0	50-140			
Surrogate: Toluene-d8	87.9		ug/L		110	50-140			

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	26.1	1	mg/L	26.0			0.4	20	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Metals									
Mercury	0.35	0.1	ug/L	0.36			2.5	20	
Antimony	ND	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	21.3	1	ug/L	20.8			2.1	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	18	10	ug/L	16			12.4	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium (VI)	ND	10	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	0.94	0.5	ug/L	0.96			2.2	20	
Lead	ND	0.1	ug/L	ND			NC	20	
Molybdenum	1.04	0.5	ug/L	1.03			0.3	20	
Nickel	ND	1	ug/L	ND			NC	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	18200	200	ug/L	19800			8.5	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	ND	0.1	ug/L	ND			NC	20	
Vanadium	ND	0.5	ug/L	ND			NC	20	
Zinc	7	5	ug/L	8			4.0	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	5.10	0.5	ug/L	4.16			20.3	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	4.48	0.5	ug/L	3.95			12.6	30	
Dibromochloromethane	3.06	0.5	ug/L	2.48			20.9	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2)	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	
<i>Surrogate: 4-Bromofluorobenzene</i>	<i>83.0</i>		<i>ug/L</i>		<i>104</i>	<i>50-140</i>			
<i>Surrogate: Dibromofluoromethane</i>	<i>91.3</i>		<i>ug/L</i>		<i>114</i>	<i>50-140</i>			
<i>Surrogate: Toluene-d8</i>	<i>84.5</i>		<i>ug/L</i>		<i>106</i>	<i>50-140</i>			

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	35.3	1	mg/L	26.0	92.7	70-124			
Hydrocarbons									
F1 PHCs (C6-C10)	1820	25	ug/L	ND	91.0	68-117			
F2 PHCs (C10-C16)	1470	100	ug/L	ND	91.9	60-140			
F3 PHCs (C16-C34)	3710	100	ug/L	ND	94.7	60-140			
F4 PHCs (C34-C50)	2520	100	ug/L	ND	102	60-140			
Metals									
Mercury	1.58	0.1	ug/L	0.36	81.1	70-130			
Arsenic	50.1	1	ug/L	ND	99.7	80-120			
Barium	62.4	1	ug/L	20.8	83.2	80-120			
Beryllium	47.7	0.5	ug/L	ND	95.3	80-120			
Boron	61	10	ug/L	16	89.6	80-120			
Cadmium	44.0	0.1	ug/L	ND	88.0	80-120			
Chromium (VI)	174	10	ug/L	ND	87.0	70-130			
Chromium	51.1	1	ug/L	ND	102	80-120			
Cobalt	48.1	0.5	ug/L	ND	96.2	80-120			
Copper	47.4	0.5	ug/L	0.96	92.8	80-120			
Lead	42.4	0.1	ug/L	ND	84.8	80-120			
Molybdenum	47.2	0.5	ug/L	1.03	92.4	80-120			
Nickel	48.0	1	ug/L	ND	94.9	80-120			
Selenium	45.7	1	ug/L	ND	91.0	80-120			
Silver	42.8	0.1	ug/L	ND	85.6	80-120			
Sodium	26400	200	ug/L	19800	66.5	80-120			QM-07
Thallium	43.0	0.1	ug/L	ND	86.1	80-120			
Uranium	44.5	0.1	ug/L	ND	89.0	80-120			
Vanadium	51.0	0.5	ug/L	ND	102	80-120			
Zinc	51	5	ug/L	8	87.0	80-120			
Semi-Volatiles									
Acenaphthene	4.56	0.05	ug/L	ND	91.2	50-140			
Acenaphthylene	4.08	0.05	ug/L	ND	81.5	50-140			
Anthracene	4.36	0.01	ug/L	ND	87.1	50-140			
Benzo [a] anthracene	4.36	0.01	ug/L	ND	87.2	50-140			
Benzo [a] pyrene	4.62	0.01	ug/L	ND	92.4	50-140			
Benzo [b] fluoranthene	5.94	0.05	ug/L	ND	119	50-140			
Benzo [g,h,i] perylene	4.41	0.05	ug/L	ND	88.1	50-140			
Benzo [k] fluoranthene	5.97	0.05	ug/L	ND	119	50-140			
Chrysene	4.82	0.05	ug/L	ND	96.3	50-140			
Dibenzo [a,h] anthracene	4.63	0.05	ug/L	ND	92.6	50-140			
Fluoranthene	3.97	0.01	ug/L	ND	79.4	50-140			
Fluorene	4.32	0.05	ug/L	ND	86.5	50-140			
Indeno [1,2,3-cd] pyrene	4.78	0.05	ug/L	ND	95.7	50-140			
1-Methylnaphthalene	4.39	0.05	ug/L	ND	87.8	50-140			
2-Methylnaphthalene	4.70	0.05	ug/L	ND	94.0	50-140			
Naphthalene	4.60	0.05	ug/L	ND	92.1	50-140			
Phenanthrene	4.27	0.05	ug/L	ND	85.5	50-140			
Pyrene	4.11	0.01	ug/L	ND	82.1	50-140			
Surrogate: 2-Fluorobiphenyl	17.3		ug/L		86.6	50-140			
Surrogate: Terphenyl-d14	24.1		ug/L		121	50-140			

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	110	5.0	ug/L	ND	110	50-140			
Benzene	41.2	0.5	ug/L	ND	103	60-130			
Bromodichloromethane	36.4	0.5	ug/L	ND	90.9	60-130			
Bromoform	41.6	0.5	ug/L	ND	104	60-130			
Bromomethane	39.6	0.5	ug/L	ND	98.9	50-140			
Carbon Tetrachloride	33.6	0.2	ug/L	ND	84.0	60-130			
Chlorobenzene	40.5	0.5	ug/L	ND	101	60-130			
Chloroform	37.6	0.5	ug/L	ND	94.0	60-130			
Dibromochloromethane	36.3	0.5	ug/L	ND	90.7	60-130			
Dichlorodifluoromethane	42.4	1.0	ug/L	ND	106	50-140			
1,2-Dichlorobenzene	38.5	0.5	ug/L	ND	96.2	60-130			
1,3-Dichlorobenzene	36.2	0.5	ug/L	ND	90.6	60-130			
1,4-Dichlorobenzene	35.7	0.5	ug/L	ND	89.2	60-130			
1,1-Dichloroethane	34.4	0.5	ug/L	ND	86.0	60-130			
1,2-Dichloroethane	40.8	0.5	ug/L	ND	102	60-130			
1,1-Dichloroethylene	45.4	0.5	ug/L	ND	114	60-130			
cis-1,2-Dichloroethylene	36.1	0.5	ug/L	ND	90.2	60-130			
trans-1,2-Dichloroethylene	33.6	0.5	ug/L	ND	84.0	60-130			
1,2-Dichloropropane	40.0	0.5	ug/L	ND	100	60-130			
cis-1,3-Dichloropropylene	32.0	0.5	ug/L	ND	80.1	60-130			
trans-1,3-Dichloropropylene	29.0	0.5	ug/L	ND	72.6	60-130			
Ethylbenzene	42.2	0.5	ug/L	ND	106	60-130			
Ethylene dibromide (dibromoethane, 1,2-	33.4	0.2	ug/L	ND	83.6	60-130			
Hexane	40.3	1.0	ug/L	ND	101	60-130			
Methyl Ethyl Ketone (2-Butanone)	104	5.0	ug/L	ND	104	50-140			
Methyl Isobutyl Ketone	101	5.0	ug/L	ND	101	50-140			
Methyl tert-butyl ether	72.8	2.0	ug/L	ND	72.8	50-140			
Methylene Chloride	45.6	5.0	ug/L	ND	114	60-130			
Styrene	33.2	0.5	ug/L	ND	83.1	60-130			
1,1,1,2-Tetrachloroethane	34.3	0.5	ug/L	ND	85.7	60-130			
1,1,2,2-Tetrachloroethane	33.8	0.5	ug/L	ND	84.4	60-130			
Tetrachloroethylene	38.1	0.5	ug/L	ND	95.2	60-130			
Toluene	42.0	0.5	ug/L	ND	105	60-130			
1,1,1-Trichloroethane	37.8	0.5	ug/L	ND	94.4	60-130			
1,1,2-Trichloroethane	36.3	0.5	ug/L	ND	90.8	60-130			
Trichloroethylene	35.5	0.5	ug/L	ND	88.8	60-130			
Trichlorofluoromethane	47.0	1.0	ug/L	ND	117	60-130			
Vinyl chloride	32.9	0.5	ug/L	ND	82.2	50-140			
m,p-Xylenes	79.7	0.5	ug/L	ND	99.6	60-130			
o-Xylene	41.1	0.5	ug/L	ND	103	60-130			
Surrogate: 4-Bromofluorobenzene	79.9		ug/L		99.9	50-140			
Surrogate: Dibromofluoromethane	80.6		ug/L		101	50-140			
Surrogate: Toluene-d8	84.7		ug/L		106	50-140			

Certificate of Analysis

Report Date: 22-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 15-Feb-2023

Client PO: 56822

Project Description: PE5579

Qualifier Notes:

Login Qualifiers :

Sample - Not preserved - Metals 250ml

Applies to samples: BH1-23-GW1, BH2-23-GW1, BH4-23-GW1, DUP1-GW1

Sample preserved upon receipt at the lab.

Metals 250ml

Applies to samples: BH1-23-GW1, BH2-23-GW1, BH4-23-GW1, DUP1-GW1

QC Qualifiers :

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

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

CCME PHC additional information:

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



Parcel ID: 2307291



Parcel Order Number (Lab Use Only) 2307291	Chain Of Custody (Lab Use Only)
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Client Name: PATERSON GROUP	Project Ref: PE5579	Page 1 of 1
Contact Name: Mark D'Auray; Joshua Dempsey	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular
Address: 9 Auriza Drive	PO #: 56822	
Telephone: 617-226-7381	E-mail: mdauray@patersongroup.ca jdempsey@patersongroup.ca	

<input checked="" type="checkbox"/> REG 153/04 <input type="checkbox"/> REG 406/19 Other Regulation <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/Fine <input type="checkbox"/> REG 558 <input type="checkbox"/> PWQO <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> CCME <input type="checkbox"/> MISA <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other <input type="checkbox"/> SU - Sani <input type="checkbox"/> SU - Storm <input type="checkbox"/> Table _____ <input type="checkbox"/> Mun: _____ For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Other: _____		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)		Required Analysis										
Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Sodium	Chloride
				Date	Time									
1 BH1-23-GW1	GW		8	Feb 14/23	1:00p	X	X	X	X	X	X		X	X
2 BH2-23-GW1			8		12:20p	X	X	X	X	X	X		X	X
3 BH3-23-GW1			3		11:40a	X	X							
4 BH4-23-GW1			8		11:00a	X	X	X	X	X	X		X	X
5 DUPI-GW1			8			X	X	X	X	X	X		X	X
6														
7														
8														
9														
10														

Comments:	Method of Delivery: PARACEL COURIER
-----------	--

Relinquished By (Sign): <i>Joshua Dempsey</i>	Received By Driver/Depot: A. TROUPE	Received at Lab: <i>[Signature]</i>	Verified By: Sandra Demers
Relinquished By (Print): Joshua Dempsey	Date/Time: 15/02/23 16:17	Date/Time: 15/02/23 17:00	Date/Time: Feb 16, 8:50
Date/Time: Feb 15/2023	Temperature: _____ °C	Temperature: 6.2	pH Verified: <input checked="" type="checkbox"/> By: Sandra Demers

Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 56948
Project: PE5579
Custody:

Report Date: 8-Mar-2023
Order Date: 6-Mar-2023

Order #: 2310068

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

Paracel ID	Client ID
2310068-01	BH1-23-GW2
2310068-02	BH2-23-GW2
2310068-03	BH3-23-GW2
2310068-04	BH4-23-GW2

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 08-Mar-2023

Client: Paterson Group Consulting Engineers

Order Date: 6-Mar-2023

Client PO: 56948

Project Description: PE5579

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	7-Mar-23	7-Mar-23

Certificate of Analysis

Report Date: 08-Mar-2023

Client: Paterson Group Consulting Engineers

Order Date: 6-Mar-2023

Client PO: 56948

Project Description: PE5579

	Client ID:	BH1-23-GW2	BH2-23-GW2	BH3-23-GW2	BH4-23-GW2
	Sample Date:	02-Mar-23 09:00	02-Mar-23 09:00	02-Mar-23 09:00	02-Mar-23 09:00
	Sample ID:	2310068-01	2310068-02	2310068-03	2310068-04
	MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water

Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	60.4	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	0.7	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	1.9	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis

Report Date: 08-Mar-2023

Client: Paterson Group Consulting Engineers

Order Date: 6-Mar-2023

Client PO: 56948

Project Description: PE5579

	Client ID:	BH1-23-GW2	BH2-23-GW2	BH3-23-GW2	BH4-23-GW2
	Sample Date:	02-Mar-23 09:00	02-Mar-23 09:00	02-Mar-23 09:00	02-Mar-23 09:00
	Sample ID:	2310068-01	2310068-02	2310068-03	2310068-04
	MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	102%	106%	106%	104%
Dibromofluoromethane	Surrogate	80.0%	89.4%	89.8%	92.0%
Toluene-d8	Surrogate	110%	111%	111%	111%

Certificate of Analysis

Report Date: 08-Mar-2023

Client: Paterson Group Consulting Engineers

Order Date: 6-Mar-2023

Client PO: 56948

Project Description: PE5579

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
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	84.4		ug/L		106	50-140			
Surrogate: Dibromofluoromethane	66.7		ug/L		83.3	50-140			
Surrogate: Toluene-d8	90.4		ug/L		113	50-140			

Certificate of Analysis

Report Date: 08-Mar-2023

Client: Paterson Group Consulting Engineers

Order Date: 6-Mar-2023

Client PO: 56948

Project Description: PE5579

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
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	83.7		ug/L		105	50-140			
Surrogate: Dibromofluoromethane	73.8		ug/L		92.2	50-140			
Surrogate: Toluene-d8	88.9		ug/L		111	50-140			

Certificate of Analysis

Report Date: 08-Mar-2023

Client: Paterson Group Consulting Engineers

Order Date: 6-Mar-2023

Client PO: 56948

Project Description: PE5579

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	127	5.0	ug/L	ND	127	50-140			
Benzene	47.1	0.5	ug/L	ND	118	60-130			
Bromodichloromethane	41.0	0.5	ug/L	ND	103	60-130			
Bromoform	32.6	0.5	ug/L	ND	81.4	60-130			
Bromomethane	48.2	0.5	ug/L	ND	120	50-140			
Carbon Tetrachloride	34.5	0.2	ug/L	ND	86.2	60-130			
Chlorobenzene	41.3	0.5	ug/L	ND	103	60-130			
Chloroform	41.5	0.5	ug/L	ND	104	60-130			
Dibromochloromethane	32.9	0.5	ug/L	ND	82.2	60-130			
Dichlorodifluoromethane	45.3	1.0	ug/L	ND	113	50-140			
1,2-Dichlorobenzene	37.4	0.5	ug/L	ND	93.5	60-130			
1,3-Dichlorobenzene	36.0	0.5	ug/L	ND	89.9	60-130			
1,4-Dichlorobenzene	35.1	0.5	ug/L	ND	87.8	60-130			
1,1-Dichloroethane	35.0	0.5	ug/L	ND	87.4	60-130			
1,2-Dichloroethane	47.0	0.5	ug/L	ND	118	60-130			
1,1-Dichloroethylene	46.9	0.5	ug/L	ND	117	60-130			
cis-1,2-Dichloroethylene	47.2	0.5	ug/L	ND	118	60-130			
trans-1,2-Dichloroethylene	30.8	0.5	ug/L	ND	76.9	60-130			
1,2-Dichloropropane	47.3	0.5	ug/L	ND	118	60-130			
cis-1,3-Dichloropropylene	36.0	0.5	ug/L	ND	90.0	60-130			
trans-1,3-Dichloropropylene	31.6	0.5	ug/L	ND	78.9	60-130			
Ethylbenzene	47.5	0.5	ug/L	ND	119	60-130			
Ethylene dibromide (dibromoethane, 1,2-	34.4	0.2	ug/L	ND	86.0	60-130			
Hexane	48.8	1.0	ug/L	ND	122	60-130			
Methyl Ethyl Ketone (2-Butanone)	136	5.0	ug/L	ND	136	50-140			
Methyl Isobutyl Ketone	127	5.0	ug/L	ND	127	50-140			
Methyl tert-butyl ether	79.0	2.0	ug/L	ND	79.0	50-140			
Methylene Chloride	48.3	5.0	ug/L	ND	121	60-130			
Styrene	32.0	0.5	ug/L	ND	79.9	60-130			
1,1,1,2-Tetrachloroethane	33.0	0.5	ug/L	ND	82.4	60-130			
1,1,2,2-Tetrachloroethane	34.8	0.5	ug/L	ND	87.1	60-130			
Tetrachloroethylene	37.3	0.5	ug/L	ND	93.2	60-130			
Toluene	44.8	0.5	ug/L	ND	112	60-130			
1,1,1-Trichloroethane	40.9	0.5	ug/L	ND	102	60-130			
1,1,2-Trichloroethane	39.9	0.5	ug/L	ND	99.7	60-130			
Trichloroethylene	37.2	0.5	ug/L	ND	93.1	60-130			
Trichlorofluoromethane	46.4	1.0	ug/L	ND	116	60-130			
Vinyl chloride	40.4	0.5	ug/L	ND	101	50-140			
m,p-Xylenes	83.8	0.5	ug/L	ND	105	60-130			
o-Xylene	42.9	0.5	ug/L	ND	107	60-130			
Surrogate: 4-Bromofluorobenzene	82.6		ug/L		103	50-140			
Surrogate: Dibromofluoromethane	83.5		ug/L		104	50-140			
Surrogate: Toluene-d8	86.8		ug/L		109	50-140			

Certificate of Analysis

Report Date: 08-Mar-2023

Client: Paterson Group Consulting Engineers

Order Date: 6-Mar-2023

Client PO: 56948

Project Description: PE5579

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



Parcel ID: 2310068



Blvd
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Parcel Order Number (Lab Use Only) 2310068	Chain Of Custody (Lab Use Only)
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Client Name: PATERSON GROUP	Project Ref: 7E5579	Page 1 of 1
Contact Name: MARC D'ARCY; Joshua Dempsey	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular
Address: 9 Anviga Drive	PO #: 56948	
Telephone: 613-226-7381	E-mail: mdarcy@patersongroup.ca jdempsey@patersongroup.ca	
Date Required: _____		

<input checked="" type="checkbox"/> REG 153/04 <input type="checkbox"/> REG 406/19 Other Regulation <input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/Fine <input type="checkbox"/> REG 558 <input type="checkbox"/> PWQO <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> CCME <input type="checkbox"/> MISA <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other <input type="checkbox"/> SU - Sani <input type="checkbox"/> SU - Storm <input type="checkbox"/> Table _____ <input type="checkbox"/> Other: _____ For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)		Required Analysis															
Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)							
				Date	Time														
1 BH1-23-GW2	GW		2	March 2/23		X													
2 BH2-23-GW2	↓		↓	↓		↓													
3 BH3-23-GW2	↓		↓	↓		↓													
4 BH4-23-GW2	↓		↓	↓		↓													
5																			
6																			
7																			
8																			
9																			
10																			

Comments:		Method of Delivery: PARACEL COURIER	
Relinquished By (Sign): Joshua Dempsey	Received By Driver/Depot: A. FLOUVE	Received at Lab: Scotia Demeris	Verified By: Scotia Demeris
Relinquished By (Print): Joshua Dempsey	Date/Time: 06/03/23 1500	Date/Time: March, 3:30	Date/Time: March, 3:42
Date/Time: March 6 / 2023	Temperature: _____ °C	Temperature: 17.1	pH Verified: <input type="checkbox"/> By: _____

Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 56816
Project: PE5579
Custody:

Report Date: 16-Feb-2023
Order Date: 13-Feb-2023

Order #: 2307076

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

Paracel ID	Client ID
2307076-01	BH1-SS2
2307076-02	BH2-SS2
2307076-03	BH3-SS3
2307076-04	BH4-SS2

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 16-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Feb-2023

Client PO: 56816

Project Description: PE5579

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	15-Feb-23	16-Feb-23
Mercury by CVAA	EPA 7471B - CVAA, digestion	15-Feb-23	16-Feb-23
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	15-Feb-23	15-Feb-23
PHC F1	CWS Tier 1 - P&T GC-FID	14-Feb-23	14-Feb-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	13-Feb-23	15-Feb-23
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	15-Feb-23	15-Feb-23
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	10-Feb-23	15-Feb-23
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	14-Feb-23	14-Feb-23
Solids, %	CWS Tier 1 - Gravimetric	14-Feb-23	15-Feb-23

Certificate of Analysis

Report Date: 16-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Feb-2023

Client PO: 56816

Project Description: PE5579

Client ID:	BH1-SS2	BH2-SS2	BH3-SS3	BH4-SS2
Sample Date:	09-Feb-23 00:00	09-Feb-23 00:00	10-Feb-23 00:00	10-Feb-23 00:00
Sample ID:	2307076-01	2307076-02	2307076-03	2307076-04
MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	88.3	80.6	85.7	89.0
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General Inorganics

pH	0.05 pH Units	7.86	11.37	7.94	8.14
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Metals

Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	5.6	6.0	4.4	3.8
Barium	1.0 ug/g dry	93.5	74.7	79.5	56.2
Beryllium	0.5 ug/g dry	0.6	0.6	0.6	<0.5
Boron	5.0 ug/g dry	9.1	8.2	8.4	<5.0
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	20.9	19.5	24.0	15.5
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	<0.2	<0.2
Cobalt	1.0 ug/g dry	12.4	8.8	11.1	5.2
Copper	5.0 ug/g dry	28.4	22.2	50.4	20.6
Lead	1.0 ug/g dry	9.6	7.8	4.2	13.2
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	<0.1
Molybdenum	1.0 ug/g dry	1.5	1.1	<1.0	<1.0
Nickel	5.0 ug/g dry	30.6	23.3	24.3	12.1
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Vanadium	10.0 ug/g dry	28.3	22.9	27.3	19.3
Zinc	20.0 ug/g dry	49.7	43.8	44.6	28.0

Volatiles

Acetone	0.50 ug/g dry	<0.50	<0.50	<0.50	<0.50
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.07
Bromodichloromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Bromoform	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Bromomethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Carbon Tetrachloride	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Chlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Chloroform	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Dibromochloromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05

Certificate of Analysis

Report Date: 16-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Feb-2023

Client PO: 56816

Project Description: PE5579

	Client ID:	BH1-SS2	BH2-SS2	BH3-SS3	BH4-SS2
	Sample Date:	09-Feb-23 00:00	09-Feb-23 00:00	10-Feb-23 00:00	10-Feb-23 00:00
	Sample ID:	2307076-01	2307076-02	2307076-03	2307076-04
	MDL/Units	Soil	Soil	Soil	Soil
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,2-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,2-Dichloropropane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Hexane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	<0.50	<0.50	<0.50
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	<0.50	<0.50	<0.50
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Methylene Chloride	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Styrene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Tetrachloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	0.20
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Trichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Trichlorofluoromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Vinyl chloride	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	0.07
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	0.07
4-Bromofluorobenzene	Surrogate	106%	113%	108%	105%
Dibromofluoromethane	Surrogate	96.1%	100%	97.3%	95.3%
Toluene-d8	Surrogate	117%	123%	118%	117%

Hydrocarbons

Certificate of Analysis

Report Date: 16-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Feb-2023

Client PO: 56816

Project Description: PE5579

	Client ID:	BH1-SS2	BH2-SS2	BH3-SS3	BH4-SS2
	Sample Date:	09-Feb-23 00:00	09-Feb-23 00:00	10-Feb-23 00:00	10-Feb-23 00:00
	Sample ID:	2307076-01	2307076-02	2307076-03	2307076-04
	MDL/Units	Soil	Soil	Soil	Soil
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	44	32	37
F4 PHCs (C34-C50)	6 ug/g dry	<6	49	55	60

Semi-Volatiles

Acenaphthene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Acenaphthylene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.03
Anthracene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.04
Benzo [a] anthracene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.10
Benzo [a] pyrene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.12
Benzo [b] fluoranthene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.22
Benzo [g,h,i] perylene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.09
Benzo [k] fluoranthene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.10
Chrysene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.13
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.02
Fluoranthene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.15
Fluorene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.08
1-Methylnaphthalene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.08
2-Methylnaphthalene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.11
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04	<0.04	<0.04	0.20
Naphthalene	0.01 ug/g dry	<0.01	<0.01	<0.01	0.08
Phenanthrene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.07
Pyrene	0.02 ug/g dry	<0.02	<0.02	<0.02	0.16
2-Fluorobiphenyl	Surrogate	68.0%	68.1%	80.7%	74.6%
Terphenyl-d14	Surrogate	85.0%	86.6%	99.4%	89.7%

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Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	1.03		ug/g		77.1	50-140			
Surrogate: Terphenyl-d14	1.33		ug/g		100	50-140			
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						

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Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	8.10		ug/g		101	50-140			
Surrogate: Dibromofluoromethane	6.79		ug/g		84.9	50-140			
Surrogate: Toluene-d8	8.70		ug/g		109	50-140			

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Client PO: 56816

Project Description: PE5579

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	8.35	0.05	pH Units	8.42			0.8	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g	ND			NC	30	
Metals									
Antimony	ND	1.0	ug/g	ND			NC	30	
Arsenic	3.8	1.0	ug/g	3.6			4.0	30	
Barium	25.5	1.0	ug/g	18.9			29.8	30	
Beryllium	ND	0.5	ug/g	ND			NC	30	
Boron	ND	5.0	ug/g	ND			NC	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g	ND			NC	35	
Chromium	8.4	5.0	ug/g	8.0			5.3	30	
Cobalt	2.9	1.0	ug/g	2.8			3.6	30	
Copper	10.0	5.0	ug/g	9.8			2.0	30	
Lead	6.6	1.0	ug/g	6.0			9.2	30	
Mercury	ND	0.1	ug/g	ND			NC	30	
Molybdenum	ND	1.0	ug/g	ND			NC	30	
Nickel	8.1	5.0	ug/g	7.8			3.3	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	14.8	10.0	ug/g	14.5			2.0	30	
Zinc	21.4	20.0	ug/g	21.0			1.7	30	
Physical Characteristics									
% Solids	91.8	0.1	% by Wt.	91.3			0.5	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g	ND			NC	40	
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	1.11		ug/g		66.1	50-140			
Surrogate: Terphenyl-d14	1.29		ug/g		77.1	50-140			
Volatiles									
Acetone	ND	0.50	ug/g	ND			NC	50	
Benzene	ND	0.02	ug/g	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g	ND			NC	50	
Bromoform	ND	0.05	ug/g	ND			NC	50	

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Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromomethane	ND	0.05	ug/g	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g	ND			NC	50	
Chloroform	ND	0.05	ug/g	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-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	8.49		ug/g		101	50-140			
Surrogate: Dibromofluoromethane	7.73		ug/g		92.0	50-140			
Surrogate: Toluene-d8	9.30		ug/g		111	50-140			

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Project Description: PE5579

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	171	7	ug/g	ND	85.3	80-120			
F2 PHCs (C10-C16)	96	4	ug/g	ND	112	60-140			
F3 PHCs (C16-C34)	257	8	ug/g	ND	123	60-140			
F4 PHCs (C34-C50)	169	6	ug/g	ND	128	60-140			
Metals									
Arsenic	40.4	1.0	ug/g	1.4	78.0	70-130			
Barium	48.1	1.0	ug/g	7.5	81.2	70-130			
Beryllium	39.2	0.5	ug/g	ND	78.2	70-130			
Boron	38.9	5.0	ug/g	ND	75.7	70-130			
Cadmium	37.5	0.5	ug/g	ND	74.9	70-130			
Chromium (VI)	4.8	0.2	ug/g	ND	87.0	70-130			
Chromium	43.5	5.0	ug/g	ND	80.6	70-130			
Cobalt	39.8	1.0	ug/g	1.1	77.3	70-130			
Copper	42.4	5.0	ug/g	ND	76.9	70-130			
Lead	38.7	1.0	ug/g	2.4	72.5	70-130			
Mercury	1.29	0.1	ug/g	ND	86.2	70-130			
Molybdenum	38.6	1.0	ug/g	ND	76.8	70-130			
Nickel	42.0	5.0	ug/g	ND	77.7	70-130			
Selenium	37.5	1.0	ug/g	ND	75.0	70-130			
Silver	38.4	0.3	ug/g	ND	76.8	70-130			
Thallium	37.2	1.0	ug/g	ND	74.4	70-130			
Uranium	37.5	1.0	ug/g	ND	74.8	70-130			
Vanadium	45.7	10.0	ug/g	ND	79.8	70-130			
Zinc	45.5	20.0	ug/g	ND	74.2	70-130			
Semi-Volatiles									
Acenaphthene	0.188	0.02	ug/g	ND	89.7	50-140			
Acenaphthylene	0.161	0.02	ug/g	ND	76.8	50-140			
Anthracene	0.164	0.02	ug/g	ND	78.2	50-140			
Benzo [a] anthracene	0.153	0.02	ug/g	ND	73.1	50-140			
Benzo [a] pyrene	0.149	0.02	ug/g	ND	71.4	50-140			
Benzo [b] fluoranthene	0.196	0.02	ug/g	ND	93.9	50-140			
Benzo [g,h,i] perylene	0.129	0.02	ug/g	ND	61.8	50-140			
Benzo [k] fluoranthene	0.172	0.02	ug/g	ND	82.4	50-140			
Chrysene	0.188	0.02	ug/g	ND	89.8	50-140			
Dibenzo [a,h] anthracene	0.124	0.02	ug/g	ND	59.3	50-140			
Fluoranthene	0.154	0.02	ug/g	ND	73.5	50-140			
Fluorene	0.158	0.02	ug/g	ND	75.8	50-140			
Indeno [1,2,3-cd] pyrene	0.129	0.02	ug/g	ND	61.5	50-140			
1-Methylnaphthalene	0.175	0.02	ug/g	ND	83.8	50-140			
2-Methylnaphthalene	0.194	0.02	ug/g	ND	92.8	50-140			
Naphthalene	0.184	0.01	ug/g	ND	88.0	50-140			
Phenanthrene	0.170	0.02	ug/g	ND	81.4	50-140			
Pyrene	0.156	0.02	ug/g	ND	74.5	50-140			
Surrogate: 2-Fluorobiphenyl	1.14		ug/g		68.4	50-140			
Surrogate: Terphenyl-d14	1.46		ug/g		87.4	50-140			
Volatiles									
Acetone	11.0	0.50	ug/g	ND	110	50-140			
Benzene	3.42	0.02	ug/g	ND	85.6	60-130			

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Project Description: PE5579

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromodichloromethane	2.82	0.05	ug/g	ND	70.5	60-130			
Bromoform	3.48	0.05	ug/g	ND	86.9	60-130			
Bromomethane	4.38	0.05	ug/g	ND	110	50-140			
Carbon Tetrachloride	3.00	0.05	ug/g	ND	75.1	60-130			
Chlorobenzene	3.39	0.05	ug/g	ND	84.8	60-130			
Chloroform	3.13	0.05	ug/g	ND	78.2	60-130			
Dibromochloromethane	2.95	0.05	ug/g	ND	73.7	60-130			
Dichlorodifluoromethane	4.20	0.05	ug/g	ND	105	50-140			
1,2-Dichlorobenzene	3.25	0.05	ug/g	ND	81.3	60-130			
1,3-Dichlorobenzene	3.04	0.05	ug/g	ND	76.0	60-130			
1,4-Dichlorobenzene	2.96	0.05	ug/g	ND	74.0	60-130			
1,1-Dichloroethane	3.20	0.05	ug/g	ND	79.9	60-130			
1,2-Dichloroethane	3.44	0.05	ug/g	ND	85.9	60-130			
1,1-Dichloroethylene	3.75	0.05	ug/g	ND	93.8	60-130			
cis-1,2-Dichloroethylene	3.09	0.05	ug/g	ND	77.1	60-130			
trans-1,2-Dichloroethylene	3.61	0.05	ug/g	ND	90.3	60-130			
1,2-Dichloropropane	3.30	0.05	ug/g	ND	82.6	60-130			
cis-1,3-Dichloropropylene	3.92	0.05	ug/g	ND	98.0	60-130			
trans-1,3-Dichloropropylene	3.43	0.05	ug/g	ND	85.7	60-130			
Ethylbenzene	3.48	0.05	ug/g	ND	87.0	60-130			
Ethylene dibromide (dibromoethane, 1,2-	2.85	0.05	ug/g	ND	71.4	60-130			
Hexane	3.20	0.05	ug/g	ND	79.9	60-130			
Methyl Ethyl Ketone (2-Butanone)	8.90	0.50	ug/g	ND	89.0	50-140			
Methyl Isobutyl Ketone	8.51	0.50	ug/g	ND	85.1	50-140			
Methyl tert-butyl ether	7.69	0.05	ug/g	ND	76.9	50-140			
Methylene Chloride	3.72	0.05	ug/g	ND	92.9	60-130			
Styrene	2.87	0.05	ug/g	ND	71.7	60-130			
1,1,1,2-Tetrachloroethane	2.86	0.05	ug/g	ND	71.6	60-130			
1,1,2,2-Tetrachloroethane	3.03	0.05	ug/g	ND	75.8	60-130			
Tetrachloroethylene	3.17	0.05	ug/g	ND	79.3	60-130			
Toluene	3.49	0.05	ug/g	ND	87.2	60-130			
1,1,1-Trichloroethane	2.71	0.05	ug/g	ND	67.8	60-130			
1,1,2-Trichloroethane	3.15	0.05	ug/g	ND	78.8	60-130			
Trichloroethylene	2.99	0.05	ug/g	ND	74.7	60-130			
Trichlorofluoromethane	3.51	0.05	ug/g	ND	87.8	50-140			
Vinyl chloride	2.74	0.02	ug/g	ND	68.6	50-140			
m,p-Xylenes	6.68	0.05	ug/g	ND	83.5	60-130			
o-Xylene	3.39	0.05	ug/g	ND	84.8	60-130			
Surrogate: 4-Bromofluorobenzene	8.00		ug/g		100	50-140			
Surrogate: Dibromofluoromethane	8.24		ug/g		103	50-140			
Surrogate: Toluene-d8	8.34		ug/g		104	50-140			

Certificate of Analysis

Report Date: 16-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Feb-2023

Client PO: 56816

Project Description: PE5579

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 when the units are denoted with 'dry'.

Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

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



Parcel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
---------------------------------------	------------------------------------

Client Name: PATERSON GROUP	Project Ref: PE5579	Page 1 of 1
Contact Name: Max D'Amy	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular Date Required: _____
Address: 9 Amiga Drive	PO #: 56816	
Telephone: 613-226-7381	E-mail: mdamy@patersongroup.ca	

<input checked="" type="checkbox"/> REG 153/04 <input type="checkbox"/> 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															
<input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/Fine <input type="checkbox"/> REG 558 <input type="checkbox"/> PWQO <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> CCME <input type="checkbox"/> MISA <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other <input type="checkbox"/> SU - Sani <input type="checkbox"/> SU - Storm <input type="checkbox"/> Table _____ For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Other: _____		Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	Trace Metals	pH					
Sample ID/Location Name					Date	Time														
1	BH1-SS2	S		3	Feb 9/2023		X	X	X	X	X	X			X					
2	BH2-SS2	↓		3	Feb 9/2023		↓	↓	↓	↓	↓	↓			↓					
3	BH3-SS3	↓		2	Feb 10/2023		↓	↓	↓	↓	↓	↓			↓					
4	BH4-SS2	↓		3	Feb 10/2023		↓	↓	↓	↓	↓	↓			↓					
5																				
6																				
7																				
8																				
9																				
10																				

Comments:			Method of Delivery: PARACEL COURIER		
Relinquished By (Sign): [Signature]	Received By Driver/Depot: [Signature]	Received at Lab: [Signature]	Verified By: [Signature]		
Relinquished By (Print): Joelana Dempsey	Date/Time: 13/02/23 1605	Date/Time: 13/02/23 4:29pm	Date/Time: 13/02/23 4:40pm		
Date/Time: Feb 13/2023	Temperature: _____ °C	Temperature: 6.7	pH Verified: <input type="checkbox"/> By: _____		

Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 57283
Project: PE5579
Custody:

Report Date: 24-Apr-2023
Order Date: 19-Apr-2023

Order #: 2316343

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

Parcel ID	Client ID
2316343-01	BH2-23-GW
2316343-02	BH12-23-GW

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 24-Apr-2023

Client: **Paterson Group Consulting Engineers**

Order Date: 19-Apr-2023

Client PO: 57283

Project Description: **PE5579**

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	21-Apr-23	21-Apr-23

Certificate of Analysis

Report Date: 24-Apr-2023

Client: Paterson Group Consulting Engineers

Order Date: 19-Apr-2023

Client PO: 57283

Project Description: PE5579

Client ID:	BH2-23-GW	BH12-23-GW	-	-
Sample Date:	14-Apr-23 09:00	14-Apr-23 09:00	-	-
Sample ID:	2316343-01	2316343-02	-	-
MDL/Units	Ground Water	Ground Water	-	-

Volatiles

Acetone	5.0 ug/L	<5.0	<5.0	-	-
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
Chloroform	0.5 ug/L	0.7	0.7	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	-	-
Hexane	1.0 ug/L	<1.0	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	-
Styrene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	0.6	0.7	-	-
Toluene	0.5 ug/L	<0.5	<0.5	-	-

Certificate of Analysis

Report Date: 24-Apr-2023

Client: Paterson Group Consulting Engineers

Order Date: 19-Apr-2023

Client PO: 57283

Project Description: PE5579

	Client ID:	BH2-23-GW	BH12-23-GW	-	-
	Sample Date:	14-Apr-23 09:00	14-Apr-23 09:00	-	-
	Sample ID:	2316343-01	2316343-02	-	-
	MDL/Units	Ground Water	Ground Water	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	-	-
4-Bromofluorobenzene	Surrogate	110%	110%	-	-
Dibromofluoromethane	Surrogate	111%	112%	-	-
Toluene-d8	Surrogate	104%	103%	-	-

Certificate of Analysis

Report Date: 24-Apr-2023

Client: Paterson Group Consulting Engineers

Order Date: 19-Apr-2023

Client PO: 57283

Project Description: PE5579

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
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	86.9		ug/L		109	50-140			
Surrogate: Dibromofluoromethane	86.6		ug/L		108	50-140			
Surrogate: Toluene-d8	84.2		ug/L		105	50-140			

Certificate of Analysis

Report Date: 24-Apr-2023

Client: Paterson Group Consulting Engineers

Order Date: 19-Apr-2023

Client PO: 57283

Project Description: PE5579

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
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	87.2		ug/L		109	50-140			
Surrogate: Dibromofluoromethane	90.5		ug/L		113	50-140			
Surrogate: Toluene-d8	82.3		ug/L		103	50-140			

Certificate of Analysis

Report Date: 24-Apr-2023

Client: Paterson Group Consulting Engineers

Order Date: 19-Apr-2023

Client PO: 57283

Project Description: PE5579

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	108	5.0	ug/L	ND	108	50-140			
Benzene	38.5	0.5	ug/L	ND	96.4	60-130			
Bromodichloromethane	40.8	0.5	ug/L	ND	102	60-130			
Bromoform	38.0	0.5	ug/L	ND	95.0	60-130			
Bromomethane	36.7	0.5	ug/L	ND	91.8	50-140			
Carbon Tetrachloride	39.9	0.2	ug/L	ND	99.7	60-130			
Chlorobenzene	39.1	0.5	ug/L	ND	97.8	60-130			
Chloroform	30.9	0.5	ug/L	ND	77.4	60-130			
Dibromochloromethane	39.0	0.5	ug/L	ND	97.5	60-130			
Dichlorodifluoromethane	41.7	1.0	ug/L	ND	104	50-140			
1,2-Dichlorobenzene	37.3	0.5	ug/L	ND	93.2	60-130			
1,3-Dichlorobenzene	36.7	0.5	ug/L	ND	91.7	60-130			
1,4-Dichlorobenzene	35.4	0.5	ug/L	ND	88.5	60-130			
1,1-Dichloroethane	40.9	0.5	ug/L	ND	102	60-130			
1,2-Dichloroethane	38.9	0.5	ug/L	ND	97.3	60-130			
1,1-Dichloroethylene	38.3	0.5	ug/L	ND	95.7	60-130			
cis-1,2-Dichloroethylene	32.6	0.5	ug/L	ND	81.6	60-130			
trans-1,2-Dichloroethylene	36.0	0.5	ug/L	ND	90.0	60-130			
1,2-Dichloropropane	37.7	0.5	ug/L	ND	94.2	60-130			
cis-1,3-Dichloropropylene	44.5	0.5	ug/L	ND	111	60-130			
trans-1,3-Dichloropropylene	47.3	0.5	ug/L	ND	118	60-130			
Ethylbenzene	38.3	0.5	ug/L	ND	95.7	60-130			
Ethylene dibromide (dibromoethane, 1,2-	40.6	0.2	ug/L	ND	101	60-130			
Hexane	41.6	1.0	ug/L	ND	104	60-130			
Methyl Ethyl Ketone (2-Butanone)	109	5.0	ug/L	ND	109	50-140			
Methyl Isobutyl Ketone	106	5.0	ug/L	ND	106	50-140			
Methyl tert-butyl ether	124	2.0	ug/L	ND	124	50-140			
Methylene Chloride	38.5	5.0	ug/L	ND	96.2	60-130			
Styrene	36.4	0.5	ug/L	ND	91.0	60-130			
1,1,1,2-Tetrachloroethane	41.5	0.5	ug/L	ND	104	60-130			
1,1,2,2-Tetrachloroethane	45.6	0.5	ug/L	ND	114	60-130			
Tetrachloroethylene	39.0	0.5	ug/L	ND	97.4	60-130			
Toluene	39.0	0.5	ug/L	ND	97.6	60-130			
1,1,1-Trichloroethane	40.9	0.5	ug/L	ND	102	60-130			
1,1,2-Trichloroethane	40.0	0.5	ug/L	ND	100	60-130			
Trichloroethylene	37.1	0.5	ug/L	ND	92.7	60-130			
Trichlorofluoromethane	41.0	1.0	ug/L	ND	102	60-130			
Vinyl chloride	35.6	0.5	ug/L	ND	89.1	50-140			
m,p-Xylenes	75.3	0.5	ug/L	ND	94.1	60-130			
o-Xylene	37.7	0.5	ug/L	ND	94.3	60-130			
Surrogate: 4-Bromofluorobenzene	87.0		ug/L		109	50-140			
Surrogate: Dibromofluoromethane	74.9		ug/L		93.7	50-140			
Surrogate: Toluene-d8	79.9		ug/L		99.9	50-140			

Certificate of Analysis

Report Date: 24-Apr-2023

Client: Paterson Group Consulting Engineers

Order Date: 19-Apr-2023

Client PO: 57283

Project Description: PE5579

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



net: Blvd.
KIG 4.08
7
labs.com
com

Parcel Order Number (Lab Use Only) 2316343	Chain Of Custody (Lab Use Only)
--	------------------------------------

Client Name: Paterson	Project Ref: PG 5579
Contact Name: Mark D'Arcy	Quote #:
Address: 9 Auriga	PO #: 57283
Telephone: 613 226 7381	E-mail: M.Darcy@Patersongroup.ca G.Paterson@Patersongroup.ca

Page 1 of 1

Turnaround Time

1 day 3 day

2 day Regular

Date Required: _____

REG 153/04 REG 406/19

Other Regulation

Table 1 Res/Park Med/Fine REG 558 PWQO

Table 2 Ind/Comm Coarse CCME MISA

Table 3 Agr/Other SU - Sani SU - Storm

Table _____

Mun: _____

Other: _____

For RSC: Yes No

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

Required Analysis

Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
				Date	Time							
1 BH2-23-GW	GW		2	Apr 14 2023			X					
2 BH12-23-GW	↓		↓	↓			X					
3												
4												
5												
6												
7												
8												
9												
10												

Comments:

Relinquished By (Sign): G Pat	Received By Driver/Depot: A. HOUSE	Received at Lab: [Signature]	Method of Delivery: PARACEL COURIER
Relinquished By (Print): Grant Paterson	Date/Time: 19/04/23 1631	Date/Time: 19/04/23 5pm	Verified by: [Signature]
Date/Time: 04/19/2023	Temperature: °C	Temperature: 15	Date/Time: APR 20 2023 3:38

Chain of Custody (Blank).xlsx

Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 56852
Project: PE5579
Custody:

Report Date: 27-Feb-2023
Order Date: 21-Feb-2023

Order #: 2308090

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

Paracel ID	Client ID
2308090-01	BH3-23-GW

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 27-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 21-Feb-2023

Client PO: 56852

Project Description: PE5579

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Anions	EPA 300.1 - IC	22-Feb-23	22-Feb-23
Chromium, hexavalent - water	MOE E3056 - colourimetric	22-Feb-23	22-Feb-23
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	22-Feb-23	22-Feb-23
Metals, ICP-MS	EPA 200.8 - ICP-MS	23-Feb-23	23-Feb-23
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	24-Feb-23	25-Feb-23

Certificate of Analysis

Report Date: 27-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 21-Feb-2023

Client PO: 56852

Project Description: PE5579

Client ID:	BH3-23-GW	-	-	-
Sample Date:	21-Feb-23 00:00	-	-	-
Sample ID:	2308090-01	-	-	-
MDL/Units	Ground Water	-	-	-

Anions

Chloride	1 mg/L	1320	-	-	-
----------	--------	------	---	---	---

Metals

Mercury	0.1 ug/L	<0.1	-	-	-
Antimony	0.5 ug/L	2.4	-	-	-
Arsenic	1 ug/L	4	-	-	-
Barium	1 ug/L	229	-	-	-
Beryllium	0.5 ug/L	<0.5	-	-	-
Boron	10 ug/L	195	-	-	-
Cadmium	0.1 ug/L	<0.1	-	-	-
Chromium	1 ug/L	<1	-	-	-
Chromium (VI)	10 ug/L	<10	-	-	-
Cobalt	0.5 ug/L	0.7	-	-	-
Copper	0.5 ug/L	1.8	-	-	-
Lead	0.1 ug/L	0.2	-	-	-
Molybdenum	0.5 ug/L	17.7	-	-	-
Nickel	1 ug/L	5	-	-	-
Selenium	1 ug/L	<1	-	-	-
Silver	0.1 ug/L	<0.1	-	-	-
Sodium	200 ug/L	612000	-	-	-
Thallium	0.1 ug/L	<0.1	-	-	-
Uranium	0.1 ug/L	4.0	-	-	-
Vanadium	0.5 ug/L	0.6	-	-	-
Zinc	5 ug/L	<5	-	-	-

Semi-Volatiles

Acenaphthene	0.05 ug/L	<0.05	-	-	-
Acenaphthylene	0.05 ug/L	<0.05	-	-	-
Anthracene	0.01 ug/L	<0.01	-	-	-
Benzo [a] anthracene	0.01 ug/L	<0.01	-	-	-
Benzo [a] pyrene	0.01 ug/L	<0.01	-	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05	-	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	-	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05	-	-	-
Chrysene	0.05 ug/L	<0.05	-	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	-	-	-
Fluoranthene	0.01 ug/L	<0.01	-	-	-

Certificate of Analysis

Report Date: 27-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 21-Feb-2023

Client PO: 56852

Project Description: PE5579

	Client ID:	BH3-23-GW	-	-	-
	Sample Date:	21-Feb-23 00:00	-	-	-
	Sample ID:	2308090-01	-	-	-
	MDL/Units	Ground Water	-	-	-
Fluorene	0.05 ug/L	<0.05	-	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	-	-	-
1-Methylnaphthalene	0.05 ug/L	<0.05	-	-	-
2-Methylnaphthalene	0.05 ug/L	<0.05	-	-	-
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	-	-	-
Naphthalene	0.05 ug/L	<0.05	-	-	-
Phenanthrene	0.05 ug/L	<0.05	-	-	-
Pyrene	0.01 ug/L	<0.01	-	-	-
2-Fluorobiphenyl	Surrogate	106%	-	-	-
Terphenyl-d14	Surrogate	127%	-	-	-

Certificate of Analysis

Report Date: 27-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 21-Feb-2023

Client PO: 56852

Project Description: PE5579

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	ND	1	mg/L						
Metals									
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	20.1		ug/L		101	50-140			
Surrogate: Terphenyl-d14	24.5		ug/L		122	50-140			

Certificate of Analysis

Report Date: 27-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 21-Feb-2023

Client PO: 56852

Project Description: PE5579

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	1380	5	mg/L	1390			0.3	20	
Metals									
Mercury	ND	0.1	ug/L	ND			NC	20	
Antimony	2.40	0.5	ug/L	2.39			0.4	20	
Arsenic	4.2	1	ug/L	4.4			3.0	20	
Barium	232	1	ug/L	229			1.5	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	196	10	ug/L	195			0.6	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium (VI)	ND	10	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	0.66	0.5	ug/L	0.68			3.1	20	
Copper	1.83	0.5	ug/L	1.84			0.4	20	
Lead	0.20	0.1	ug/L	0.20			2.4	20	
Molybdenum	18.0	0.5	ug/L	17.7			1.5	20	
Nickel	5.6	1	ug/L	5.4			2.4	20	
Selenium	1.0	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	528000	200	ug/L	612000			14.7	20	
Thallium	0.11	0.1	ug/L	ND			NC	20	
Uranium	4.0	0.1	ug/L	4.0			0.9	20	
Vanadium	0.62	0.5	ug/L	0.61			2.1	20	
Zinc	ND	5	ug/L	ND			NC	20	

Certificate of Analysis

Report Date: 27-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 21-Feb-2023

Client PO: 56852

Project Description: PE5579

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Anions									
Chloride	9.86	1	mg/L	ND	98.6	78-114			
Metals									
Mercury	2.13	0.1	ug/L	ND	71.0	70-130			
Arsenic	50.6	1	ug/L	4.4	92.4	80-120			
Barium	43.1	1	ug/L	ND	86.1	80-120			
Beryllium	36.6	0.5	ug/L	ND	73.3	80-120			QM-07
Boron	44	10	ug/L	ND	87.7	80-120			
Cadmium	37.4	0.1	ug/L	ND	74.7	80-120			QM-07
Chromium (VI)	174	10	ug/L	ND	87.0	70-130			
Chromium	58.5	1	ug/L	ND	116	80-120			
Cobalt	51.3	0.5	ug/L	0.68	101	80-120			
Copper	46.5	0.5	ug/L	1.84	89.4	80-120			
Lead	37.9	0.1	ug/L	0.20	75.4	80-120			QM-07
Molybdenum	64.9	0.5	ug/L	17.7	94.4	80-120			
Nickel	52.6	1	ug/L	5.4	94.3	80-120			
Selenium	42.8	1	ug/L	ND	85.7	80-120			
Silver	45.4	0.1	ug/L	ND	90.8	80-120			
Sodium	8580	200	ug/L	ND	85.8	80-120			
Thallium	39.1	0.1	ug/L	0.10	77.9	80-120			QM-07
Uranium	45.9	0.1	ug/L	4.0	83.8	80-120			
Vanadium	60.6	0.5	ug/L	0.61	120	80-120			
Zinc	44	5	ug/L	ND	88.5	80-120			
Semi-Volatiles									
Acenaphthene	4.72	0.05	ug/L	ND	94.3	50-140			
Acenaphthylene	4.16	0.05	ug/L	ND	83.1	50-140			
Anthracene	4.48	0.01	ug/L	ND	89.7	50-140			
Benzo [a] anthracene	4.71	0.01	ug/L	ND	94.3	50-140			
Benzo [a] pyrene	4.63	0.01	ug/L	ND	92.6	50-140			
Benzo [b] fluoranthene	6.49	0.05	ug/L	ND	130	50-140			
Benzo [g,h,i] perylene	4.24	0.05	ug/L	ND	84.9	50-140			
Benzo [k] fluoranthene	5.34	0.05	ug/L	ND	107	50-140			
Chrysene	5.14	0.05	ug/L	ND	103	50-140			
Dibenzo [a,h] anthracene	4.43	0.05	ug/L	ND	88.5	50-140			
Fluoranthene	4.25	0.01	ug/L	ND	84.9	50-140			
Fluorene	4.68	0.05	ug/L	ND	93.6	50-140			
Indeno [1,2,3-cd] pyrene	4.73	0.05	ug/L	ND	94.7	50-140			
1-Methylnaphthalene	4.71	0.05	ug/L	ND	94.1	50-140			
2-Methylnaphthalene	5.27	0.05	ug/L	ND	105	50-140			
Naphthalene	4.75	0.05	ug/L	ND	95.0	50-140			
Phenanthrene	4.27	0.05	ug/L	ND	85.4	50-140			
Pyrene	4.47	0.01	ug/L	ND	89.4	50-140			
Surrogate: 2-Fluorobiphenyl	22.8		ug/L		114	50-140			
Surrogate: Terphenyl-d14	26.9		ug/L		135	50-140			

Certificate of Analysis

Report Date: 27-Feb-2023

Client: Paterson Group Consulting Engineers

Order Date: 21-Feb-2023

Client PO: 56852

Project Description: PE5579

Qualifier Notes:

QC Qualifiers :

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

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

Source Result: Data used as source for matrix and duplicate samples

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated



Parcel Order Number (Lab Use Only) <i>2308090</i>	Chain Of Custody (Lab Use Only)
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Client Name: <i>Paterson</i>	Project Ref: <i>PE5579</i>	Page <u> </u> of <u> </u>
Contact Name: <i>Mark D'Arcy + Josh Dempsey</i>	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular
Address: <i>9 Auriga</i>	PO #: <i>56562</i>	
Telephone: <i>613 226 7381</i>	E-mail: <i>MDarcy@Patersongroup.ca</i> <i>JDempsey@Patersongroup.ca</i>	
Date Required: _____		

<input checked="" type="checkbox"/> REG 153/04 <input type="checkbox"/> 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																	
<input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other <input type="checkbox"/> Table _____ For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> REG 558 <input type="checkbox"/> PWQD <input type="checkbox"/> CCME <input type="checkbox"/> MISA <input type="checkbox"/> SU - Sani <input type="checkbox"/> SU - Storm Mun: _____ <input type="checkbox"/> Other: _____		PHCs F1-F4+BTEX	VOCs	PAHS	Metals by ICP	Hg	CrVI	B (HWS)	Sodium	Chlorides									
Sample ID/Location Name		Matrix	Air Volume	# of Containers	Sample Taken															
					Date	Time														
1 <i>BH3-23-GW</i>		<i>GW</i>		<i>5</i>	<i>Feb 21 2023</i>															
2																				
3																				
4																				
5																				
6																				
7																				
8																				
9																				
10																				

Comments:		Method of Delivery: <i>PARACEL COURIER</i>	
Relinquished By (Sign): <i>G-Pat</i>	Received By Driver/Depot: <i>A TROUPE</i>	Received at Lab: <i>[Signature]</i>	Verified By: <i>[Signature]</i>
Relinquished By (Print): <i>Grant Paterson</i>	Date/Time: <i>21/02/23 1520</i>	Date/Time: <i>Feb 21/23 5:20</i>	Date/Time: <i>Feb 21/23</i>
Date/Time: <i>Feb 21 2023</i>	Temperature: °C	Temperature: <i>1.4</i>	pH Verified: <i>[Signature]</i> By: <i>[Signature]</i> <i>825</i>

*Inn of Custody (Blank) etc

Certificate of Analysis

Paterson Group Consulting Engineers

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Sam Berube

Client PO: 58356
Project: PE6234

Custody:

Report Date: 15-Sep-2023
Order Date: 11-Sep-2023

Order #: 2337081

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

Parcel ID	Client ID
2337081-01	BH1-23-SS2
2337081-02	TP1-23-G1
2337081-03	TP1-23-G3
2337081-04	TP2-23-G3
2337081-05	TP4-23-G1
2337081-07	TP6-23-G2
2337081-08	TP7-23-G2
2337081-10	DUP1-23

Approved By:



Dale Robertson, BSc

Laboratory Director

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	13-Sep-23	13-Sep-23
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	12-Sep-23	13-Sep-23
Conductivity	MOE E3138 - probe @25 °C, water ext	13-Sep-23	14-Sep-23
Mercury by CVAA	EPA 7471B - CVAA, digestion	13-Sep-23	13-Sep-23
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	11-Sep-23	12-Sep-23
PHC F1	CWS Tier 1 - P&T GC-FID	13-Sep-23	13-Sep-23
PHC F4G (gravimetric)	CWS Tier 1 - Extraction Gravimetric	15-Sep-23	15-Sep-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	12-Sep-23	12-Sep-23
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	13-Sep-23	13-Sep-23
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	12-Sep-23	12-Sep-23
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	13-Sep-23	13-Sep-23
SAR	Calculated	13-Sep-23	13-Sep-23
Solids, %	CWS Tier 1 - Gravimetric	12-Sep-23	13-Sep-23

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Client ID:	BH1-23-SS2	TP1-23-G1	TP1-23-G3	TP2-23-G3	-	-
Sample Date:	01-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	-	-
Sample ID:	2337081-01	2337081-02	2337081-03	2337081-04	-	-
Matrix:	Soil	Soil	Soil	Soil	-	-
MDL/Units						

Physical Characteristics

% Solids	0.1 % by Wt.	88.8	95.2	89.3	88.7	-	-
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General Inorganics

SAR	0.01 N/A	3.98	8.80	8.07	-	-	-
Conductivity	5 uS/cm	738	1490	1350	-	-	-
pH	0.05 pH Units	-	-	7.57	-	-	-

Metals

Antimony	1 ug/g	-	-	<1.0	<1.0	-	-
Arsenic	1 ug/g	-	-	4.9	6.1	-	-
Barium	1 ug/g	-	-	81.7	67.2	-	-
Beryllium	0.5 ug/g	-	-	0.7	0.8	-	-
Boron	5 ug/g	-	-	7.0	7.5	-	-
Cadmium	0.5 ug/g	-	-	<0.5	<0.5	-	-
Chromium	5 ug/g	-	-	25.3	23.6	-	-
Chromium (VI)	0.2 ug/g	-	-	<0.2	0.2	-	-
Cobalt	1 ug/g	-	-	11.5	12.4	-	-
Copper	5 ug/g	-	-	30.0	32.4	-	-
Lead	1 ug/g	-	-	13.2	9.9	-	-
Mercury	0.1 ug/g	-	-	<0.1	<0.1	-	-
Molybdenum	1 ug/g	-	-	1.3	1.6	-	-
Nickel	5 ug/g	-	-	34.9	33.8	-	-
Selenium	1 ug/g	-	-	<1.0	<1.0	-	-
Silver	0.3 ug/g	-	-	<0.3	<0.3	-	-
Thallium	1 ug/g	-	-	<1.0	<1.0	-	-
Uranium	1 ug/g	-	-	<1.0	<1.0	-	-
Vanadium	10 ug/g	-	-	34.0	31.5	-	-

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Client ID:	BH1-23-SS2	TP1-23-G1	TP1-23-G3	TP2-23-G3	-	-
Sample Date:	01-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	-	-
Sample ID:	2337081-01	2337081-02	2337081-03	2337081-04	-	-
Matrix:	Soil	Soil	Soil	Soil	-	-
MDL/Units						

Metals

Zinc	20 ug/g	-	-	58.3	54.2	-	-
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Volatiles

Acetone	0.5 ug/g	<0.50	-	-	-	-	-
Benzene	0.02 ug/g	<0.02	-	-	-	-	-
Bromodichloromethane	0.05 ug/g	<0.05	-	-	-	-	-
Bromoform	0.05 ug/g	<0.05	-	-	-	-	-
Bromomethane	0.05 ug/g	<0.05	-	-	-	-	-
Carbon Tetrachloride	0.05 ug/g	<0.05	-	-	-	-	-
Chlorobenzene	0.05 ug/g	<0.05	-	-	-	-	-
Chloroform	0.05 ug/g	<0.05	-	-	-	-	-
Dibromochloromethane	0.05 ug/g	<0.05	-	-	-	-	-
Dichlorodifluoromethane	0.05 ug/g	<0.05	-	-	-	-	-
1,2-Dichlorobenzene	0.05 ug/g	<0.05	-	-	-	-	-
1,3-Dichlorobenzene	0.05 ug/g	<0.05	-	-	-	-	-
1,4-Dichlorobenzene	0.05 ug/g	<0.05	-	-	-	-	-
1,1-Dichloroethane	0.05 ug/g	<0.05	-	-	-	-	-
1,2-Dichloroethane	0.05 ug/g	<0.05	-	-	-	-	-
1,1-Dichloroethylene	0.05 ug/g	<0.05	-	-	-	-	-
cis-1,2-Dichloroethylene	0.05 ug/g	<0.05	-	-	-	-	-
trans-1,2-Dichloroethylene	0.05 ug/g	<0.05	-	-	-	-	-
1,2-Dichloropropane	0.05 ug/g	<0.05	-	-	-	-	-
cis-1,3-Dichloropropylene	0.05 ug/g	<0.05	-	-	-	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	<0.05	-	-	-	-	-
1,3-Dichloropropene, total	0.05 ug/g	<0.05	-	-	-	-	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	<0.05	-	-	-	-	-

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Client ID:	BH1-23-SS2	TP1-23-G1	TP1-23-G3	TP2-23-G3	-	-
Sample Date:	01-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	-	-
Sample ID:	2337081-01	2337081-02	2337081-03	2337081-04	-	-
Matrix:	Soil	Soil	Soil	Soil	-	-
MDL/Units						

Volatiles

Ethylbenzene	0.05 ug/g	<0.05	-	-	-	-
Hexane	0.05 ug/g	<0.05	-	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.5 ug/g	<0.50	-	-	-	-
Methyl Isobutyl Ketone	0.5 ug/g	<0.50	-	-	-	-
Methyl tert-butyl ether	0.05 ug/g	<0.05	-	-	-	-
Methylene Chloride	0.05 ug/g	<0.05	-	-	-	-
Styrene	0.05 ug/g	<0.05	-	-	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	<0.05	-	-	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	<0.05	-	-	-	-
Tetrachloroethylene	0.05 ug/g	<0.05	-	-	-	-
Toluene	0.05 ug/g	<0.05	-	-	-	-
1,1,1-Trichloroethane	0.05 ug/g	<0.05	-	-	-	-
1,1,2-Trichloroethane	0.05 ug/g	<0.05	-	-	-	-
Trichloroethylene	0.05 ug/g	<0.05	-	-	-	-
Trichlorofluoromethane	0.05 ug/g	<0.05	-	-	-	-
Vinyl chloride	0.02 ug/g	<0.02	-	-	-	-
m,p-Xylenes	0.05 ug/g	<0.05	-	-	-	-
o-Xylene	0.05 ug/g	<0.05	-	-	-	-
Xylenes, total	0.05 ug/g	<0.05	-	-	-	-
Dibromofluoromethane	Surrogate	99.6%	-	-	-	-
Toluene-d8	Surrogate	106%	-	-	-	-
4-Bromofluorobenzene	Surrogate	101%	-	-	-	-
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	-

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Client ID:	BH1-23-SS2	TP1-23-G1	TP1-23-G3	TP2-23-G3	-	-
Sample Date:	01-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	-	-
Sample ID:	2337081-01	2337081-02	2337081-03	2337081-04	-	-
Matrix:	Soil	Soil	Soil	Soil	-	-
MDL/Units						

Volatiles

m,p-Xylenes	0.05 ug/g	-	-	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g	-	-	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g	-	-	<0.05	<0.05	-	-
Toluene-d8	Surrogate	-	-	105%	107%	-	-

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	-	-	16	<8	-	-
F4 PHCs (C34-C50)	6 ug/g	-	-	40	<6	-	-

Semi-Volatiles

Acenaphthene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Acenaphthylene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Anthracene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Benzo [a] anthracene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Benzo [a] pyrene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Benzo [b] fluoranthene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Benzo [g,h,i] perylene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Benzo [k] fluoranthene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Chrysene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Dibenzo [a,h] anthracene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Fluoranthene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Fluorene	0.02 ug/g	-	-	<0.02	<0.02	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	-	-	<0.02	<0.02	-	-
1-Methylnaphthalene	0.02 ug/g	-	-	<0.02	<0.02	-	-
2-Methylnaphthalene	0.02 ug/g	-	-	<0.02	<0.02	-	-

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Client ID:	BH1-23-SS2	TP1-23-G1	TP1-23-G3	TP2-23-G3	-	-
Sample Date:	01-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	-	-
Sample ID:	2337081-01	2337081-02	2337081-03	2337081-04	-	-
Matrix:	Soil	Soil	Soil	Soil	-	-
MDL/Units						

Semi-Volatiles

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	-	-	<0.02	<0.02	-	-
Pyrene	0.02 ug/g	-	-	<0.02	<0.02	-	-
2-Fluorobiphenyl	Surrogate	-	-	65.3%	84.1%	-	-
Terphenyl-d14	Surrogate	-	-	77.5%	77.8%	-	-

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Client ID:	TP4-23-G1	TP6-23-G2	TP7-23-G2	DUP1-23		
Sample Date:	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	-	-
Sample ID:	2337081-05	2337081-07	2337081-08	2337081-10		
Matrix:	Soil	Soil	Soil	Soil		
MDL/Units						

Physical Characteristics

% Solids	0.1 % by Wt.	93.7	81.9	91.7	88.7	-	-
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General Inorganics

SAR	0.01 N/A	-	5.85	-	-	-	-
Conductivity	5 uS/cm	-	2220	-	-	-	-
pH	0.05 pH Units	-	-	7.42	-	-	-

Metals

Antimony	1 ug/g	7.7	<1.0	<1.0	<1.0	-	-
Arsenic	1 ug/g	17.3	8.1	5.2	5.0	-	-
Barium	1 ug/g	98.4	72.6	150	85.8	-	-
Beryllium	0.5 ug/g	<0.5	0.6	0.7	0.7	-	-
Boron	5 ug/g	7.1	12.4	15.6	9.9	-	-
Cadmium	0.5 ug/g	<0.5	<0.5	<0.5	<0.5	-	-
Chromium	5 ug/g	26.1	23.7	27.2	27.8	-	-
Chromium (VI)	0.2 ug/g	<0.2	<0.2	<0.2	<0.2	-	-
Cobalt	1 ug/g	8.5	8.0	11.5	12.2	-	-
Copper	5 ug/g	143	17.5	43.1	29.8	-	-
Lead	1 ug/g	156	15.3	43.9	14.3	-	-
Mercury	0.1 ug/g	0.1	<0.1	<0.1	<0.1	-	-
Molybdenum	1 ug/g	3.2	1.8	2.0	2.4	-	-
Nickel	5 ug/g	32.5	19.8	26.1	34.9	-	-
Selenium	1 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 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Uranium	1 ug/g	<1.0	<1.0	<1.0	<1.0	-	-
Vanadium	10 ug/g	26.8	29.6	32.0	40.1	-	-

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Client ID:	TP4-23-G1	TP6-23-G2	TP7-23-G2	DUP1-23		
Sample Date:	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	-	-
Sample ID:	2337081-05	2337081-07	2337081-08	2337081-10		
Matrix:	Soil	Soil	Soil	Soil		
MDL/Units						

Metals

Zinc	20 ug/g	68.1	48.6	116	60.3	-	-
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Volatiles

Acetone	0.5 ug/g	-	<0.50	-	-	-	-
Benzene	0.02 ug/g	-	<0.02	-	-	-	-
Bromodichloromethane	0.05 ug/g	-	<0.05	-	-	-	-
Bromoform	0.05 ug/g	-	<0.05	-	-	-	-
Bromomethane	0.05 ug/g	-	<0.05	-	-	-	-
Carbon Tetrachloride	0.05 ug/g	-	<0.05	-	-	-	-
Chlorobenzene	0.05 ug/g	-	<0.05	-	-	-	-
Chloroform	0.05 ug/g	-	<0.05	-	-	-	-
Dibromochloromethane	0.05 ug/g	-	<0.05	-	-	-	-
Dichlorodifluoromethane	0.05 ug/g	-	<0.05	-	-	-	-
1,2-Dichlorobenzene	0.05 ug/g	-	<0.05	-	-	-	-
1,3-Dichlorobenzene	0.05 ug/g	-	<0.05	-	-	-	-
1,4-Dichlorobenzene	0.05 ug/g	-	<0.05	-	-	-	-
1,1-Dichloroethane	0.05 ug/g	-	<0.05	-	-	-	-
1,2-Dichloroethane	0.05 ug/g	-	<0.05	-	-	-	-
1,1-Dichloroethylene	0.05 ug/g	-	<0.05	-	-	-	-
cis-1,2-Dichloroethylene	0.05 ug/g	-	<0.05	-	-	-	-
trans-1,2-Dichloroethylene	0.05 ug/g	-	<0.05	-	-	-	-
1,2-Dichloropropane	0.05 ug/g	-	<0.05	-	-	-	-
cis-1,3-Dichloropropylene	0.05 ug/g	-	<0.05	-	-	-	-
trans-1,3-Dichloropropylene	0.05 ug/g	-	<0.05	-	-	-	-
1,3-Dichloropropene, total	0.05 ug/g	-	<0.05	-	-	-	-
Ethylene dibromide (dibromoethane,	0.05 ug/g	-	<0.05	-	-	-	-

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Client ID:	TP4-23-G1	TP6-23-G2	TP7-23-G2	DUP1-23	-	-
Sample Date:	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	-	-
Sample ID:	2337081-05	2337081-07	2337081-08	2337081-10	-	-
Matrix:	Soil	Soil	Soil	Soil	-	-
MDL/Units						

Volatiles

Ethylbenzene	0.05 ug/g	-	<0.05	-	-	-
Hexane	0.05 ug/g	-	<0.05	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.5 ug/g	-	<0.50	-	-	-
Methyl Isobutyl Ketone	0.5 ug/g	-	<0.50	-	-	-
Methyl tert-butyl ether	0.05 ug/g	-	<0.05	-	-	-
Methylene Chloride	0.05 ug/g	-	<0.05	-	-	-
Styrene	0.05 ug/g	-	<0.05	-	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g	-	<0.05	-	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g	-	<0.05	-	-	-
Tetrachloroethylene	0.05 ug/g	-	<0.05	-	-	-
Toluene	0.05 ug/g	-	<0.05	-	-	-
1,1,1-Trichloroethane	0.05 ug/g	-	<0.05	-	-	-
1,1,2-Trichloroethane	0.05 ug/g	-	<0.05	-	-	-
Trichloroethylene	0.05 ug/g	-	<0.05	-	-	-
Trichlorofluoromethane	0.05 ug/g	-	<0.05	-	-	-
Vinyl chloride	0.02 ug/g	-	<0.02	-	-	-
m,p-Xylenes	0.05 ug/g	-	<0.05	-	-	-
o-Xylene	0.05 ug/g	-	<0.05	-	-	-
Xylenes, total	0.05 ug/g	-	<0.05	-	-	-
Toluene-d8	Surrogate	-	111%	-	-	-
4-Bromofluorobenzene	Surrogate	-	113%	-	-	-
Dibromofluoromethane	Surrogate	-	113%	-	-	-
Benzene	0.02 ug/g	0.12	-	<0.02	-	-
Ethylbenzene	0.05 ug/g	0.08	-	<0.05	-	-
Toluene	0.05 ug/g	0.39	-	<0.05	-	-

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Client ID:	TP4-23-G1	TP6-23-G2	TP7-23-G2	DUP1-23	-	-
Sample Date:	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	-	-
Sample ID:	2337081-05	2337081-07	2337081-08	2337081-10	-	-
Matrix:	Soil	Soil	Soil	Soil	-	-
MDL/Units						

Volatiles

m,p-Xylenes	0.05 ug/g	0.24	-	<0.05	-	-
o-Xylene	0.05 ug/g	0.18	-	<0.05	-	-
Xylenes, total	0.05 ug/g	0.42	-	<0.05	-	-
Toluene-d8	Surrogate	101%	-	105%	-	-

Hydrocarbons

F1 PHCs (C6-C10)	7 ug/g	<7	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g	<4	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g	294	102	139	-	-
F4 PHCs (C34-C50)	6 ug/g	328 [1]	166 [1]	130 [1]	-	-
F4G PHCs (gravimetric)	50 ug/g	608	488	251	-	-

Semi-Volatiles

Acenaphthene	0.02 ug/g	<0.02	<0.02	-	-	-
Acenaphthylene	0.02 ug/g	0.23	<0.02	-	-	-
Anthracene	0.02 ug/g	0.35	<0.02	-	-	-
Benzo [a] anthracene	0.02 ug/g	0.23	<0.02	-	-	-
Benzo [a] pyrene	0.02 ug/g	0.34	<0.02	-	-	-
Benzo [b] fluoranthene	0.02 ug/g	0.79	<0.02	-	-	-
Benzo [g,h,i] perylene	0.02 ug/g	1.17	<0.02	-	-	-
Benzo [k] fluoranthene	0.02 ug/g	0.30	<0.02	-	-	-
Chrysene	0.02 ug/g	0.33	<0.02	-	-	-
Dibenzo [a,h] anthracene	0.02 ug/g	0.12	<0.02	-	-	-
Fluoranthene	0.02 ug/g	0.40	0.03	-	-	-
Fluorene	0.02 ug/g	<0.02	<0.02	-	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g	0.58	<0.02	-	-	-
1-Methylnaphthalene	0.02 ug/g	0.19	<0.02	-	-	-

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Client ID:	TP4-23-G1	TP6-23-G2	TP7-23-G2	DUP1-23		
Sample Date:	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	06-Sep-23 09:00	-	-
Sample ID:	2337081-05	2337081-07	2337081-08	2337081-10		
Matrix:	Soil	Soil	Soil	Soil		
MDL/Units						

Semi-Volatiles

2-Methylnaphthalene	0.02 ug/g	0.25	<0.02	-	-	-	-
Methylnaphthalene (1&2)	0.04 ug/g	0.44	<0.04	-	-	-	-
Naphthalene	0.01 ug/g	0.13	<0.01	-	-	-	-
Phenanthrene	0.02 ug/g	0.27	<0.02	-	-	-	-
Pyrene	0.02 ug/g	0.34	0.02	-	-	-	-
2-Fluorobiphenyl	Surrogate	64.2%	75.4%	-	-	-	-
Terphenyl-d14	Surrogate	68.8%	67.1%	-	-	-	-

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics								
Conductivity	ND	5	uS/cm					
Hydrocarbons								
F1 PHCs (C6-C10)	ND	7	ug/g					
F2 PHCs (C10-C16)	ND	4	ug/g					
F3 PHCs (C16-C34)	ND	8	ug/g					
F4 PHCs (C34-C50)	ND	6	ug/g					
F4G PHCs (gravimetric)	ND	50	ug/g					
Metals								
Antimony	ND	1.0	ug/g					
Arsenic	ND	1.0	ug/g					
Barium	ND	1.0	ug/g					
Beryllium	ND	0.5	ug/g					
Boron	ND	5.0	ug/g					
Cadmium	ND	0.5	ug/g					
Chromium (VI)	ND	0.2	ug/g					
Chromium	ND	5.0	ug/g					
Cobalt	ND	1.0	ug/g					
Copper	ND	5.0	ug/g					
Lead	ND	1.0	ug/g					
Mercury	ND	0.1	ug/g					
Molybdenum	ND	1.0	ug/g					
Nickel	ND	5.0	ug/g					
Selenium	ND	1.0	ug/g					
Silver	ND	0.3	ug/g					
Thallium	ND	1.0	ug/g					
Uranium	ND	1.0	ug/g					
Vanadium	ND	10.0	ug/g					
Zinc	ND	20.0	ug/g					
Semi-Volatiles								
Acenaphthene	ND	0.02	ug/g					
Acenaphthylene	ND	0.02	ug/g					
Anthracene	ND	0.02	ug/g					

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [a] anthracene	ND	0.02	ug/g					
Benzo [a] pyrene	ND	0.02	ug/g					
Benzo [b] fluoranthene	ND	0.02	ug/g					
Benzo [g,h,i] perylene	ND	0.02	ug/g					
Benzo [k] fluoranthene	ND	0.02	ug/g					
Chrysene	ND	0.02	ug/g					
Dibenzo [a,h] anthracene	ND	0.02	ug/g					
Fluoranthene	ND	0.02	ug/g					
Fluorene	ND	0.02	ug/g					
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g					
1-Methylnaphthalene	ND	0.02	ug/g					
2-Methylnaphthalene	ND	0.02	ug/g					
Methylnaphthalene (1&2)	ND	0.04	ug/g					
Naphthalene	ND	0.01	ug/g					
Phenanthrene	ND	0.02	ug/g					
Pyrene	ND	0.02	ug/g					
Surrogate: 2-Fluorobiphenyl	0.721		%	54.1	50-140			
Surrogate: Terphenyl-d14	0.725		%	54.4	50-140			
Volatiles								
Acetone	ND	0.50	ug/g					
Benzene	ND	0.02	ug/g					
Bromodichloromethane	ND	0.05	ug/g					
Bromoform	ND	0.05	ug/g					
Bromomethane	ND	0.05	ug/g					
Carbon Tetrachloride	ND	0.05	ug/g					
Chlorobenzene	ND	0.05	ug/g					
Chloroform	ND	0.05	ug/g					
Dibromochloromethane	ND	0.05	ug/g					
Dichlorodifluoromethane	ND	0.05	ug/g					
1,2-Dichlorobenzene	ND	0.05	ug/g					
1,3-Dichlorobenzene	ND	0.05	ug/g					
1,4-Dichlorobenzene	ND	0.05	ug/g					

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1-Dichloroethane	ND	0.05	ug/g					
1,2-Dichloroethane	ND	0.05	ug/g					
1,1-Dichloroethylene	ND	0.05	ug/g					
cis-1,2-Dichloroethylene	ND	0.05	ug/g					
trans-1,2-Dichloroethylene	ND	0.05	ug/g					
1,2-Dichloropropane	ND	0.05	ug/g					
cis-1,3-Dichloropropylene	ND	0.05	ug/g					
trans-1,3-Dichloropropylene	ND	0.05	ug/g					
1,3-Dichloropropene, total	ND	0.05	ug/g					
Ethylbenzene	ND	0.05	ug/g					
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.05	ug/g					
Hexane	ND	0.05	ug/g					
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g					
Methyl Isobutyl Ketone	ND	0.50	ug/g					
Methyl tert-butyl ether	ND	0.05	ug/g					
Methylene Chloride	ND	0.05	ug/g					
Styrene	ND	0.05	ug/g					
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g					
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g					
Tetrachloroethylene	ND	0.05	ug/g					
Toluene	ND	0.05	ug/g					
1,1,1-Trichloroethane	ND	0.05	ug/g					
1,1,2-Trichloroethane	ND	0.05	ug/g					
Trichloroethylene	ND	0.05	ug/g					
Trichlorofluoromethane	ND	0.05	ug/g					
Vinyl chloride	ND	0.02	ug/g					
m,p-Xylenes	ND	0.05	ug/g					
o-Xylene	ND	0.05	ug/g					
Xylenes, total	ND	0.05	ug/g					
Surrogate: 4-Bromofluorobenzene	7.10		%	88.7	50-140			
Surrogate: Dibromofluoromethane	7.73		%	96.6	50-140			
Surrogate: Toluene-d8	7.92		%	99.0	50-140			

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
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	7.92		%	99.0	50-140			

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	0.08	0.01	N/A	0.08			0.0	30	
Conductivity	141	5	uS/cm	145			2.8	5	
pH	7.71	0.05	pH Units	7.65			0.8	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g	ND			NC	30	
F3 PHCs (C16-C34)	47	8	ug/g	16			NC	30	
F4 PHCs (C34-C50)	78	6	ug/g	40			NC	30	
Metals									
Antimony	ND	1.0	ug/g	ND			NC	30	
Arsenic	5.2	1.0	ug/g	4.9			5.2	30	
Barium	82.4	1.0	ug/g	81.7			1.0	30	
Beryllium	0.7	0.5	ug/g	0.7			9.6	30	
Boron	9.0	5.0	ug/g	7.0			25.6	30	
Cadmium	ND	0.5	ug/g	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g	ND			NC	35	
Chromium	26.7	5.0	ug/g	25.3			5.3	30	
Cobalt	11.7	1.0	ug/g	11.5			1.7	30	
Copper	30.6	5.0	ug/g	30.0			1.8	30	
Lead	13.3	1.0	ug/g	13.2			1.1	30	
Mercury	ND	0.1	ug/g	ND			NC	30	
Molybdenum	1.7	1.0	ug/g	1.3			26.9	30	
Nickel	39.3	5.0	ug/g	34.9			11.7	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	37.3	10.0	ug/g	34.0			9.2	30	
Zinc	59.9	20.0	ug/g	58.3			2.9	30	

Physical Characteristics

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
% Solids	88.5	0.1	% by Wt.	88.8			0.3	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g	ND			NC	40	
Acenaphthylene	0.035	0.02	ug/g	0.040			13.7	40	
Anthracene	ND	0.02	ug/g	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g	0.027			NC	40	
Benzo [a] pyrene	0.028	0.02	ug/g	0.054			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g	0.051			NC	40	
Benzo [g,h,i] perylene	0.035	0.02	ug/g	0.059			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g	0.022			NC	40	
Chrysene	ND	0.02	ug/g	0.027			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g	ND			NC	40	
Fluoranthene	ND	0.02	ug/g	0.026			NC	40	
Fluorene	ND	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	0.022	0.02	ug/g	0.049			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	0.025			NC	40	
Surrogate: 2-Fluorobiphenyl	1.08		%		65.3	50-140			
Surrogate: Terphenyl-d14	1.07		%		64.9	50-140			
Volatiles									
Acetone	ND	0.50	ug/g	ND			NC	50	
Benzene	ND	0.02	ug/g	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g	ND			NC	50	
Bromoform	ND	0.05	ug/g	ND			NC	50	
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	

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Dibromochloromethane	ND	0.05	ug/g	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.05	ug/g	ND			NC	50	
Hexane	ND	0.05	ug/g	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g	ND			NC	50	
Styrene	ND	0.05	ug/g	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	ND	0.05	ug/g	ND			NC	50	
<i>Surrogate: 4-Bromofluorobenzene</i>	8.71		%		101	50-140			
<i>Surrogate: Dibromofluoromethane</i>	8.46		%		98.5	50-140			
<i>Surrogate: Toluene-d8</i>	8.85		%		103	50-140			
Benzene	ND	0.02	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
<i>Surrogate: Toluene-d8</i>	8.85		%		103	50-140			

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	179	7	ug/g	ND	104	85-115			
F2 PHCs (C10-C16)	75	4	ug/g	ND	83.6	60-140			
F3 PHCs (C16-C34)	272	8	ug/g	16	116	60-140			
F4 PHCs (C34-C50)	225	6	ug/g	40	133	60-140			
F4G PHCs (gravimetric)	980	50	ug/g	ND	98.0	80-120			
Metals									
Arsenic	53.0	1.0	ug/g	2.0	102	70-130			
Barium	80.4	1.0	ug/g	32.7	95.6	70-130			
Beryllium	48.9	0.5	ug/g	ND	97.3	70-130			
Boron	49.0	5.0	ug/g	ND	92.3	70-130			
Cadmium	43.7	0.5	ug/g	ND	87.2	70-130			
Chromium (VI)	0.2	0.2	ug/g	ND	81.5	70-130			
Chromium	61.9	5.0	ug/g	10.1	104	70-130			
Cobalt	54.3	1.0	ug/g	4.6	99.3	70-130			
Copper	60.1	5.0	ug/g	12.0	96.2	70-130			
Lead	50.7	1.0	ug/g	5.3	90.9	70-130			
Mercury	1.31	0.1	ug/g	ND	87.2	70-130			
Molybdenum	48.7	1.0	ug/g	ND	96.4	70-130			
Nickel	64.9	5.0	ug/g	14.0	102	70-130			
Selenium	46.1	1.0	ug/g	ND	91.9	70-130			
Silver	40.1	0.3	ug/g	ND	80.1	70-130			
Thallium	43.1	1.0	ug/g	ND	86.0	70-130			
Uranium	48.8	1.0	ug/g	ND	96.9	70-130			
Vanadium	66.4	10.0	ug/g	13.6	106	70-130			
Zinc	71.0	20.0	ug/g	23.3	95.4	70-130			
Semi-Volatiles									
Acenaphthene	0.151	0.02	ug/g	ND	73.0	50-140			
Acenaphthylene	0.199	0.02	ug/g	0.040	76.9	50-140			
Anthracene	0.153	0.02	ug/g	ND	73.9	50-140			
Benzo [a] anthracene	0.179	0.02	ug/g	0.027	73.7	50-140			

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzo [a] pyrene	0.176	0.02	ug/g	0.054	59.1	50-140			
Benzo [b] fluoranthene	0.168	0.02	ug/g	0.051	56.6	50-140			
Benzo [g,h,i] perylene	0.185	0.02	ug/g	0.059	60.9	50-140			
Benzo [k] fluoranthene	0.145	0.02	ug/g	0.022	59.5	50-140			
Chrysene	0.173	0.02	ug/g	0.027	70.4	50-140			
Dibenzo [a,h] anthracene	0.172	0.02	ug/g	ND	83.1	50-140			
Fluoranthene	0.157	0.02	ug/g	0.026	63.4	50-140			
Fluorene	0.151	0.02	ug/g	ND	72.8	50-140			
Indeno [1,2,3-cd] pyrene	0.155	0.02	ug/g	0.049	51.5	50-140			
1-Methylnaphthalene	0.198	0.02	ug/g	ND	95.8	50-140			
2-Methylnaphthalene	0.218	0.02	ug/g	ND	105	50-140			
Naphthalene	0.149	0.01	ug/g	ND	72.1	50-140			
Phenanthrene	0.149	0.02	ug/g	ND	72.0	50-140			
Pyrene	0.151	0.02	ug/g	0.025	61.1	50-140			
<i>Surrogate: 2-Fluorobiphenyl</i>	<i>0.922</i>		%		<i>55.7</i>	<i>50-140</i>			
<i>Surrogate: Terphenyl-d14</i>	<i>0.963</i>		%		<i>58.2</i>	<i>50-140</i>			
Volatiles									
Acetone	12.0	0.50	ug/g	ND	120	50-140			
Benzene	4.21	0.02	ug/g	ND	105	60-130			
Bromodichloromethane	4.22	0.05	ug/g	ND	105	60-130			
Bromoform	3.37	0.05	ug/g	ND	84.3	60-130			
Bromomethane	5.14	0.05	ug/g	ND	129	50-140			
Carbon Tetrachloride	3.17	0.05	ug/g	ND	79.3	60-130			
Chlorobenzene	3.55	0.05	ug/g	ND	88.8	60-130			
Chloroform	5.08	0.05	ug/g	ND	127	60-130			
Dibromochloromethane	3.13	0.05	ug/g	ND	78.2	60-130			
Dichlorodifluoromethane	3.61	0.05	ug/g	ND	90.1	50-140			
1,2-Dichlorobenzene	3.76	0.05	ug/g	ND	94.0	60-130			
1,3-Dichlorobenzene	3.78	0.05	ug/g	ND	94.5	60-130			
1,4-Dichlorobenzene	3.62	0.05	ug/g	ND	90.4	60-130			
1,1-Dichloroethane	4.83	0.05	ug/g	ND	121	60-130			

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichloroethane	4.15	0.05	ug/g	ND	104	60-130			
1,1-Dichloroethylene	4.13	0.05	ug/g	ND	103	60-130			
cis-1,2-Dichloroethylene	4.93	0.05	ug/g	ND	123	60-130			
trans-1,2-Dichloroethylene	4.67	0.05	ug/g	ND	117	60-130			
1,2-Dichloropropane	4.52	0.05	ug/g	ND	113	60-130			
cis-1,3-Dichloropropylene	4.71	0.05	ug/g	ND	118	60-130			
trans-1,3-Dichloropropylene	4.72	0.05	ug/g	ND	118	60-130			
Ethylbenzene	3.42	0.05	ug/g	ND	85.4	60-130			
Ethylene dibromide (dibromoethane, 1,2-)	4.61	0.05	ug/g	ND	115	60-130			
Hexane	5.02	0.05	ug/g	ND	125	60-130			
Methyl Ethyl Ketone (2-Butanone)	10.5	0.50	ug/g	ND	105	50-140			
Methyl Isobutyl Ketone	9.32	0.50	ug/g	ND	93.2	50-140			
Methyl tert-butyl ether	12.7	0.05	ug/g	ND	127	50-140			
Methylene Chloride	4.05	0.05	ug/g	ND	101	60-130			
Styrene	4.14	0.05	ug/g	ND	104	60-130			
1,1,1,2-Tetrachloroethane	4.23	0.05	ug/g	ND	106	60-130			
1,1,2,2-Tetrachloroethane	4.87	0.05	ug/g	ND	122	60-130			
Tetrachloroethylene	3.49	0.05	ug/g	ND	87.2	60-130			
Toluene	3.50	0.05	ug/g	ND	87.4	60-130			
1,1,1-Trichloroethane	5.15	0.05	ug/g	ND	129	60-130			
1,1,2-Trichloroethane	4.93	0.05	ug/g	ND	123	60-130			
Trichloroethylene	3.20	0.05	ug/g	ND	80.0	60-130			
Trichlorofluoromethane	3.57	0.05	ug/g	ND	89.2	50-140			
Vinyl chloride	4.61	0.02	ug/g	ND	115	50-140			
m,p-Xylenes	6.89	0.05	ug/g	ND	86.2	60-130			
o-Xylene	3.38	0.05	ug/g	ND	84.4	60-130			
<i>Surrogate: 4-Bromofluorobenzene</i>	6.94		%		86.8	50-140			
<i>Surrogate: Dibromofluoromethane</i>	8.77		%		110	50-140			
<i>Surrogate: Toluene-d8</i>	7.40		%		92.4	50-140			
Benzene	4.21	0.02	ug/g	ND	105	60-130			
Ethylbenzene	3.42	0.05	ug/g	ND	85.4	60-130			

Certificate of Analysis

Report Date: 15-Sep-2023

Client: Paterson Group Consulting Engineers

Order Date: 11-Sep-2023

Client PO: 58356

Project Description: PE6234

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Toluene	3.50	0.05	ug/g	ND	87.4	60-130			
m,p-Xylenes	6.89	0.05	ug/g	ND	86.2	60-130			
o-Xylene	3.38	0.05	ug/g	ND	84.4	60-130			
Surrogate: Toluene-d8	7.40		%		92.4	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 58356

Report Date: 15-Sep-2023

Order Date: 11-Sep-2023

Project Description: PE6234

Qualifier Notes:

Sample Qualifiers :

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

QC Qualifiers:

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 crite

- When reported, data for F4G has been processed using a silica gel cleanup.

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



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Parcel Order Number (Lab Use Only) 2337081	Chain Of Custody (Lab Use Only)
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Client Name: Paterson Group	Project Ref: PE6234	Page 1 of 1
Contact Name: Samuel Berube	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular
Address: 9 Auriga Dr, Ottawa	PO #: 58356	
Telephone: 613 226 7381	E-mail: Sberube@patersongroup.ca	
		Date Required: _____

<input checked="" type="checkbox"/> REG 153/04 <input type="checkbox"/> 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														
<input type="checkbox"/> Table 1 <input type="checkbox"/> Res/Park <input type="checkbox"/> Med/Fine <input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input type="checkbox"/> Coarse <input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other <input type="checkbox"/> Table _____ For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> REG 558 <input type="checkbox"/> PWQO <input type="checkbox"/> CCME <input type="checkbox"/> MISA <input type="checkbox"/> SU - Sani <input type="checkbox"/> SU - Storm Mun: _____ <input type="checkbox"/> Other: _____		Matrix	Air Volume	# of Containers	Sample Taken		PHCS F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	EC/SAR	PH	HOLD
Sample ID/Location Name							Date	Time										
1	BK1-23-552		S		2	Sept 1/23			X						X			
2	TP1-23-G1		S		1	Sept 6/23									X			
3	TP1-23-G3		S		2	↓			X	X	X	X	X		X	X		
4	TP2-23-G3		S		2				X	X	X	X	X					
5	TP4-23-G1		S		2				X	X	X	X	X					
6	TP4-23-G3		S		2													X
7	TP6-23-G2		S		2				X	X	X	X	X		X			
8	TP7-23-G2		S		2				X		X	X	X			X		
9	TP7-23-G5		S		2				X		X	X	X				X	
10	DUP1-23		S		1						X	X	X					X

Comments:		Method of Delivery: Paracel Courier	
Relinquished By (Sign): Trudy Blair	Received By (Sign): Samuel Berube	Received at Lab: SO	Verified By: SO
Relinquished By (Print): Trudy Blair	Date/Time: Sept 12 2023 3:49 PM	Date/Time: Sept 12 2023 11:40 AM	Date/Time: Sept 13 2023 11:51 AM
Date/Time: Sept 11 2023	Temperature: 5.1 °C	Temperature: 12.4	pH Verified: <input type="checkbox"/> By: _____

Certificate of Analysis

Paterson Group Consulting Engineers (Ottawa)

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Sam Berube

Client PO: 58372
Project: PE6234
Custody: 141904

Report Date: 20-Sep-2023
Order Date: 14-Sep-2023

Order #: 2337347

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

Parcel ID	Client ID
2337347-01	BH1-23-GW1
2337347-02	BH2-23-GW1
2337347-03	BH3-23-GW1

Approved By:



Mark Foto, M.Sc.

Lab Supervisor

Certificate of Analysis

Report Date: 20-Sep-2023

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

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: **PE6234**

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Metals, ICP-MS	EPA 200.8 - ICP-MS	20-Sep-23	20-Sep-23
PHC F1	CWS Tier 1 - P&T GC-FID	15-Sep-23	15-Sep-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	15-Sep-23	16-Sep-23
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	15-Sep-23	15-Sep-23

Certificate of Analysis

Report Date: 20-Sep-2023

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

Client ID:	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	-	-
Sample Date:	13-Sep-23 09:00	13-Sep-23 09:00	13-Sep-23 09:00	-	-
Sample ID:	2337347-01	2337347-02	2337347-03	-	-
Matrix:	Ground Water	Ground Water	Ground Water	-	-
MDL/Units					

Metals

Antimony	0.5 ug/L	-	-	2.3	-	-
Arsenic	1 ug/L	-	-	1	-	-
Barium	1 ug/L	-	-	212	-	-
Beryllium	0.5 ug/L	-	-	<0.5	-	-
Boron	10 ug/L	-	-	233	-	-
Cadmium	0.1 ug/L	-	-	<0.1	-	-
Chromium	1 ug/L	-	-	<1	-	-
Cobalt	0.5 ug/L	-	-	2.2	-	-
Copper	0.5 ug/L	-	-	3.5	-	-
Lead	0.1 ug/L	-	-	0.5	-	-
Molybdenum	0.5 ug/L	-	-	4.6	-	-
Nickel	1 ug/L	-	-	5	-	-
Selenium	1 ug/L	-	-	<1	-	-
Silver	0.1 ug/L	-	-	<0.1	-	-
Sodium	200 ug/L	-	-	382000	-	-
Thallium	0.1 ug/L	-	-	0.2	-	-
Uranium	0.1 ug/L	-	-	5.2	-	-
Vanadium	0.5 ug/L	-	-	0.9	-	-
Zinc	5 ug/L	-	-	<5	-	-

Volatiles

Acetone	5 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	-	-

Certificate of Analysis

Report Date: 20-Sep-2023

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

Client ID:	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	-	-
Sample Date:	13-Sep-23 09:00	13-Sep-23 09:00	13-Sep-23 09:00	-	-
Sample ID:	2337347-01	2337347-02	2337347-03	-	-
Matrix:	Ground Water	Ground Water	Ground Water	-	-
MDL/Units					

Volatiles

Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Dichlorodifluoromethane	1 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	-	-	-
Ethylene dibromide (dibromoethane,	0.2 ug/L	<0.2	<0.2	<0.2	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Hexane	1 ug/L	<1.0	<1.0	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5 ug/L	<5.0	<5.0	<5.0	-	-	-
Methyl Isobutyl Ketone	5 ug/L	<5.0	<5.0	<5.0	-	-	-
Methyl tert-butyl ether	2 ug/L	<2.0	<2.0	<2.0	-	-	-
Methylene Chloride	5 ug/L	<5.0	<5.0	<5.0	-	-	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-

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Report Date: 20-Sep-2023

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

Client ID:	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	-	-
Sample Date:	13-Sep-23 09:00	13-Sep-23 09:00	13-Sep-23 09:00	-	-
Sample ID:	2337347-01	2337347-02	2337347-03	-	-
Matrix:	Ground Water	Ground Water	Ground Water	-	-
MDL/Units					

Volatiles

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 ug/L	<1.0	<1.0	<1.0	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	111%	116%	124%	-	-	-
Toluene-d8	Surrogate	125%	122%	129%	-	-	-
Dibromofluoromethane	Surrogate	104%	109%	109%	-	-	-

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: 20-Sep-2023

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons								
F1 PHCs (C6-C10)	ND	25	ug/L					
F2 PHCs (C10-C16)	ND	100	ug/L					
F3 PHCs (C16-C34)	ND	100	ug/L					
F4 PHCs (C34-C50)	ND	100	ug/L					
Metals								
Antimony	ND	0.5	ug/L					
Arsenic	ND	1	ug/L					
Barium	ND	1	ug/L					
Beryllium	ND	0.5	ug/L					
Boron	ND	10	ug/L					
Cadmium	ND	0.1	ug/L					
Chromium	ND	1	ug/L					
Cobalt	ND	0.5	ug/L					
Copper	ND	0.5	ug/L					
Lead	ND	0.1	ug/L					
Molybdenum	ND	0.5	ug/L					
Nickel	ND	1	ug/L					
Selenium	ND	1	ug/L					
Silver	ND	0.1	ug/L					
Sodium	ND	200	ug/L					
Thallium	ND	0.1	ug/L					
Uranium	ND	0.1	ug/L					
Vanadium	ND	0.5	ug/L					
Zinc	ND	5	ug/L					
Volatiles								
Acetone	ND	5.0	ug/L					
Benzene	ND	0.5	ug/L					
Bromodichloromethane	ND	0.5	ug/L					
Bromoform	ND	0.5	ug/L					
Bromomethane	ND	0.5	ug/L					
Carbon Tetrachloride	ND	0.2	ug/L					
Chlorobenzene	ND	0.5	ug/L					

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Report Date: 20-Sep-2023

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

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

Method Quality Control: Blank

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

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Report Date: 20-Sep-2023

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

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	ND	0.5	ug/L					
Xylenes, total	ND	0.5	ug/L					
Surrogate: 4-Bromofluorobenzene	93.8		%	117	50-140			
Surrogate: Dibromofluoromethane	84.5		%	106	50-140			
Surrogate: Toluene-d8	103		%	128	50-140			

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Report Date: 20-Sep-2023

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	47	25	ug/L	46			2.2	30	
Metals									
Antimony	1.54	0.5	ug/L	1.64			6.6	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	ND	1	ug/L	ND			NC	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	ND	10	ug/L	ND			NC	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	ND	0.5	ug/L	ND			NC	20	
Lead	ND	0.1	ug/L	0.11			NC	20	
Molybdenum	ND	0.5	ug/L	ND			NC	20	
Nickel	ND	1	ug/L	ND			NC	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	249	200	ug/L	241			3.2	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	ND	0.1	ug/L	ND			NC	20	
Vanadium	ND	0.5	ug/L	ND			NC	20	
Zinc	ND	5	ug/L	ND			NC	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	

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Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	13.3	0.5	ug/L	12.1			9.6	30	
Ethylene dibromide (dibromoethane, 1,2-)	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	10.0	0.5	ug/L	9.10			9.8	30	

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Report Date: 20-Sep-2023

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

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
o-Xylene	2.88	0.5	ug/L	2.84			1.4	30	
Surrogate: 4-Bromofluorobenzene	88.4		%		110	50-140			
Surrogate: Dibromofluoromethane	83.5		%		104	50-140			
Surrogate: Toluene-d8	101		%		126	50-140			

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Report Date: 20-Sep-2023

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1860	25	ug/L	ND	93.1	85-115			
F2 PHCs (C10-C16)	1560	100	ug/L	ND	97.5	60-140			
F3 PHCs (C16-C34)	3860	100	ug/L	ND	98.4	60-140			
F4 PHCs (C34-C50)	2150	100	ug/L	ND	86.7	60-140			
Metals									
Arsenic	51.7	1	ug/L	ND	103	80-120			
Barium	48.0	1	ug/L	ND	95.6	80-120			
Beryllium	55.9	0.5	ug/L	ND	112	80-120			
Boron	57	10	ug/L	ND	102	80-120			
Cadmium	48.3	0.1	ug/L	ND	96.4	80-120			
Chromium	53.6	1	ug/L	ND	107	80-120			
Cobalt	51.7	0.5	ug/L	ND	103	80-120			
Copper	51.3	0.5	ug/L	ND	102	80-120			
Lead	45.8	0.1	ug/L	0.11	91.3	80-120			
Molybdenum	45.6	0.5	ug/L	ND	90.4	80-120			
Nickel	51.6	1	ug/L	ND	103	80-120			
Selenium	51.8	1	ug/L	ND	103	80-120			
Silver	50.8	0.1	ug/L	ND	101	80-120			
Sodium	9620	200	ug/L	241	93.8	80-120			
Thallium	47.0	0.1	ug/L	0.10	93.8	80-120			
Uranium	45.5	0.1	ug/L	ND	90.8	80-120			
Vanadium	51.9	0.5	ug/L	ND	104	80-120			
Zinc	52	5	ug/L	ND	103	80-120			
Volatiles									
Acetone	133	5.0	ug/L	ND	133	50-140			
Benzene	35.4	0.5	ug/L	ND	88.4	60-130			
Bromodichloromethane	34.7	0.5	ug/L	ND	86.7	60-130			
Bromoform	49.8	0.5	ug/L	ND	125	60-130			
Bromomethane	29.1	0.5	ug/L	ND	72.8	50-140			
Carbon Tetrachloride	35.6	0.2	ug/L	ND	89.1	60-130			

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Report Date: 20-Sep-2023

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chlorobenzene	45.5	0.5	ug/L	ND	114	60-130			
Chloroform	35.6	0.5	ug/L	ND	89.0	60-130			
Dibromochloromethane	50.6	0.5	ug/L	ND	126	60-130			
Dichlorodifluoromethane	42.6	1.0	ug/L	ND	107	50-140			
1,2-Dichlorobenzene	47.1	0.5	ug/L	ND	118	60-130			
1,3-Dichlorobenzene	47.4	0.5	ug/L	ND	118	60-130			
1,4-Dichlorobenzene	48.4	0.5	ug/L	ND	121	60-130			
1,1-Dichloroethane	33.2	0.5	ug/L	ND	82.9	60-130			
1,2-Dichloroethane	31.6	0.5	ug/L	ND	79.0	60-130			
1,1-Dichloroethylene	41.0	0.5	ug/L	ND	103	60-130			
cis-1,2-Dichloroethylene	39.0	0.5	ug/L	ND	97.6	60-130			
trans-1,2-Dichloroethylene	38.8	0.5	ug/L	ND	97.0	60-130			
1,2-Dichloropropane	29.4	0.5	ug/L	ND	73.6	60-130			
cis-1,3-Dichloropropylene	35.9	0.5	ug/L	ND	89.7	60-130			
trans-1,3-Dichloropropylene	36.6	0.5	ug/L	ND	91.4	60-130			
Ethylbenzene	47.2	0.5	ug/L	ND	118	60-130			
Ethylene dibromide (dibromoethane, 1,2-)	46.8	0.2	ug/L	ND	117	60-130			
Hexane	40.8	1.0	ug/L	ND	102	60-130			
Methyl Ethyl Ketone (2-Butanone)	78.5	5.0	ug/L	ND	78.5	50-140			
Methyl Isobutyl Ketone	73.6	5.0	ug/L	ND	73.6	50-140			
Methyl tert-butyl ether	85.7	2.0	ug/L	ND	85.7	50-140			
Methylene Chloride	47.1	5.0	ug/L	ND	118	60-130			
Styrene	41.4	0.5	ug/L	ND	103	60-130			
1,1,1,2-Tetrachloroethane	44.6	0.5	ug/L	ND	112	60-130			
1,1,2,2-Tetrachloroethane	44.5	0.5	ug/L	ND	111	60-130			
Tetrachloroethylene	50.6	0.5	ug/L	ND	126	60-130			
Toluene	35.7	0.5	ug/L	ND	89.2	60-130			
1,1,1-Trichloroethane	36.4	0.5	ug/L	ND	91.1	60-130			
1,1,2-Trichloroethane	32.8	0.5	ug/L	ND	81.9	60-130			
Trichloroethylene	34.4	0.5	ug/L	ND	86.0	60-130			
Trichlorofluoromethane	42.0	1.0	ug/L	ND	105	60-130			

Certificate of Analysis

Report Date: 20-Sep-2023

Client: Paterson Group Consulting Engineers (Ottawa)

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Vinyl chloride	44.2	0.5	ug/L	ND	110	50-140			
m,p-Xylenes	90.7	0.5	ug/L	ND	113	60-130			
o-Xylene	41.3	0.5	ug/L	ND	103	60-130			
Surrogate: 4-Bromofluorobenzene	85.8		%		107	50-140			
Surrogate: Dibromofluoromethane	84.4		%		106	50-140			
Surrogate: Toluene-d8	80.0		%		100	50-140			

Certificate of Analysis

Report Date: 20-Sep-2023

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

Order Date: 14-Sep-2023

Client PO: 58372

Project Description: PE6234

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.

Parcel ID: 2337347



Parcel Order Number (Lab Use Only) 2337347	Chain Of Custody (Lab Use Only) No 141904
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Client Name: Paterson	Project Ref: PE62034	Page <u> </u> of <u> </u>
Contact Name: Sgm Berube	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular
Address: 9 Auriga	PO #: 58372	
Telephone: 613 226 7381	E-mail: SBerube@patersongroup.ca G.Paterson@patersongroup.ca	Date Required: _____

REG 153/04 <input checked="" type="checkbox"/> REG 408/19 <input type="checkbox"/>		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																	
<input type="checkbox"/> Table 1	<input type="checkbox"/> Res/Park	<input type="checkbox"/> Med/Fine	<input type="checkbox"/> REG 558	<input type="checkbox"/> PWQO	Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CMI	B (HWS)							
<input type="checkbox"/> Table 2	<input type="checkbox"/> Ind/Comm	<input type="checkbox"/> Coarse	<input type="checkbox"/> CCME	<input type="checkbox"/> MISA																			
<input type="checkbox"/> Table 3	<input type="checkbox"/> Agri/Other		<input type="checkbox"/> SU - Sani	<input type="checkbox"/> SU - Storm																			
For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No		Mun: _____		Other: _____		Sample ID/Location Name		Date	Time														
1	BH1-23 - GW1		GW	3	SEP 13 2023					X	X												
2	BH2-23 - GW1		↓	3	↓					X	X												
3	BH3-23 - GW1		↓	4	↓					X	X	X											
4																							
5																							
6																							
7																							
8																							
9																							
10																							

Comments:		Method of Delivery: Paracel Carrier	
Relinquished By (Sign): G.Pat	Received By Driver/Depot:	Received at Lab: Unneepan Dakinai	Verified By: Hisa
Relinquished By (Print): Grant Paterson	Date/Time:	Date/Time: SEP 14, 2023 09:15	Date/Time: SEP 14, 23 9:41
Date/Time: SEP 13 2023	Temperature: _____ °C	Temperature: 3.9 °C	pH Verified: <input checked="" type="checkbox"/> By: Hisa