

Phase II Environmental Site Assessment

75 Breezehill Avenue

Ottawa, Ontario

Prepared for 2729685 Ontario Inc. c/o Fotenn

Report: PE6049-2
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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the property addressed 75 Breezehill Avenue, in the Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II ESA Property.

The subsurface investigation consisted of four (4) boreholes, all which were instrumented with groundwater monitoring wells. The general soil profile encountered during the field program consisted of fill material consisting of silty sand with gravel, traces of crushed stone and organics, underlain by silty clay, overlying glacial till (silty clay with sand, gravel, cobbles and boulders) followed by grey limestone bedrock.

Eight (8) soil samples, including a duplicate sample, were submitted for laboratory analysis of volatile organic compounds (VOCs), petroleum hydrocarbons (PHCs, Fractions F₁-F₄), metals (including, mercury and hexavalent chromium (CrVI)) and polycyclic aromatic hydrocarbons (PAHs). No VOC and PHC concentrations were identified in any of the soil samples analysed. Concentrations of metal and PAH parameters were found to exceed the MECP Table 3 Residential Standards. The exceeding metal parameter was identified to be Arsenic in BH4-23-AU1. The exceeding PAH parameters were identified to be benzo[a]pyrene and fluoranthene in samples BH2-23-SS2 and BH4-23-AU1.

The location of samples tested as part of the Phase II ESA in the soil are shown on PE6049-4 – Analytical Testing Plan – Soil.

Groundwater samples from monitoring wells BH1-23, BH2-23, BH3-23 and BH4-23 were collected during the June 13, 2023, sampling event. No free product or petroleum hydrocarbon sheen was noted on the purge water during the groundwater sampling event.

Groundwater samples were analyzed for VOCs, PHCs, metals and PAHs. Concentrations of PHC's and PAHs were not detected above the laboratory detection limits, while some metals below the MECP Table 3 Residential Standards were identified in each of the groundwater samples analyzed. Toluene and Xylene were identified in the groundwater sample BH4-23-GW1 below the site standards. The groundwater results comply with the MECP Table 3 Standards.

Recommendations

It is our understanding that the Phase II ESA Property will be redeveloped with a 30-storey and a 35-storey residential apartment building consisting of community/commercial space on the ground level and residential space. Due to the change in land use to a more sensitive land use (industrial to residential), a record of site condition (RSC) will be required as per O.Reg 154/03.

Based on the findings of the Phase II ESA, the identified PAH concentrations within soil samples BH2-23-SS2 and BH4-23-AU1 and the metal concentration within soil sample BH4-23-AU1 is considered to be isolated to the fill material in the immediate vicinity of each respective borehole. At this time the identified impacts do not pose a risk to the current on-site operations, however, during redevelopment of the property, it is recommended that a soil remediation program be completed.

Excess soil requiring off-site disposal during construction must be managed in accordance with Ontario Regulation 406/19 – On-site and Excess Soil Management.

Monitoring Wells

If the monitoring wells installed on the Phase II ESA Property are not going to be used in the future, or will be destroyed during site redevelopment, they should be abandoned according to Ontario Regulation 903. The wells will be registered with the MECP under this regulation.

1.0 INTRODUCTION

At the request of 2729685 Ontario Inc. c/o Fotenn, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment at 75 Breezehill (the Phase II ESA Property), in the City of Ottawa, Ontario. The purpose of this Phase II ESA has been to address areas of potential environmental concern (APECs) identified on the Phase II ESA Property, during the Phase I ESA conducted by Paterson in May of 2023.

1.1 Site Description

Address:	75 Breezehill Avenue, Ottawa, Ontario
Location:	The Phase I Property is located on the east side of Breezehill Avenue and on the north side of Laurel Avenue, in the City of Ottawa, Ontario. Refer to Figure 1 – Key Plan in the Figures section following the text.
Legal Description:	Part of Lots 10, 11, 12, 13 and 14 and all of lots D, E and 9, and Loretta Avenue of Registered Plan 73, in the City of Ottawa, Ontario.
PIN:	04107-0004
Latitude and Longitude:	45° 24' 20" N, 75° 43' 3.3" W
Site Description:	
Configuration:	Irregular
Area:	6170.4 m ² (approximately)
Zoning:	IG1 – General Industrial Zone.

1.2 Property Ownership

Paterson was engaged to conduct this Phase I-ESA by Mr. Thomas Freeman of Fotenn on behalf of the property owner 2729685 Ontario Inc.. Mr. Freeman can be reached by telephone at (613) 730-5709.

1.3 Current and Proposed Future Uses

The Phase II ESA Property is currently occupied with a two-storey mixed-use building, located in the eastern portion of the property, backing to the former railway line. A single sea can shipping container was located on the parking areas fronting Laurel Street. A large portion of the western parking lot is used for storage of a U-Haul rental vehicle fleet. The subject building consists of eight tenant spaces, while only one of them was vacant at the time of this assessment. The tenants consist of a mix of commercial retail, warehousing, and storage.

It is our understanding that the proposed future use of the Phase II ESA Property is a 30-storey and 35-storey residential apartment buildings consisting of community/commercial space on the ground level and residential space.

1.4 Applicable Site Condition Standard

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

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

Section 35 of O.Reg. 153/04 does apply to the Phase II ESA Property in that the property does not rely upon potable groundwater.

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

Section 43.1 of O.Reg. 153/04 does not apply to the Phase II ESA Property in that the property is not a Shallow Soil property.

The proposed future use of the Phase II ESA Property is mixed use (residential and commercial); therefore, the Residential Standards have been selected for the purpose of this Phase II ESA.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II ESA Property is located on the east side of Breezehill Avenue and on the north side of Laurel Avenue, in the City of Ottawa, Ontario. The site is situated in an urban mixed-use industrial/commercial area.

The Phase II ESA Property is occupied with a two-storey mixed-use building, located in the eastern portion of the property, backing to the former railway line. A single sea can shipping container was located on the parking areas fronting Laurel Street. A large portion of the western parking lot is used for storage of a U-Haul rental vehicle fleet. Site drainage consists primarily of sheetflow to catch basins located on site and overflow to the neighbouring streets.

The site topography is relatively flat, while the regional topography appears to slope down towards the north, in the general direction of the Rideau River.

2.2 Past Investigations

Paterson completed a Phase I ESA in August of 2023 for the Phase II ESA Property. Based on the findings of the Phase I ESA, seven (7) potentially contaminating activities (PCAs) were determined to result in areas of potential environmental concern (APECs) on the Phase II ESA Property:

- ☐ APEC 1: Resulting from a former fuel storage located on the original two-storey commercial building located at the northeast corner of the Phase I ESA Property (PCA 28).
- ☐ APEC 2: Resulting from “Use of Road Salt for Deicing,” across the Phase I ESA Property (PCA Other).
- ☐ APEC 3: Resulting from the importation of fill material of unknown quality; associated with the possible presence of poor quality fill material located associated with the multiple additions and regrading of the parking lot located in the western portion of the Phase I Property (PCA 30).
- ☐ APEC 4: Resulting from the storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems; associated with the presence of an existing off-site auto service garage at 111 Breezehill Avenue, located adjacent to the west of the Phase I Property (PCA 52).

- ❑ APEC 5: Resulting from the ink manufacturing, processing and bulk storage; associated with the presence of the Canadian Bank Note Limited (formerly British American Bank Note Co.), located 80 m to the south of the Phase I Property (PCA 31).
- ❑ APEC 6: Resulting transfer and storage of coal fuel, possible leakage of storage tanks/containers and discharge of coal petroleum hydrocarbons from the former fuel/coal company located north of the Phase I Property. (PCA Other).
- ❑ APEC 7: Resulting from the storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems; associated with various automotive businesses/motor vehicle repair shops located at 55 Breezehill Avenue (PCA 52).

The rationale for identifying the above APECs is based on a review of fire insurance plans, aerial photographs, field observations, and personal interviews. A Phase II ESA was recommended to address the aforementioned APECs.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted on April 18, 2023. The field program consisted of drilling four (4) boreholes to address the APECs identified on the Phase II ESA Property. All of the boreholes (BH1-23 through BH4-23) were completed with monitoring well installations. One borehole (BH4-23) was cored into the bedrock and terminated at a maximum depth of 13.64 m below the ground surface (mbgs). All other boreholes were drilled to a maximum depth of 9.6 and 9.75 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 this media is based on the Contaminants of Potential Concern identified in the Phase I ESA.

Contaminants of potential concern on the Phase II ESA Property include benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, F1-F4), volatile organic compounds (VOC), polycyclic aromatic hydrocarbons (PAH) and metals (including arsenic, antimony and selenium), mercury (Hg) and hexavalent chromium (CrVI). These CPCs may be present in the soil and/or groundwater beneath the Phase II ESA Property.

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

Based on the available mapping information, the bedrock beneath the Phase I Property generally consists of interbedded limestone and shale of the Verulam Formation, while the surficial geology consists largely of paleozoic rocks with an overburden ranging in thickness from approximately 2 m to 3 m.

Groundwater is anticipated to be encountered within the overburden and flow in a north easterly direction towards the Rideau River.

Water Bodies and Areas of Natural and Scientific Interest

No water bodies or areas of natural and scientific interest were identified within the Phase I Study Area. The nearest named water body with respect to the Phase I Property is the Ottawa River, located approximately 750m to the north.

Drinking Water Wells

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

Existing Buildings and Structures

The Phase I Property is currently occupied with a two-storey commercial warehouse building, that is composed of two additions to the original building. A single basement level is present in the footprint of the original building to the north.

Fill Placement

Based on the historical use of the Phase I ESA Property, fill material of unknown quality is likely present throughout the Phase II ESA Property, resulting from the development of the Phase I ESA Property and the multiple additions constructed to former parking lots.

Fill material is not considered to be present on the eastern portion of the Phase II ESA Property which was occupied by the warehouse structure.

Current and Future Property Use

The Phase I Property is currently being used for commercial office space, commercial warehousing purposes and storage.

It is our understanding that the Phase I Property is to be redeveloped with two multi-storey residential apartment buildings.

Neighbouring Land Use

The surrounding lands within the Phase I Study Area consist largely of commercial and industrial properties, with the exception of some residential land to the east, across Breezehill Avenue.

Current land use is depicted on Drawing PE6049-2 – Surrounding Land Use Plan, in the Figures section of this report.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.1 of the Phase I-ESA report, seven (7) PCAs and the resultant APECs are summarized in Table 1, along with their respective locations and contaminants of potential concern (CPCs).

Table 1 Areas of Potential Environmental Concern					
Area of Potential Environmental Concern	Location of APEC on Phase I Property	Potentially Contaminating Activity (Table 2 – O. Reg. 153/04)	Location of PCA (On-Site or Off-Site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC #1 Former Fuel Storage Tank	Northeastern portion/original two-storey commercial building	<i>“Gasoline and Associated Products Storage and Fixed Tanks”</i>	On-Site	VOCs BTEX PHCs(F ₁ -F ₄)	Soil and Groundwater
APEC #2 Possible Use of Road Salt for De-Icing Purposes	Parking lot	<i>“Item N/A: Use of de-icing salt for safety purposes during snow and ice conditions”</i>	On-Site	EC SAR	Soil

Table 1 (Continued) Areas of Potential Environmental Concern					
APEC #3 Fill Material of Unknown Quality	Parking lot	<i>"Item 30: Importation of Fill Material of Unknown Quality"</i>	On-Site	PAHs Metals	Soil
APEC #4 Existing Automotive Garage	Western portion of parking lot area of Phase I Property	<i>"Item 52: Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems"</i>	Off-Site	VOCs BTEX PHCs (F ₁ -F ₄)	Soil and Groundwater
APEC #5 Existing printing facility	Southern portion of Phase I Property	<i>"Item 31: Ink Manufacturing Processing and Bulk Storage"</i>	Off-Site	VOCs	Groundwater
APEC #6 Former Coal Fuel Storage and Supplier	Northern portion of Phase I Property	<i>"Item Other: Former fuel/coal company located north of the Phase I Property. Transfer and storage of coal fuel, possible leakage of storage tanks/containers and discharge of coal petroleum hydrocarbons"</i>	Off-Site	VOCs BTEX PHCs (F ₁ -F ₄) PAHs Metals Hg CrVI	Soil and Groundwater
APEC #7 Various automotive businesses / motor vehicle repair shops	Northern portion of Phase I Property	<i>"Item 52: Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems"</i>	Off-Site	VOCs BTEX PHCs (F ₁ -F ₄)	Soil and Groundwater

Based on the findings of this assessment, it is understood a substance has been applied to surfaces of the Phase I ESA Property for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both.

In accordance with Section 49.1 of O.Reg. 153/04, any EC and SAR concentrations on the RSC Property that exceed the MECP Table 3 standards for a residential/institutional land use are deemed not to be exceeded for the purpose of Part XV.1 of the Act. This exemption is being relied on for APEC 1.

As previously discussed in Section 7.1 of the Phase I-ESA report, and shown on Drawing PE6049-2-Surrounding Land Use Plan, the remaining off-site PCAs are not considered to represent APECs on the Phase I ESA Property.

Contaminants of Potential Concern

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

- ☐ Benzene, Ethylbenzene, Toluene, and Xylenes (BTEX);
- ☐ Volatile Organic Compounds (VOCs);
- ☐ Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F₁-F₄);
- ☐ Polycyclic Aromatic Hydrocarbons (PAHs);
- ☐ Mercury (Hg⁺)
- ☐ Hexavalent Chromium (Cr^{VI})

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

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I ESA is considered to be sufficient to conclude that there are PCAs and APECs associated with the Phase I Property.

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

3.4 Deviations from Sampling and Analysis Plan

There were no deviations from the Sampling and Analysis Plan which is included in Appendix 1 of this report.

3.5 Impediments

Buried underground stormwater drains and watermain were unable to be accurately located by the utility locator. As a result the location of borehole BH4-23 was unable to be situated adjacent to the building at the southern entrance. Instead, the borehole was drilled on the south west portion on the asphalt portion of the Phase II ESA Property. No other impediments were encountered during the Phase II ESA field program.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation conducted for this Phase II ESA consisted of drilling four (4) boreholes to address the APECs identified on the Phase II ESA Property. All of the boreholes (BH1-23 through BH4-23) were completed with monitoring well installations. One borehole (BH4-23) was cored into the bedrock and terminated at a maximum depth of 13.64 m below the ground surface (mbgs). All other boreholes were drilled to a maximum depth of 9.6 and 9.75 mbgs.

The boreholes were drilled using a low clearance track mounted drill rig operated by George Downing Estate Drilling of Hawkesbury, Ontario, under full-time supervision of Paterson personnel. The borehole locations are indicated on the attached Drawing PE6049-3 - Test Hole Location Plan.

4.2 Soil Sampling

A total of forty-five (45) soil samples and three (3) rock core 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.

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

The borehole profiles generally consist of fill material consisting of silty sand with gravel, traces of crushed stone and organics, underlain by silty clay, overlying glacial till (silty clay with sand, gravel, cobbles and boulders) followed by grey limestone bedrock.

4.3 Field Screening Measurements

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

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

The PID readings were found to range from 0.0 to 5.58 ppm in the soil samples obtained. These results do not indicate the potential for significant contamination from volatile contaminants. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1. The results of the vapour survey are presented on the Soil Profile and Test Data sheets.

4.4 Groundwater Monitoring Well Installation

Three (3) groundwater monitoring wells were installed on the Phase II ESA Property as part of the subsurface investigation. The monitoring wells consisted of 51 mm diameter, Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed below in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

Borehole locations and elevations were surveyed geodetically by Paterson personnel.

TABLE 2. Monitoring Well Construction Details						
Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1-23	63.95	7.52	4.52-7.52	4.22-7.52	0.30-4.22	Flushmount
BH2-23	64.08	7.52	4.52-7.52	4.22-7.52	0.30-4.22	Flushmount
BH3-23	63.76	6.1	3.1-6.1	2.8-6.1	0.30-2.8	Flushmount
BH4-23	63.86	9.1	6.1-9.1	5.8-9.1	0.30-5.8	Flushmount

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, as well as analyzed parameters are presented in Tables 3 and 4.

TABLE 3: Soil Samples Submitted and Analyzed Parameters								
Sample ID	Sample Depth/ Stratigraphic Unit	Parameters Analyzed						Rationale
		VOCs	PHCs (F1-F4)	Metals	Hg	CrVI	PAH	
April 23, 2023								
BH1-23-SS2	0.76-1.37m Fill	X	X	X	X	X	X	Assess the quality of the fill material.
BH1-23-SS9	6.1-6.7m Glacial Till	X	X	X	X	X		Assess potential impacts in the soil resulting from the off-site former coal supplier activities on the adjacent property to the north.
BH2-23-SS2	0.76-1.37m Fill	X	X	X	X	X	X	Assess the quality of the fill material.
BH2-23-SS9	6.1-6.71m Glacial Till	X	X	X	X	X		Assess potential impacts in the soil resulting from the off-site former coal fuel supplier activities on the adjacent property to the north
BH3-23-SS2	0.76-1.37m Fill	X	X	X	X	X	X	Assess the quality of the fill material.
BH3-23-SS6	3.81-4.42m Silty Clay	X	X	X	X	X		Assess potential impacts in the soil resulting from the off-site automotive garage on the adjacent property to the west.
DUP	0.76-1.37m Fill	X	X	X	X	X	X	Duplicate soil sample (BH2-23-SS2) for QA/QC purposes.
April 24, 2023								
BH4-23-AU1	0.25 – 0.61m Fill	X	X				X	Assess the quality of the fill material.
BH4-23-SS7	4.57-5.18m Silty Clay	X	X	X	X	X		Assess potential impacts in the soil resulting from the off-site printing facility on the neighbouring property to the south.

TABLE 4: Groundwater Samples Submitted and Analyzed Parameters								
Sample ID	Screened Interval	Parameters Analyzed						Rationale
		VOCs	PHCs (F1-F4)	Metals	Hg	CrVI	PAH	
March 30 and 31, 2021								
BH1-23-GW1	4.52-7.52m	X	X	X	X	X	X	Assess potential groundwater impacts from the former coal supplier activities on the adjacent property to the north.
BH2-23-GW1	4.52-7.52m	X	X	X	X	X	X	
BH3-23-GW1	3.1-6.1m	X	X	X	X	X	X	Assess potential groundwater impacts from the automotive garage on the adjacent property to the west.
BH4-23-GW1	6.1-9.1m	X	X	X	X	X	X	Assess potential groundwater impacts from the printing facility on the neighbouring property to the south.
DUP	4.52-7.52m	X	X					Duplicate groundwater sample (BH2-GW1) for QA/QC purposes.

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

4.7 Residue Management

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

4.8 Elevation Surveying

Boreholes were surveyed at geodetic elevations by Paterson personnel.

4.9 Quality Assurance and Quality Control Measures

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

5.0 REVIEW AND EVALUATION

5.1 Geology

Site soils consist of fill material consisting of silty sand with gravel, traces of crushed stone and organics, underlain by silty clay, overlying glacial till (silty clay with sand, gravel, cobbles and boulders) followed by grey limestone bedrock.

Bedrock was encountered only in BH4-23 at a depth of approximately 9.83m below grade. Bedrock was cored to a maximum depth of 13.64.97 m below grade.

Groundwater was encountered within the overburden at depths ranging from approximately 3.28 to 4.49 mbgs.

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 events on March 25 of 2021 using an electronic water level meter. Groundwater levels are summarized below in Table 5.

TABLE 5: Groundwater Level Measurements				
Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1-23	63.95	4.17	59.78	June 13, 2023
BH2-23	64.08	4.49	59.59	June 13, 2023
BH3-23	63.76	3.28	60.48	June 13, 2023
BH4-23	63.86	4.3	59.56	June 13, 2023

Based on the groundwater elevations measured during the sampling events, groundwater contour mapping was completed. Groundwater contours are shown on Drawing PE6049-3.

Based on the contour mapping, groundwater flow at the subject site is in a westerly direction. A horizontal hydraulic gradient of approximately 0.005m/m was calculated.

5.3 Fine-Coarse Soil Texture

Grain-size analysis was not completed for the Phase II ESA Property. As such, the more stringent, coarse-grained soil standards were used.

5.4 Soil: Field Screening

Field screening of the soil samples collected during drilling resulted in vapour readings ranging from 0 to 5.8 ppm. 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

Eight (8) soil samples and a duplicate sample were submitted for VOCs, PHCs (F1-F4), and metals (including Hg and Cr(VI)) analysis, while four (4) of these samples were also submitted for PAH analysis. The results of the analytical testing are presented in Tables 1A to 1D in Appendix 1. The laboratory certificate of analysis is provided in Appendix 1.

VOCs

No detectable VOC concentrations were identified in the soil samples analyzed. The VOC parameter soil results comply with the MECP Table 3 Standards.

PHCs (F1-F4)

Detectable PHC parameters were identified in three (3) of the soil samples analyzed. Concentrations of PHC F3-F4 were detected in soil samples BH1-23-SS2, BH2-23-SS2, BH3-23-SS2, and BH4-23-AU. All of the identified concentrations comply with the MECP Table 3 Residential Standards.

Metals

Metal parameters were detected in all of the soil samples analyzed. All metal concentrations comply with the selected MECP Table 3 standards with the exception of arsenic in sample BH4-23-AU1, cobalt in sample BH3-23-SS2 and vanadium in samples BH1-23-SS9, BH3-23-SS2 and BH3-23-SS6.

Cobalt and Vanadium identified within both the fill material and the native silty clay and are considered to be naturally occurring and associated with the Chaplain Sea deposit.

PAHs

PAH parameters were detected in four (4) of the soil samples analyzed. All PAH concentrations comply with the selected MECP Table 3 standards with the exception of benzo[a]pyrene in samples BH2-23-SS2 and BH4-23-AU1, and fluoranthene in samples BH2-23-SS2 and Bh4-23-AU1.

The analytical results for VOC, PHCs, Metals and PAHs tested in soil are shown on Drawing PE6049-4 – Analytical Testing Plan – Soil.

The maximum concentrations of analyzed parameters in the soil at the site are summarized below in Table 6.

TABLE 6: Maximum Concentrations – Soil			
Parameter	Maximum Concentration (µg/g)	Borehole	Depth Interval (m BGS)
PHC F ₃	50	BH4-23-AU1	0.25 – 0.61, Fill
PHC F ₄	90	BH1-23-SS2	0.76-1.37, Fill
Arsenic	<u>19.7</u>	BH3-23-SS2	0.76-1.37, Fill
Barium	(325)		
Beryllium	1		
Boron	9.2	BH1-23-SS2	0.76-1.37, Fill
Chromium (VI)	0.5	BH3-23-SS6	3.81-4.42, Silty Clay
Chromium	(153)	BH3-23-SS2	0.76-1.37, Fill
Cobalt	<u>26</u>		
Copper	52.5		
Lead	55.1	BH4-23-AU1	0.25 – 0.61, Fill
Molybdenum	1.4	BH2-23-SS2	0.76-1.37, Fill
Nickel	80.1	BH3-23-SS2	0.76-1.37, Fill
Uranium	(2.6)	BH4-23-SS7	4.57-5.18, Silty Clay
Vanadium	<u>111</u>	BH3-23-SS2	0.76-1.37, Fill
Zinc	157	BH4-23-AU1	0.25 – 0.61, Fill
Acenaphthene	0.02	BH2-23-SS2	0.76-1.37, Fill
Acenaphthylene	(0.12)	BH4-23-AU1	0.25 – 0.61, Fill
Anthracene	0.1		
Benzo[a]anthracene	(0.39)		
Benzo[a]pyrene	<u>0.45</u>		
Benzo[b]fluoranthene	(0.49)		
Benzo[g,h,i]perylene	0.35		
Benzo[k]fluoranthene	0.25		
Chrysene	0.35		
Dibenzo[a,h]anthracene	0.1		
Note:			
▪ <u>Bold and Underlined</u> – Results exceed Table 3 Standards			
▪ (-) – Parameters in parenthesis exceed the Table 1 Background Standards.			

TABLE 6 (Continued): Maximum Concentrations – Soil			
Parameter	Maximum Concentration (µg/g)	Borehole	Depth Interval (m BGS)
Fluoranthene	0.7	BH4-23-AU1	0.25 – 0.61, Fill
Fluorene	0.02		
Indeno [1,2,3-cd] pyrene	(0.3)		
1-Methylnaphthalene	0.03		
2-Methylnaphthalene	0.05		
Methylnaphthalene	0.07		
Naphthalene	0.05	BH2-23-SS2	0.76-1.37, Fill
Phenanthrene	0.49		
Pryene	0.6		
Note:			
<u>Bold and Underlined</u> – Results exceed Table 3 Standards (-) – Parameters in parenthesis exceed the Table 1 Background Standards.			

No other parameters were identified above the laboratory method detection limits.

5.6 Groundwater Quality

Groundwater samples from monitoring wells installed in BH1-23 through BH4-23 were submitted for laboratory analysis of VOCs and PHCs (fractions, F₁-F₄), metals and PAH analyses. The groundwater samples were obtained from the screened intervals noted in Table 2. The results of the analytical testing are presented in Tables 2A to 2D in Appendix 1. The laboratory certificate of analysis is provided in Appendix 1.

VOCs

No detectable VOC concentrations were identified in the groundwater samples analyzed with the exception of BH3-23-GW1. Toluene and xylenes were identified in groundwater samples BH3-23-GW1 at concentrations below the MECP Table 3 Standards. The groundwater results comply with the MECP Table 3 Standards.

PHCs (F₁-F₄)

No detectable PHC parameters were identified in the groundwater samples analyzed. The groundwater results comply with the MECP Table 3 Standards.

Metals

Metal parameters were identified in all of the groundwater samples analyzed. All identified metal concentrations were below the MECP Table 3 Standards. The groundwater results comply with the MECP Table 3 Standards

PAHs

No detectable PAH parameters were identified in the groundwater samples analyzed. The groundwater results comply with the MECP Table 3 Standards.

The groundwater results comply with the MECP Table 3 Standards. The analytical results for BTEX and PHCs tested in groundwater are shown on Drawing PE6049-5–Analytical Testing Plan – Groundwater.

The maximum concentrations of analyzed parameters in the groundwater at the site are summarized below in Table 7.

TABLE 7: Maximum Concentrations – Groundwater			
Parameter	Maximum Concentration (µg/g)	Borehole	Screened Interval (m BGS)
Arsenic	5	BH3-23-GW1	3.1-6.1
Barium	123	BH4-23-GW1	6.1-9.1
Boron	73	BH3-23-GW1	3.1-6.1
Chromium	4	BH2-23-GW1	4.52-7.52
Copper	1.3	BH1-23-GW1	4.52-7.52
Molybdenum	(30.3)	BH3-23-GW1	3.1-6.1
Nickel	2	BH2-23-GW1	4.52-7.52
Selenium	5		
Sodium	(704000)	BH4-23-GW1	6.1-9.1
Uranium	(9.5)	BH3-23-GW1	3.1-6.1
Vanadium	(5.1)	BH1-23-GW1	4.52-7.52
Toluene	(2.5)	BH3-23-GW1	3.1-6.1
Xylenes	0.8		

Remaining parameters analysed were not identified above the laboratory method detection limits.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of the April 2023 sampling events were handled in accordance with the Analytical Protocol with respect to preservation method, storage requirement, and container type.

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

A duplicate soil sample and groundwater sample (DUP) were obtained from BH2-23-SS2 and BH2-23-GW1 and analyzed for VOCs. Test results for the duplicate soil and groundwater samples and their respective parent samples did not identify any VOC parameter concentration above the laboratory detection limit.

Based on the analytical laboratory results, it is our opinion that the overall quality of the field data collected during this Phase II-ESA is considered to be sufficient to meet the overall objectives of this assessment.

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 153/04, 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 Phase I ESA completed for the subject site, seven (7) PCAs and the resultant APECs are summarized in Table 1 in Section 3.3, along with their respective locations and contaminants of potential concern (CPCs).

Contaminants of Potential Concern

As per Section 3.3, the contaminants of potential concern (CPCs) in soil and/or groundwater include benzene, toluene, ethylbenzene, xylenes (BTEX), volatile organic compounds (VOCs), petroleum hydrocarbons (PHCs, F₁-F₄), metals (including mercury (Hg) and hexavalent chromium (CrVI)) and polycyclic aromatic hydrocarbons (PAH).

Subsurface Structures and Utilities

The Phase I ESA Property is situated in a municipally serviced area. Underground utilities and/or structures includes municipal water main, natural gas line, a manhole and catch basin on the western asphalt portion of the Phase II ESA Property.

Based on the findings of the Phase II ESA, any former underground utilities were not expected to affect contaminant distribution and transport.

Physical Setting

Site Stratigraphy

The stratigraphy consists of:

- ☐ An asphaltic concrete structure of approximately 0.08 m thick, overlies the fill material consisting of silty sand with gravel and traces of crushed stone and organics. The fill material extended to depths of approximately 0.69 to 1.83 mbgs. Groundwater was not encountered in this layer.
- ☐ Silty clay was encountered in all of the boreholes, extending to depths of approximately 6.1 to 9.75 mbgs. Groundwater was encountered in this layer at all boreholes.
- ☐ Glacial till consisting of silty sand to sandy silt with clay, gravel, cobbles and boulders was encountered in boreholes BH3-23 and Bh4-23, extending to depths of approximately 9.83 to 9.75 mbgs.
- ☐ Limestone bedrock was encountered in borehole BH4-23 and terminated in this layer at an approximate depth of 13.64 mbgs.

Hydrogeological Characteristics

Groundwater at the Phase II ESA Property was encountered in the silty clay layer. During the most recent groundwater monitoring event, groundwater flow was measured in a westerly direction, with a hydraulic gradient of 0.005 m/m. Groundwater contours are shown on Drawing PE6049-3 – Test Hole Location Plan.

Approximate Depth to Bedrock

Bedrock was encountered during the drilling program at an approximate depth of 9.83 mbgs.

Approximate Depth to Water Table

The depth to the water table at the subject site varies between approximately 3.28 to 4.49 m below existing grade.

Sections 41 and 43.1 of the Regulation

Section 41 of the Regulation does not apply to the Phase II ESA Property, in that the subject property is not within 30m of an environmentally sensitive area.

Section 43.1 of the Regulation does not apply to the Phase II ESA Property as bedrock is located more than 2 m below ground surface.

Fill Placement

The fill material consisted of silty sand with gravel, traces of crushed stone and organics was identified in all of the boreholes, which extended to depths of 0.69 to 1.83 mbgs.

Existing Buildings and Structures

There are a single two-storey warehouse buildings present on the Phase II ESA Property. A temporary shipping container is present adjacent to the south of the subject building and is currently used for storage. No other structures are present.

Proposed Buildings and Other Structures

The proposed site development for the Phase II ESA Property will include a 30-storey and a 35-storey residential apartment building consisting of community/commercial space on the ground level and residential space.

Areas of Natural Significance

There are no areas of natural significance in the Phase I Study Area.

Water Bodies

There are no natural water bodies in the Phase I Study Area.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of this Phase II -ESA, the fill material in the immediate vicinity of BH3-23 (central portion of the Phase II property) and BH4-23 (southern portion of the Phase II property) exceed the MECP Table 3 residential standards for metal parameters (arsenic, cobalt and vanadium). Additionally, the fill material in the immediate vicinity of BH2-23 (northern portion of the Phase II property) and BH4-23 (southern portion of the Phase II property) exceed the MECP Table 3 residential standards for PAH parameters (Benzo[a]pyrene and fluoranthene). Based on the findings of the Phase I – ESA, the identified PAH and arsenic impact is considered to be limited in extent and is isolated to the fill material in the immediate vicinity of BH2-23 and BH4-23.

Types of Contaminants

Based on the analytical findings of this Phase II -ESA, the fill material in the immediate vicinity of BH2-23 and BH4-23 exceeds the MECP Table 3 Residential Standards for the Metal (arsenic) and PAH parameters (Benzo[a]pyrene and fluoranthene).

Contaminated Media

Based on the analytical findings of this Phase II -ESA, the fill material in the immediate vicinity of BH2-23 and BH4-23 exceeds the MECP Table 3 Residential Standards for the Metal (arsenic) and PAH parameters (Benzo[a]pyrene and fluoranthene).

What Is Known About Areas Where Contaminants Are Present

Based on the findings of the Phase I and Phase II ESAs, PAH and metal concentrations identified in the fill material on the property are considered to the result of importation of poor-quality fill material for grading purposes during development.

Cobalt and Vanadium were also identified with both the fill material and the native silty clay and are considered to be naturally occurring and associated with the Chaplain Sea deposit.

Distribution and Migration of Contaminants

Based on the findings of this Phase II -ESA, the fill material in the immediate vicinity of BH3-23 (central portion of the Phase II property) and BH4-23 (southern portion of the Phase II property) exceed the MECP Table 3 residential standards for metal parameters (arsenic, cobalt and vanadium). The identified PAH and arsenic impact is considered to be limited in extent and is isolated to the fill material in the immediate vicinity of BH2-23 and BH4-23.

It should also be noted that the impacted fill material was not located within the water table, further limiting the potential for distribution/migration. The identified impact is not considered to have had the potential to migrate into other areas of the Phase II Property.

Discharge of Contaminants

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

Climatic and Meteorological Conditions

In general, climatic and meteorological conditions have the potential to affect contaminant distribution. Two (2) ways by which climatic and meteorological conditions may affect contaminant distribution include the downward leaching of contaminants 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 analytical results contaminant distribution is not considered to have occurred on the Phase II ESA Property.

Potential for Vapour Intrusion

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

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the property addressed 75 Breezehill Avenue, in the Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II ESA Property.

The subsurface investigation consisted of four (4) boreholes, all which were instrumented with groundwater monitoring wells. The general soil profile encountered during the field program consisted of fill material consisting of silty sand with gravel, traces of crushed stone and organics, underlain by silty clay, overlying glacial till (silty clay with sand, gravel, cobbles and boulders) followed by grey limestone bedrock.

Eight (8) soil samples, including a duplicate sample, were submitted for laboratory analysis of volatile organic compounds (VOCs), petroleum hydrocarbons (PHCs, Fractions F₁-F₄), metals (including, mercury and hexavalent chromium (CrVI)) and polycyclic aromatic hydrocarbons (PAHs). No VOC and PHC concentrations were identified in any of the soil samples analysed. Concentrations of metal and PAH parameters were found to exceed the MECP Table 3 Residential Standards. The exceeding metal parameter was identified to be Arsenic in BH4-23-AU1. The exceeding PAH parameters were identified to be benzo[a]pyrene and fluoranthene in samples BH2-23-SS2 and BH4-23-AU1.

The location of samples tested as part of the Phase II ESA in the soil are shown on PE6049-4 – Analytical Testing Plan – Soil.

Groundwater samples from monitoring wells BH1-23, BH2-23, BH3-23 and BH4-23 were collected during the June 13, 2023, sampling event. No free product or petroleum hydrocarbon sheen was noted on the purge water during the groundwater sampling event.

Groundwater samples were analyzed for VOCs, PHCs, metals and PAHs. Concentrations of PHC's and PAHs were not detected above the laboratory detection limits, while some metals below the MECP Table 3 Residential Standards were identified in each of the groundwater samples analyzed. Toluene and Xylene were identified in the groundwater sample BH4-23-GW1 below the site standards. The groundwater results comply with the MECP Table 3 Standards.

Recommendations

It is our understanding that the Phase II ESA Property will be redeveloped with a 30-storey and a 35-storey residential apartment building consisting of community/commercial space on the ground level and residential space.

Based on the findings of the Phase II ESA, the identified PAH concentrations within soil samples BH2-23-SS2 and BH4-23-AU1 and the metal concentration within soil sample BH4-23-AU1 is considered to be isolated to the fill material in the immediate vicinity of each respective borehole. At this time the identified impacts do not pose a risk to the current on-site operations, however, during redevelopment of the property, it is recommended that a soil remediation program be completed.

Excess soil requiring off-site disposal during construction must be managed in accordance with Ontario Regulation 406/19 – On-site and Excess Soil Management.

Monitoring Wells

If the monitoring wells installed on the Phase II ESA Property are not going to be used in the future, or will be destroyed during site redevelopment, they should be abandoned according to Ontario Regulation 903. The wells will be registered with the MECP under this regulation.

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared under the supervision of a Qualified Person, in general accordance with O.Reg. 153/04, as amended, and meets the requirements of CSA Z769-00 (reaffirmed 2016). 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 2729685 Ontario Inc. and Fotenn. Notification from 2729685 Ontario Inc., Fotenn and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.



Mark St Pierre, P.Eng.



Michael Beaudoin, P.Eng., QP_{ESA}



Report Distribution:

- 2729685 Ontario Inc. c/o Fotenn
- Paterson Group

FIGURES

Figure 1 - Key Plan

Drawing PE6049-3 – Test Hole Location Plan & Groundwater Contour Plan

Drawing PE6049-4 – Analytical Testing Plan – Soil

Drawing PE6049-5 – Analytical Testing Plan – Groundwater

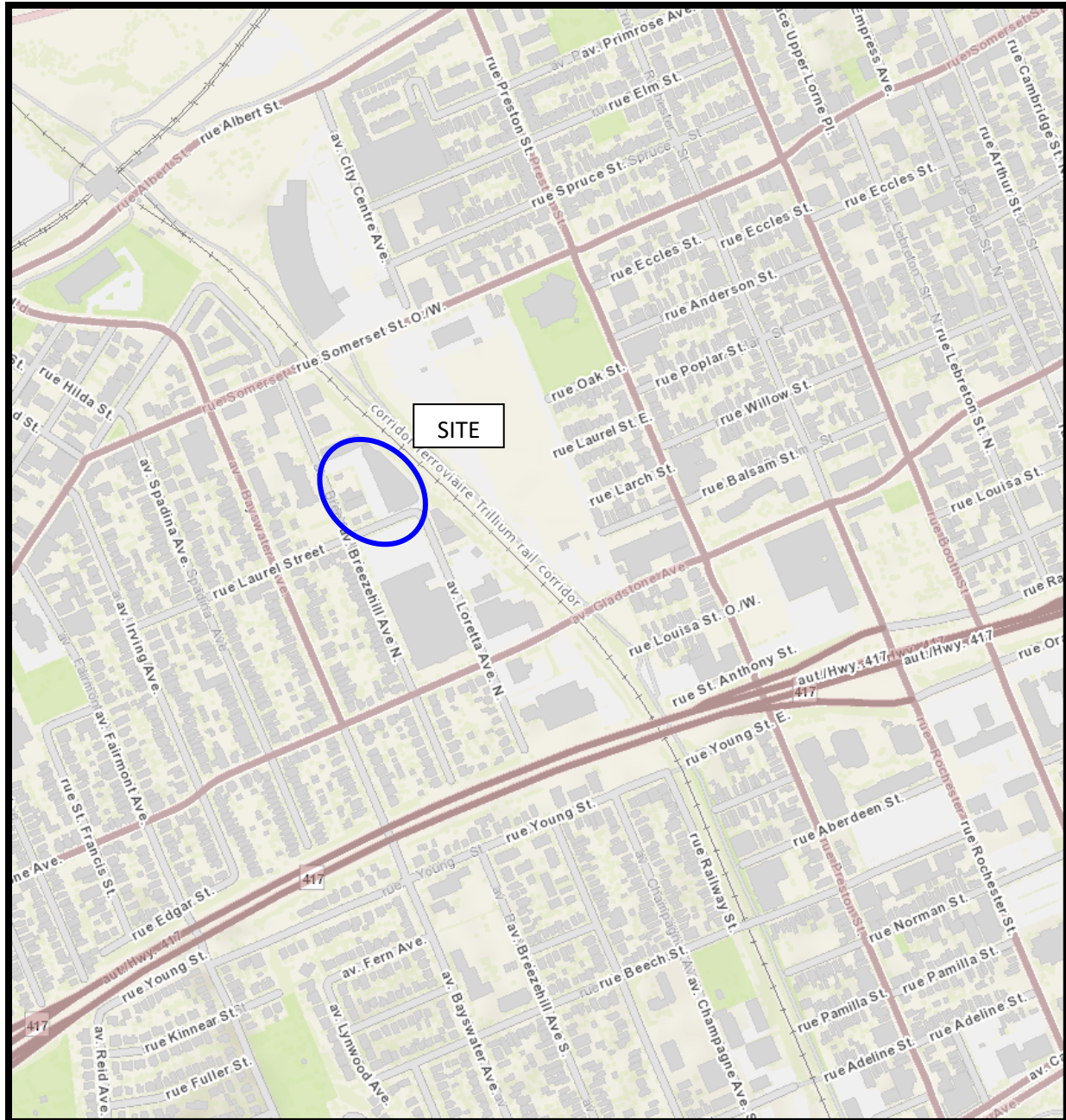
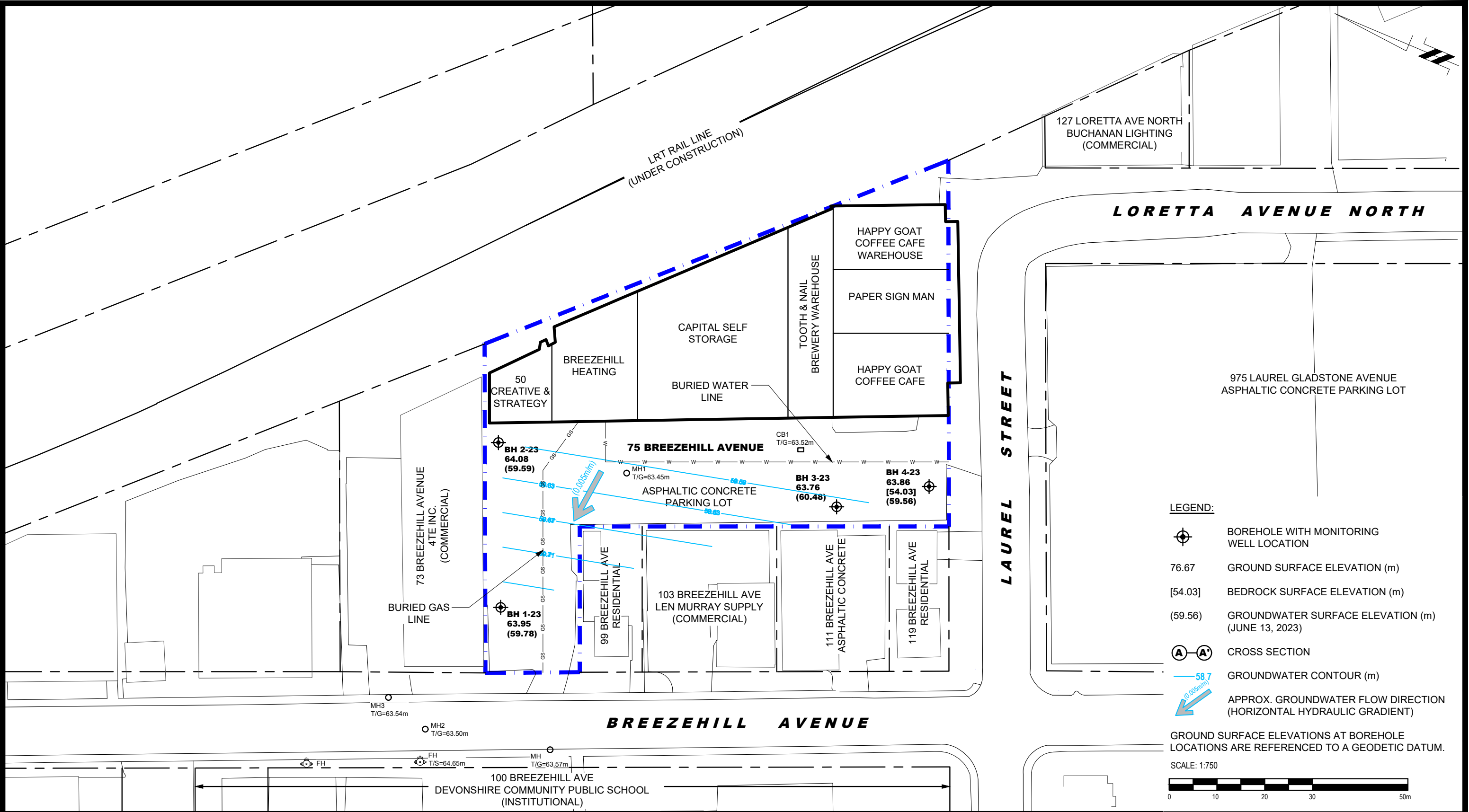


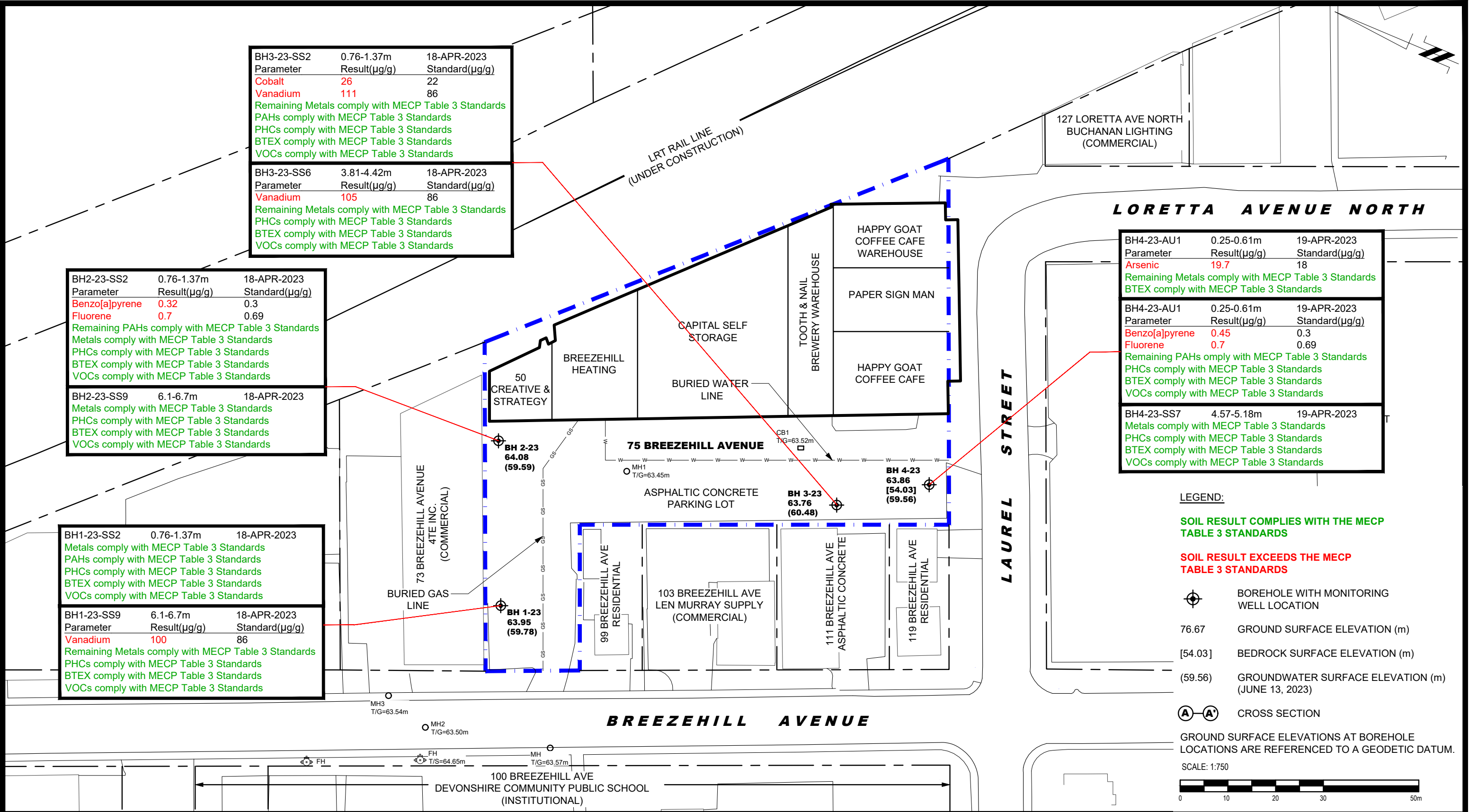
FIGURE 1
KEY PLAN



- LEGEND:**
- BOREHOLE WITH MONITORING WELL LOCATION
 - 76.67 GROUND SURFACE ELEVATION (m)
 - [54.03] BEDROCK SURFACE ELEVATION (m)
 - (59.56) GROUNDWATER SURFACE ELEVATION (m) (JUNE 13, 2023)
 - CROSS SECTION
 - GROUNDWATER CONTOUR (m)
 - APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

GROUND SURFACE ELEVATIONS AT BOREHOLE LOCATIONS ARE REFERENCED TO A GEODETIC DATUM.
SCALE: 1:750

 PATERSON GROUP 9 AURIGA DRIVE OTTAWA, ON K2E 7T9 TEL: (613) 226-7381					2729685 ONTARIO INC. PHASE II - ENVIRONMENTAL SITE ASSESSMENT 75 BREEZEHILL AVENUE NORTH OTTAWA, ONTARIO	Scale:	1:750	Date:	09/2023
						Drawn by:	YA	Report No.:	PE6049-2
						Checked by:	MSP	Dwg. No.: PE6049-3	
						Approved by:	MB		Revision No.:
	NO.	REVISIONS	DATE	INITIAL	Title:	TEST HOLE LOCATION PLAN			



BH3-23-SS2	0.76-1.37m	18-APR-2023
Parameter	Result(µg/g)	Standard(µg/g)
Cobalt	26	22
Vanadium	111	86
Remaining Metals comply with MECP Table 3 Standards		
PAHs comply with MECP Table 3 Standards		
PHCs comply with MECP Table 3 Standards		
BTEX comply with MECP Table 3 Standards		
VOCs comply with MECP Table 3 Standards		

BH3-23-SS6	3.81-4.42m	18-APR-2023
Parameter	Result(µg/g)	Standard(µg/g)
Vanadium	105	86
Remaining Metals comply with MECP Table 3 Standards		
PHCs comply with MECP Table 3 Standards		
BTEX comply with MECP Table 3 Standards		
VOCs comply with MECP Table 3 Standards		

BH2-23-SS2	0.76-1.37m	18-APR-2023
Parameter	Result(µg/g)	Standard(µg/g)
Benzo[a]pyrene	0.32	0.3
Fluorene	0.7	0.69
Remaining PAHs comply with MECP Table 3 Standards		
Metals comply with MECP Table 3 Standards		
PHCs comply with MECP Table 3 Standards		
BTEX comply with MECP Table 3 Standards		
VOCs comply with MECP Table 3 Standards		

BH2-23-SS9	6.1-6.7m	18-APR-2023
Metals comply with MECP Table 3 Standards		
PHCs comply with MECP Table 3 Standards		
BTEX comply with MECP Table 3 Standards		
VOCs comply with MECP Table 3 Standards		

BH1-23-SS2	0.76-1.37m	18-APR-2023
Metals comply with MECP Table 3 Standards		
PAHs comply with MECP Table 3 Standards		
PHCs comply with MECP Table 3 Standards		
BTEX comply with MECP Table 3 Standards		
VOCs comply with MECP Table 3 Standards		

BH1-23-SS9	6.1-6.7m	18-APR-2023
Parameter	Result(µg/g)	Standard(µg/g)
Vanadium	100	86
Remaining Metals comply with MECP Table 3 Standards		
PHCs comply with MECP Table 3 Standards		
BTEX comply with MECP Table 3 Standards		
VOCs comply with MECP Table 3 Standards		

BH4-23-AU1	0.25-0.61m	19-APR-2023
Parameter	Result(µg/g)	Standard(µg/g)
Arsenic	19.7	18
Remaining Metals comply with MECP Table 3 Standards		
BTEX comply with MECP Table 3 Standards		

BH4-23-AU1	0.25-0.61m	19-APR-2023
Parameter	Result(µg/g)	Standard(µg/g)
Benzo[a]pyrene	0.45	0.3
Fluorene	0.7	0.69
Remaining PAHs comply with MECP Table 3 Standards		
PHCs comply with MECP Table 3 Standards		
BTEX comply with MECP Table 3 Standards		
VOCs comply with MECP Table 3 Standards		

BH4-23-SS7	4.57-5.18m	19-APR-2023
Metals comply with MECP Table 3 Standards		
PHCs comply with MECP Table 3 Standards		
BTEX comply with MECP Table 3 Standards		
VOCs comply with MECP Table 3 Standards		

LEGEND:

SOIL RESULT COMPLIES WITH THE MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS THE MECP TABLE 3 STANDARDS

BOREHOLE WITH MONITORING WELL LOCATION

76.67 GROUND SURFACE ELEVATION (m)

[54.03] BEDROCK SURFACE ELEVATION (m)

(59.56) GROUNDWATER SURFACE ELEVATION (m) (JUNE 13, 2023)

CROSS SECTION

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

SCALE: 1:750

0 10 20 30 40 50m

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

NO.	REVISIONS	DATE	INITIAL

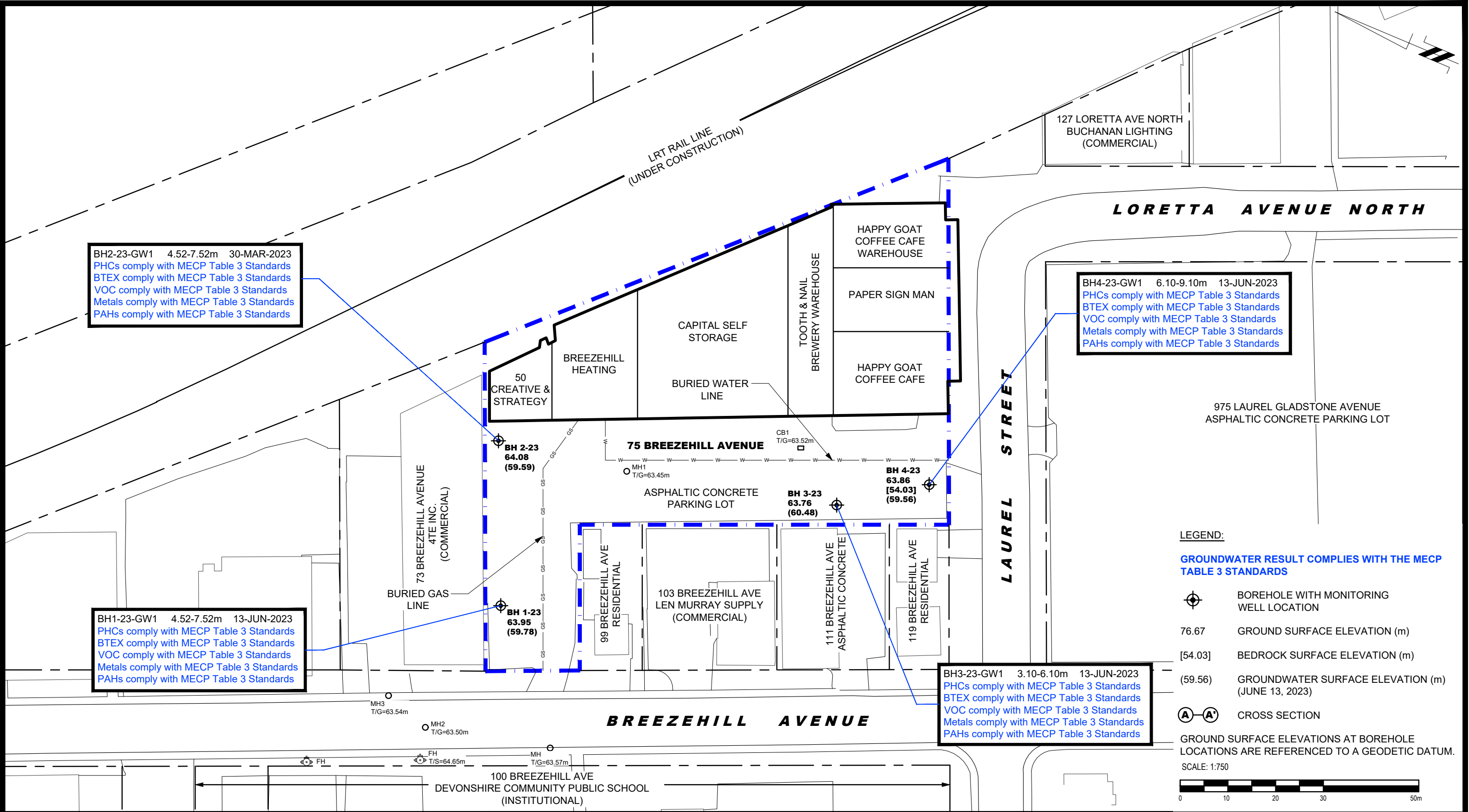
2729685 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
75 BREEZEHILL AVENUE NORTH

OTTAWA, ONTARIO

Title: ANALYTICAL TESTING PLAN - SOIL

Scale:	1:750	Date:	09/2023
Drawn by:	YA	Report No.:	PE6049-2
Checked by:	MSP	Dwg. No.:	PE6049-4
Approved by:	MB	Revision No.:	



LEGEND:

BOREHOLE WITH MONITORING WELL LOCATION

76.67 GROUND SURFACE ELEVATION (m)

[54.03] BEDROCK SURFACE ELEVATION (m)

(59.56) GROUNDWATER SURFACE ELEVATION (m) (JUNE 13, 2023)

CROSS SECTION

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

SCALE: 1:750

 PATERSON GROUP 9 AURIGA DRIVE OTTAWA, ON K2E 7T9 TEL: (613) 226-7381					2729685 ONTARIO INC. PHASE II - ENVIRONMENTAL SITE ASSESSMENT 75 BREEZEHILL AVENUE NORTH OTTAWA, ONTARIO	Scale:	1:750	Date:	09/2023
						Drawn by:	YA	Report No.:	PE6049-2
						Checked by:	MSP	Dwg. No.: PE6049-5	
						Approved by:	MB		Revision No.:
					Title: ANALYTICAL TESTING PLAN - GROUNDWATER				
	NO.	REVISIONS	DATE	INITIAL					

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

ANALYTICAL TEST RESULTS

LABORATORY CERTIFICATES OF ANALYSIS

Sampling and Analysis Plan

Phase II-Environmental Site Assessment
75 Breezehill Avenue, Ottawa, Ontario

Prepared for 2729685 Ontario Inc. c/o Fotenn

**Report: PE6049-SAP
April 2023**

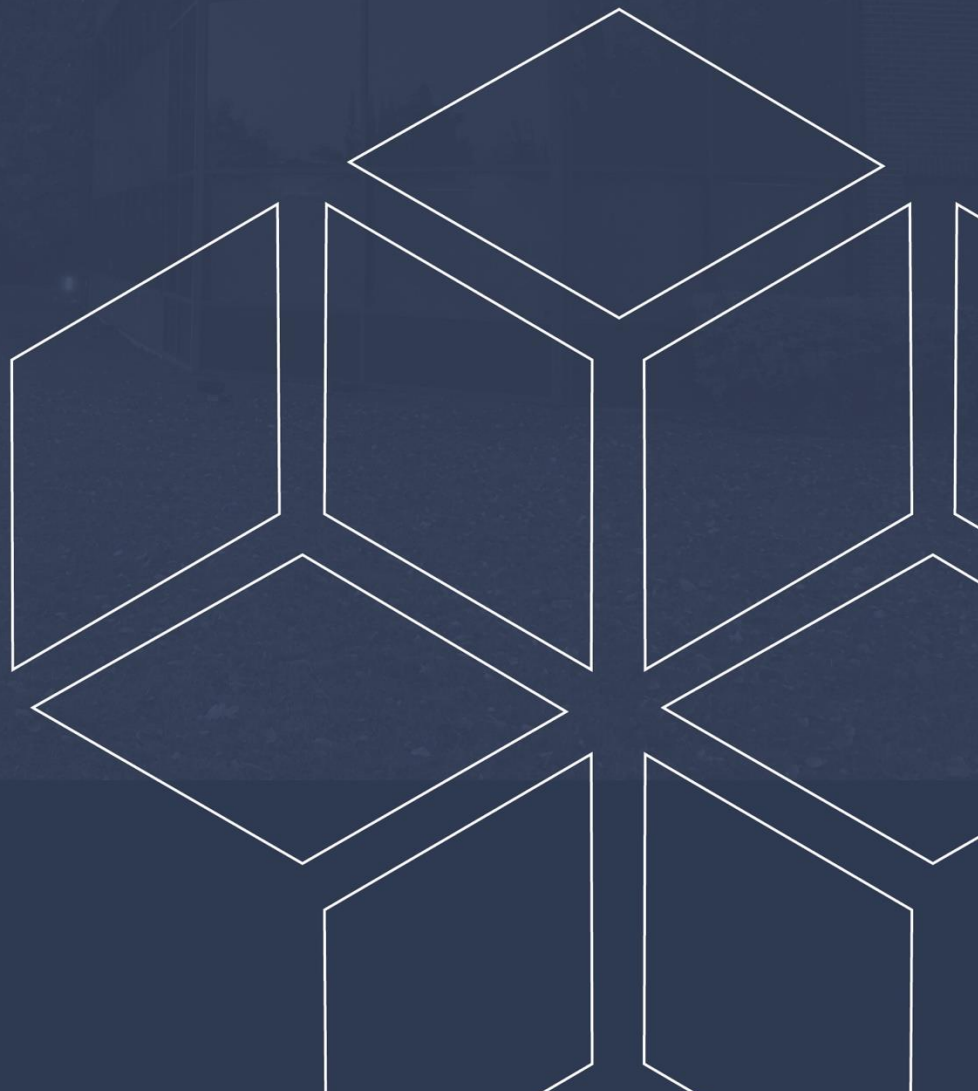


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1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by WestUrban Developments Ltd. to conduct a Phase II Environmental Site Assessment (ESA) for the property addressed, 75 Breezehill Avenue, Ottawa, Ontario. Based on the Phase I ESA conducted by Paterson, a subsurface investigation program, consisting of borehole drilling was developed to investigate potential areas of environmental impact on the Phase II Property.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-23	Place borehole on the northwestern portion of the Phase II Property to assess the potential soil and groundwater impact due to the former operation of a coal supplier, and to assess the quality of any fill material (APECs 1, 2 and 5).	Drill to an approximate depth of 10m for geotechnical purposes. Install groundwater monitoring well to straddle groundwater table based on observations made during field program.
BH2-23	Place borehole on the northeastern portion of the Phase II Property the assess the potential soil and groundwater impact due to the former operation of a coal supplier, and to assess the quality of any fill material (APECs 1, 2 and 5).	
BH3-23	Place borehole on the western central area of the Phase II Property to assess the potential soil and groundwater impact due to the automotive garage activities, and to assess the quality of any fill material (APEC 1, 2 and 3).	
BH4-23	Place borehole on the southeaster portion of the Phase II Property to assess the potential soil and groundwater impact due to the printing facility activities, and to assess the quality of any fill material (APECs 1, 2 and 4).	

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

Following borehole drilling, monitoring wells will be installed in selected boreholes (as above) for the measurement of water levels and the collection of groundwater samples. Borehole locations are shown on the Test Hole Location Plan appended to the main report.

2.0 ANALYTICAL TESTING PROGRAM

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

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

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

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

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

All borehole locations and elevations were surveyed geodetically by Paterson Personnel, during the field program.

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, which 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" [1.52 m x 50 mm] threaded sections of Schedule 40 PVC slotted well screen (5' x 1 1/4" [1.52 m x 32 mm] if installing in cored hole in bedrock)
- ☐ 5' x 2" [1.52 m x 50 mm] threaded sections of Schedule 40 PVC riser pipe (5' x 1 1/4" [1.52 m x 32 mm] 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 (0.5 x) the laboratory detection limit.

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS TO SAMPLING & ANALYSIS PLAN

Physical impediments to the Sampling and Analysis plan may include:

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

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

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
75 Breezehill Avenue
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE April 18, 2023

FILE NO.
PE6049

HOLE NO.
BH 1-23

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 %			
								20	40	60	80	
GROUND SURFACE												
Asphaltic concrete 0.05		AU	1			0	63.95	●				
FILL: Brown silty sand ith gravel, 0.18												
crushed stone, some clay 0.60		SS	2	17	13	1	62.95	●				
FILL: Brown silty sand with gravel,1.07												
trace clay and asphalt		SS	3	100	12	2	61.95	●				
FILL: Brown silty clay with sand and gravel												
		SS	4	100	8			●				
		SS	5	100	P	3	60.95	●				
		SS	6	100	P	4	59.95	●				
Hard to very stiff, brown SILTY CLAY		SS	7	100	P	5	58.95	●				
		SS	8	92	P			●				
		SS	9	75		6	57.95	●				
- stiff and grey by 6.0m depth						7	56.95					
						8	55.95					
						9	54.95					
End of Borehole 9.60												
(GWL @ 4.17m - June 13, 2023)												

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
75 Breezehill Avenue
Ottawa, Ontario

DATUM Geodetic

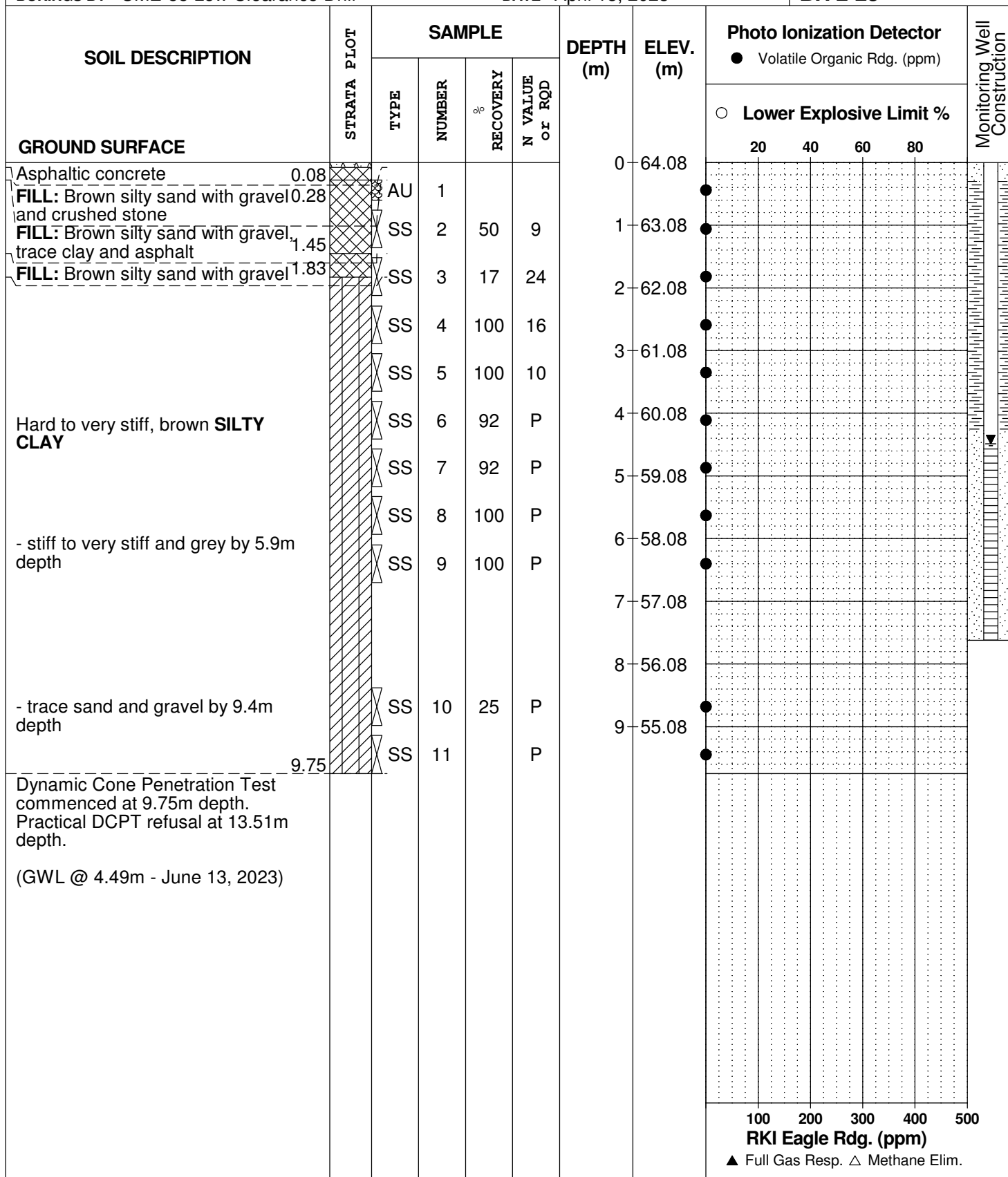
REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE April 18, 2023

FILE NO.
PE6049

HOLE NO.
BH 2-23



DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE April 18, 2023

FILE NO.
PE6049

HOLE NO.
BH 3-23

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		
Asphaltic concrete 0.08		AU	1			0	63.76						
FILL: Brown silty sand with gravel and crushed stone 0.25													
FILL: Brown silty clay with sand, gravel, trace organics 0.91		SS	2	25	13	1	62.76						
		SS	3	100	14	2	61.76						
		SS	4	100	8	3	60.76						
Hard to very stiff, brown SILTY CLAY		SS	5	100	P	4	59.76						
		SS	6	100	P	5	58.76						
- stiff to very stiff and grey by 4.6m depth		SS	7	100	P	6	57.76						
		SS	8	100	P	7	56.76						
6.02		SS	9	92	P	8	55.76						
GLACIAL TILL: Very stiff to stiff, grey silty clay, trace sand, gravel and cobbles		SS	10	75	5	9	54.76						
- gravel content increasing with depth 7.54													
		SS	11	83	10	10							
GLACIAL TILL: Compact, grey silty sand to sandy silt with clay, gravel, cobbles and boulders		SS	12	100	50+	11							
		SS	13		20	12							
9.75						13							
Dynamic Cone Penetration Test commenced at 9.75m depth. Practical DCPT refusal at 10.34m depth.													
(GWL @ 3.28m - June 13, 2023)													

DATUM Geodetic

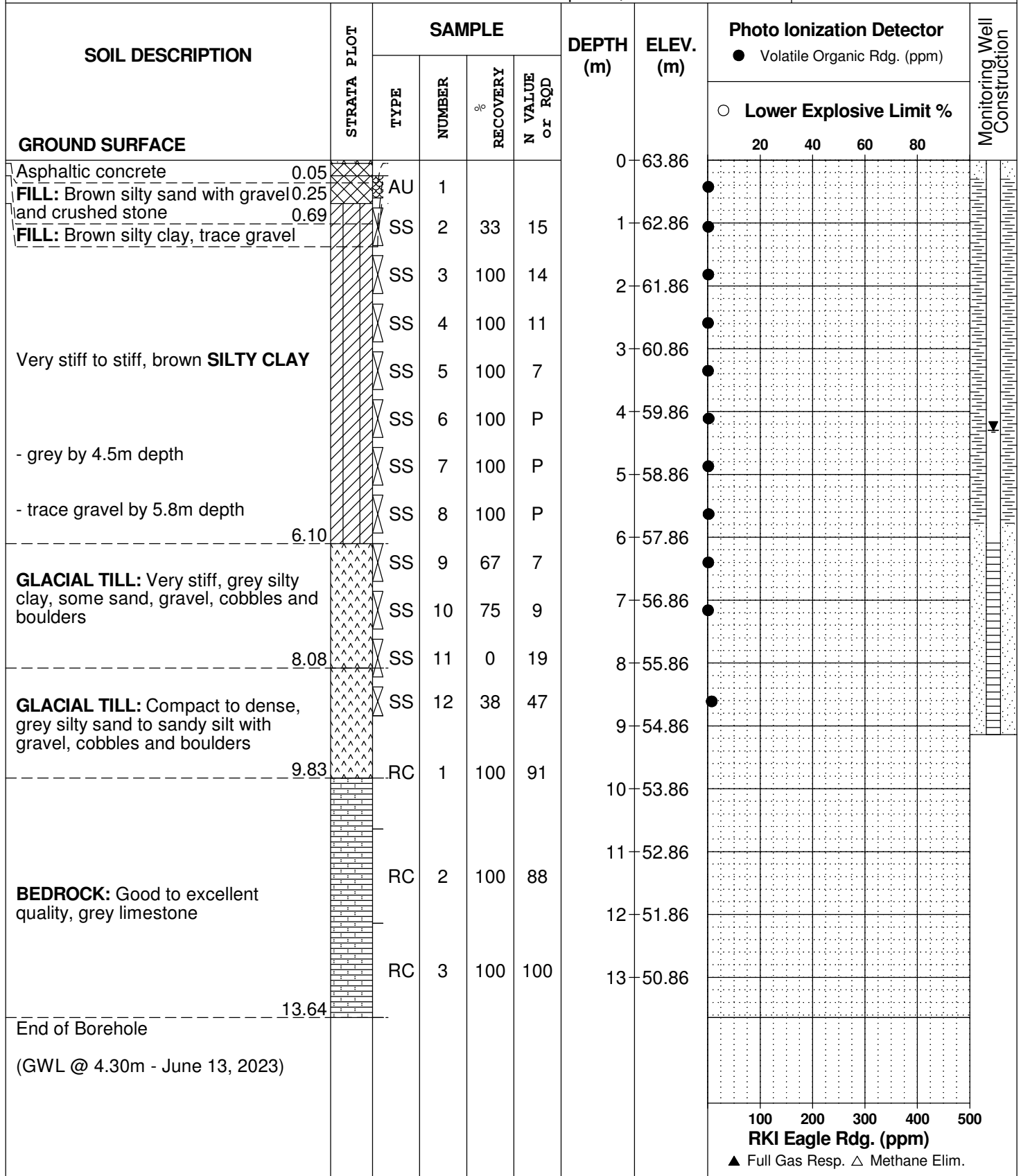
REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE April 19, 2023

FILE NO.
PE6049

HOLE NO.
BH 4-23



SYMBOLS AND TERMS

SOIL DESCRIPTION

Behavioural properties, such as structure and strength, take precedence over particle gradation in describing soils. Terminology describing soil structure are as follows:

Desiccated	-	having visible signs of weathering by oxidation of clay minerals, shrinkage cracks, etc.
Fissured	-	having cracks, and hence a blocky structure.
Varved	-	composed of regular alternating layers of silt and clay.
Stratified	-	composed of alternating layers of different soil types, e.g. silt and sand or silt and clay.
Well-Graded	-	Having wide range in grain sizes and substantial amounts of all intermediate particle sizes (see Grain Size Distribution).
Uniformly-Graded	-	Predominantly of one grain size (see Grain Size Distribution).

The standard terminology to describe the relative strength of cohesionless soils is the compactness condition, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm. An SPT N value of "P" denotes that the split-spoon sampler was pushed 300 mm into the soil without the use of a falling hammer.

Compactness Condition	'N' Value	Relative Density %
Very Loose	<4	<15
Loose	4-10	15-35
Compact	10-30	35-65
Dense	30-50	65-85
Very Dense	>50	>85

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory shear vane tests, unconfined compression tests, or occasionally by the Standard Penetration Test (SPT). Note that the typical correlations of undrained shear strength to SPT N value (tabulated below) tend to underestimate the consistency for sensitive silty clays, so Paterson reviews the applicable split spoon samples in the laboratory to provide a more representative consistency value based on tactile examination.

Consistency	Undrained Shear Strength (kPa)	'N' Value
Very Soft	<12	<2
Soft	12-25	2-4
Firm	25-50	4-8
Stiff	50-100	8-15
Very Stiff	100-200	15-30
Hard	>200	>30

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity, S_t , is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil. The classes of sensitivity may be defined as follows:

Low Sensitivity:	$S_t < 2$
Medium Sensitivity:	$2 < S_t < 4$
Sensitive:	$4 < S_t < 8$
Extra Sensitive:	$8 < S_t < 16$
Quick Clay:	$S_t > 16$

ROCK DESCRIPTION

The structural description of the bedrock mass is based on the Rock Quality Designation (RQD).

The RQD classification is based on a modified core recovery percentage in which all pieces of sound core over 100 mm long are counted as recovery. The smaller pieces are considered to be a result of closely-spaced discontinuities (resulting from shearing, jointing, faulting, or weathering) in the rock mass and are not counted. RQD is ideally determined from NQ or larger size core. However, it can be used on smaller core sizes, such as BQ, if the bulk of the fractures caused by drilling stresses (called “mechanical breaks”) are easily distinguishable from the normal in situ fractures.

RQD %	ROCK QUALITY
90-100	Excellent, intact, very sound
75-90	Good, massive, moderately jointed or sound
50-75	Fair, blocky and seamy, fractured
25-50	Poor, shattered and very seamy or blocky, severely fractured
0-25	Very poor, crushed, very severely fractured

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube, generally recovered using a piston sampler
G	-	"Grab" sample from test pit or surface materials
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size BQ, NQ, HQ, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC%	-	Natural water content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic Limit, % (water content above which soil behaves plastically)
PI	-	Plasticity Index, % (difference between LL and PL)
Dxx	-	Grain size at which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D_{30})^2 / (D_{10} \times D_{60})$
Cu	-	Uniformity coefficient = D_{60} / D_{10}

Cc and Cu are used to assess the grading of sands and gravels:

Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$

Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$

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

Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

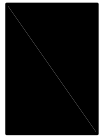
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidation ratio = p'_c / p'_o
Void Ratio		Initial sample void ratio = volume of voids / volume of solids
Wo	-	Initial water content (at start of consolidation test)

PERMEABILITY TEST

k	-	Coefficient of permeability or hydraulic conductivity is a measure of the ability of water to flow through the sample. The value of k is measured at a specified unit weight for (remoulded) cohesionless soil samples, because its value will vary with the unit weight or density of the sample during the test.
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SYMBOLS AND TERMS (continued)

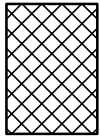
STRATA PLOT



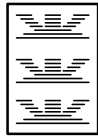
Topsoil



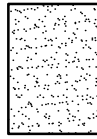
Asphalt



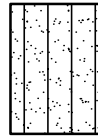
Fill



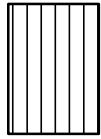
Peat



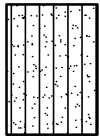
Sand



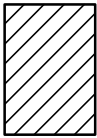
Silty Sand



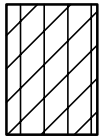
Silt



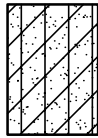
Sandy Silt



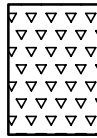
Clay



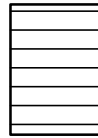
Silty Clay



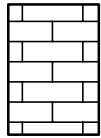
Clayey Silty Sand



Glacial Till



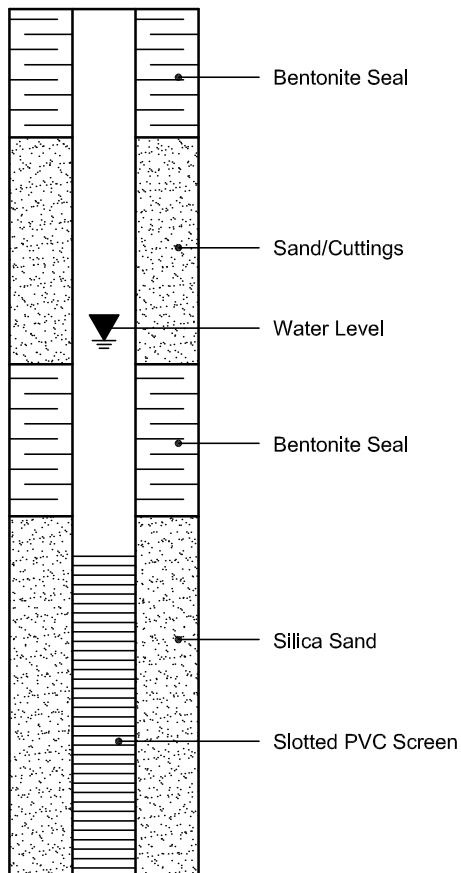
Shale



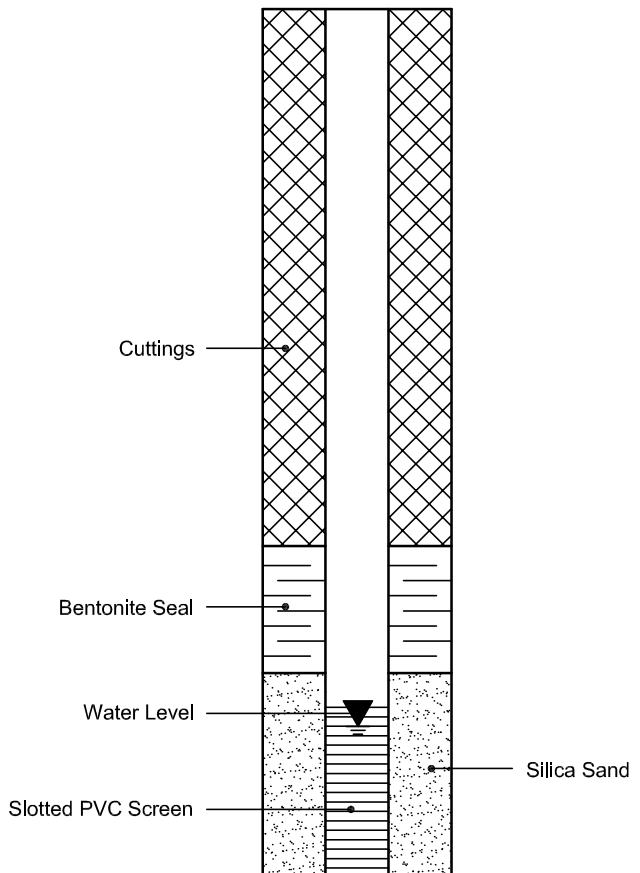
Bedrock

MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Parameter	Units	MDL	Regulation	Sample								
				BH1-23-SS2 2317215-01	BH1-23-SS9 2317215-02	BH2-23-SS2 2317215-03	BH2-23-SS9 2317215-04	BH3-23-SS2 2317215-05	BH3-23-SS6 2317215-06	BH4-23-AU1 2317215-07	BH4-23-SS7 2317215-08	BH2-23-SS2 (DUP) 2317215-09
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 3 Residential, coarse	04/18/2023	04/18/2023	04/18/2023	04/18/2023	04/18/2023	04/18/2023	04/19/2023	04/19/2023	04/18/2023
Volatiles												
Acetone	ug/g dry	0.50	16 ug/g dry	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Benzene	ug/g dry	0.02	0.21 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)	ND (0.02)
Bromodichloromethane	ug/g dry	0.05	13 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Bromoform	ug/g dry	0.05	0.27 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Bromomethane	ug/g dry	0.05	0.05 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Carbon Tetrachloride	ug/g dry	0.05	0.05 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Chlorobenzene	ug/g dry	0.05	2.4 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Chloroform	ug/g dry	0.05	0.05 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Dibromochloromethane	ug/g dry	0.05	9.4 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Dichlorodifluoromethane	ug/g dry	0.05	16 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,2-Dichlorobenzene	ug/g dry	0.05	3.4 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,3-Dichlorobenzene	ug/g dry	0.05	4.8 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,4-Dichlorobenzene	ug/g dry	0.05	0.083 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,1-Dichloroethane	ug/g dry	0.05	3.5 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,2-Dichloroethane	ug/g dry	0.05	0.05 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,1-Dichloroethylene	ug/g dry	0.05	0.05 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
cis-1,2-Dichloroethylene	ug/g dry	0.05	3.4 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
trans-1,2-Dichloroethylene	ug/g dry	0.05	0.084 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,2-Dichloropropane	ug/g dry	0.05	0.05 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
cis-1,3-Dichloropropylene	ug/g dry	0.05		ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
trans-1,3-Dichloropropylene	ug/g dry	0.05		ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,3-Dichloropropene, total	ug/g dry	0.05	0.05 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Ethylbenzene	ug/g dry	0.05	2 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Ethylene dibromide (dibrom)	ug/g dry	0.05	0.05 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Hexane	ug/g dry	0.05	2.8 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Methyl Ethyl Ketone (2-But)	ug/g dry	0.50	16 ug/g dry	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Methyl Isobutyl Ketone	ug/g dry	0.50	1.7 ug/g dry	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)	ND (0.50)
Methyl tert-butyl ether	ug/g dry	0.05	0.75 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Methylene Chloride	ug/g dry	0.05	0.1 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Styrene	ug/g dry	0.05	0.7 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,1,1,2-Tetrachloroethane	ug/g dry	0.05	0.058 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,1,2,2-Tetrachloroethane	ug/g dry	0.05	0.05 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Tetrachloroethylene	ug/g dry	0.05	0.28 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Toluene	ug/g dry	0.05	2.3 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,1,1-Trichloroethane	ug/g dry	0.05	0.38 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
1,1,2-Trichloroethane	ug/g dry	0.05	0.05 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Trichloroethylene	ug/g dry	0.05	0.061 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Trichlorofluoromethane	ug/g dry	0.05	4 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Vinyl Chloride	ug/g dry	0.02	0.02 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)	ND (0.02)
m/p-Xylene	ug/g dry	0.05		ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
o-Xylene	ug/g dry	0.05		ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)
Xylenes, total	ug/g dry	0.05	3.1 ug/g dry	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)

230 Exceeds MECP Table 3
ND (0.02) Non-detect
N/A Parameter not analyzed

Parameter	Units	MDL	Regulation	Sample							
				BH1-23-SS2 2317215-01	BH1-23-SS9 2317215-02	BH2-23-SS2 2317215-03	BH2-23-SS9 2317215-04	BH3-23-SS2 2317215-05	BH3-23-SS6 2317215-06	BH4-23-AU1 2317215-07	BH4-23-SS7 2317215-08
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 3 Residential, coarse	04/18/2023	04/18/2023	04/18/2023	04/18/2023	04/18/2023	04/18/2023	04/19/2023	04/19/2023
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)
F2 PHCs (C10-C16)	ug/g dry	4	98 ug/g dry	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)	ND (4)
F3 PHCs (C16-C34)	ug/g dry	8	300 ug/g dry	29	ND (8)	23	ND (8)	ND (8)	ND (8)	50	ND (8)
F4 PHCs (C34-C50)	ug/g dry	6	2800 ug/g dry	90	ND (6)	31	ND (6)	ND (6)	ND (6)	66	ND (6)

230 Exceeds MECP Table 3
ND (0.02) Non-detect
N/A Parameter not analyzed

Parameter	Units	MDL	Regulation	Sample								
				BH1-23-SS2 2317215-01	BH1-23-SS9 2317215-02	BH2-23-SS2 2317215-03	BH2-23-SS9 2317215-04	BH3-23-SS2 2317215-05	BH3-23-SS6 2317215-06	BH4-23-AU1 2317215-07	BH4-23-SS7 2317215-08	BH2-23-SS2 (DUP) 2317215-09
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 3 Residential, coarse	04/18/2023	04/18/2023	04/18/2023	04/18/2023	04/18/2023	04/18/2023	04/19/2023	04/19/2023	04/18/2023
Metals												
Antimony	ug/g dry	1.0	7.5 ug/g dry	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	N/A
Arsenic	ug/g dry	1.0	18 ug/g dry	6	2.6	5.6	2.7	3.7	2.4	19.7	3.2	N/A
Barium	ug/g dry	1.0	390 ug/g dry	313	320	158	233	325	284	170	196	N/A
Beryllium	ug/g dry	0.5	4 ug/g dry	0.8	0.7	0.6	0.6	1	0.7	0.8	0.8	N/A
Boron	ug/g dry	5.0	120 ug/g dry	9.2	ND (5.0)	8.2	ND (5.0)	8.4	6.2	9.1	7.7	N/A
Cadmium	ug/g dry	0.5	1.2 ug/g dry	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	N/A
Chromium (VI)	ug/g dry	0.2	8 ug/g dry	0.4	ND (0.2)	0.5	ND (0.2)	ND (0.2)	0.5	ND (0.2)	0.2	N/A
Chromium	ug/g dry	5.0	160 ug/g dry	83.1	91.6	38.3	63.9	153	120	63.8	90.4	N/A
Cobalt	ug/g dry	1.0	22 ug/g dry	18.2	20.3	10.1	15.8	26	21.8	14.3	18.2	N/A
Copper	ug/g dry	5.0	140 ug/g dry	47.5	47.7	23.5	34.2	52.5	50.7	47.1	38.9	N/A
Lead	ug/g dry	1.0	120 ug/g dry	34.5	4.1	15.4	3.9	7	4.9	55.1	5.1	N/A
Mercury	ug/g dry	0.1	0.27 ug/g dry	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	N/A
Molybdenum	ug/g dry	1.0	6.9 ug/g dry	1.1	1.1	1.4	1.1	ND (1.0)	ND (1.0)	1.3	ND (1.0)	N/A
Nickel	ug/g dry	5.0	100 ug/g dry	47.7	51.7	22.4	36.6	80.1	63.8	35.3	48.2	N/A
Selenium	ug/g dry	1.0	2.4 ug/g dry	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	N/A
Silver	ug/g dry	0.3	20 ug/g dry	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	ND (0.3)	N/A
Thallium	ug/g dry	1.0	1 ug/g dry	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	N/A
Uranium	ug/g dry	1.0	23 ug/g dry	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	2.6	N/A
Vanadium	ug/g dry	10.0	86 ug/g dry	79.5	100	63.3	81.1	111	105	63.6	85.8	N/A
Zinc	ug/g dry	20.0	340 ug/g dry	116	115	119	88.8	130	115	157	96.9	N/A

230 Exceeds MECP Table 3
ND (0.02) Non-detect
N/A Parameter not analyzed

Parameter	Units	MDL	Regulation	Sample								
				BH1-23-SS2 2317215-01	BH1-23-SS9 2317215-02	BH2-23-SS2 2317215-03	BH2-23-SS9 2317215-04	BH3-23-SS2 2317215-05	BH3-23-SS6 2317215-06	BH4-23-AU1 2317215-07	BH4-23-SS7 2317215-08	BH2-23-SS2 (DUP) 2317215-09
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 3 Residential, coarse	04/18/2023	04/18/2023	04/18/2023	04/18/2023	04/18/2023	04/18/2023	04/19/2023	04/19/2023	04/18/2023
Semi-Volatiles												
Acenaphthene	ug/g dry	0.02	7.9 ug/g dry	ND (0.02)	N/A	0.02	N/A	ND (0.02)	N/A	0.02	N/A	N/A
Acenaphthylene	ug/g dry	0.02	0.15 ug/g dry	ND (0.02)	N/A	0.1	N/A	ND (0.02)	N/A	0.12	N/A	N/A
Anthracene	ug/g dry	0.02	0.67 ug/g dry	ND (0.02)	N/A	0.08	N/A	ND (0.02)	N/A	0.1	N/A	N/A
Benzo[a]anthracene	ug/g dry	0.02	0.5 ug/g dry	0.03	N/A	0.27	N/A	0.02	N/A	0.39	N/A	N/A
Benzo[a]pyrene	ug/g dry	0.02	0.3 ug/g dry	0.03	N/A	0.32	N/A	0.03	N/A	0.45	N/A	N/A
Benzo[b]fluoranthene	ug/g dry	0.02	0.78 ug/g dry	0.04	N/A	0.34	N/A	0.03	N/A	0.49	N/A	N/A
Benzo[g,h,i]perylene	ug/g dry	0.02	6.6 ug/g dry	0.03	N/A	0.26	N/A	0.03	N/A	0.35	N/A	N/A
Benzo[k]fluoranthene	ug/g dry	0.02	0.78 ug/g dry	ND (0.02)	N/A	0.16	N/A	ND (0.02)	N/A	0.25	N/A	N/A
Chrysene	ug/g dry	0.02	7 ug/g dry	0.03	N/A	0.27	N/A	0.02	N/A	0.35	N/A	N/A
Dibenzo[a,h]anthracene	ug/g dry	0.02	0.1 ug/g dry	ND (0.02)	N/A	0.06	N/A	ND (0.02)	N/A	0.1	N/A	N/A
Fluoranthene	ug/g dry	0.02	0.69 ug/g dry	0.06	N/A	0.7	N/A	0.04	N/A	0.7	N/A	N/A
Fluorene	ug/g dry	0.02	62 ug/g dry	ND (0.02)	N/A	ND (0.02)	N/A	ND (0.02)	N/A	0.02	N/A	N/A
Indeno [1,2,3-cd] pyrene	ug/g dry	0.02	0.38 ug/g dry	0.02	N/A	0.22	N/A	0.03	N/A	0.3	N/A	N/A
1-Methylnaphthalene	ug/g dry	0.02	0.99 ug/g dry	ND (0.02)	N/A	0.03	N/A	ND (0.02)	N/A	0.03	N/A	N/A
2-Methylnaphthalene	ug/g dry	0.02	0.99 ug/g dry	ND (0.02)	N/A	0.03	N/A	ND (0.02)	N/A	0.05	N/A	N/A
Methylnaphthalene (1&2)	ug/g dry	0.04	0.99 ug/g dry	ND (0.04)	N/A	0.06	N/A	ND (0.04)	N/A	0.07	N/A	N/A
Naphthalene	ug/g dry	0.01	0.6 ug/g dry	0.02	N/A	0.05	N/A	ND (0.01)	N/A	0.05	N/A	N/A
Phenanthrene	ug/g dry	0.02	6.2 ug/g dry	0.05	N/A	0.49	N/A	0.02	N/A	0.35	N/A	N/A
Pyrene	ug/g dry	0.02	78 ug/g dry	0.05	N/A	0.6	N/A	0.03	N/A	0.56	N/A	N/A

230 Exceeds MECP Table 3
ND (0.02) Non-detect
N/A Parameter not analyzed

Parameter	Units	MDL	Regulation	Sample				
				BH1-23-GW1 2324216-01 06/13/2023 09:00 AM	BH2-23-GW1 2324216-02 06/13/2023 09:00 AM	BH3-23-GW1 2324216-03 06/13/2023 09:00 AM	BH4-23-GW1 2324216-04 06/13/2023 09:00 AM	DUP 2324216-05 06/13/2023 09:00 AM
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 3 Non-Potable Groundwater, coarse					
Volatiles								
Acetone	ug/L	5.0	130000 ug/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Benzene	ug/L	0.5	44 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromodichloromethane	ug/L	0.5	85000 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromoform	ug/L	0.5	380 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Bromomethane	ug/L	0.5	5.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Carbon Tetrachloride	ug/L	0.2	0.79 ug/L	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Chlorobenzene	ug/L	0.5	630 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Chloroform	ug/L	0.5	2.4 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Dibromochloromethane	ug/L	0.5	82000 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Dichlorodifluoromethane	ug/L	1.0	4400 ug/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
1,2-Dichlorobenzene	ug/L	0.5	4600 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,3-Dichlorobenzene	ug/L	0.5	9600 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,4-Dichlorobenzene	ug/L	0.5	8 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1-Dichloroethane	ug/L	0.5	320 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2-Dichloroethane	ug/L	0.5	1.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1-Dichloroethylene	ug/L	0.5	1.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
cis-1,2-Dichloroethylene	ug/L	0.5	1.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
trans-1,2-Dichloroethylene	ug/L	0.5	1.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,2-Dichloropropane	ug/L	0.5	16 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
cis-1,3-Dichloropropylene	ug/L	0.5		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
trans-1,3-Dichloropropylene	ug/L	0.5		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,3-Dichloropropene, total	ug/L	0.5	5.2 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylbenzene	ug/L	0.5	2300 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Ethylene dibromide (dibro)	ug/L	0.2	0.25 ug/L	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
Hexane	ug/L	1.0	51 ug/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Methyl Ethyl Ketone (2-Bu)	ug/L	5.0	470000 ug/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Methyl Isobutyl Ketone	ug/L	5.0	140000 ug/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Methyl tert-butyl ether	ug/L	2.0	190 ug/L	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)
Methylene Chloride	ug/L	5.0	610 ug/L	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
Styrene	ug/L	0.5	1300 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,1,2-Tetrachloroethane	ug/L	0.5	3.3 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,2,2-Tetrachloroethane	ug/L	0.5	3.2 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Tetrachloroethylene	ug/L	0.5	1.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Toluene	ug/L	0.5	18000 ug/L	ND (0.5)	ND (0.5)	2.5	ND (0.5)	ND (0.5)
1,1,1-Trichloroethane	ug/L	0.5	640 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
1,1,2-Trichloroethane	ug/L	0.5	4.7 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Trichloroethylene	ug/L	0.5	1.6 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Trichlorofluoromethane	ug/L	1.0	2500 ug/L	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
Vinyl Chloride	ug/L	0.5	0.5 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
m/p-Xylene	ug/L	0.5		ND (0.5)	ND (0.5)	0.8	ND (0.5)	ND (0.5)
o-Xylene	ug/L	0.5		ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Xylenes, total	ug/L	0.5	4200 ug/L	ND (0.5)	ND (0.5)	0.8	ND (0.5)	ND (0.5)

230 Exceeds MECP Table 3
 ND (0.02) Non-detect
 N/A Parameter not analyzed

Parameter	Units	MDL	Regulation	Sample				
				BH1-23-GW1 2324216-01	BH2-23-GW1 2324216-02	BH3-23-GW1 2324216-03	BH4-23-GW1 2324216-04	DUP 2324216-05
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 3 Non-Potable Groundwater, coarse	06/13/2023 09:00 AM	06/13/2023 09:00 AM	06/13/2023 09:00 AM	06/13/2023 09:00 AM	06/13/2023 09:00 AM
Hydrocarbons								
F1 PHCs (C6-C10)	ug/L	25	750 ug/L	ND (25)	ND (25)	ND (25)	ND (25)	ND (25)
F2 PHCs (C10-C16)	ug/L	100	150 ug/L	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)
F3 PHCs (C16-C34)	ug/L	100	500 ug/L	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)
F4 PHCs (C34-C50)	ug/L	100	500 ug/L	ND (100)	ND (100)	ND (100)	ND (100)	ND (100)

230 Exceeds MECP Table 3
ND (0.02) Non-detect
N/A Parameter not analyzed

Parameter	Units	MDL	Regulation	Sample				
				BH1-23-GW1 2324216-01	BH2-23-GW1 2324216-02	BH3-23-GW1 2324216-03	BH4-23-GW1 2324216-04	DUP 2324216-05
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 3 Non-Potable Groundwater, coarse	06/13/2023 09:00 AM	06/13/2023 09:00 AM	06/13/2023 09:00 AM	06/13/2023 09:00 AM	06/13/2023 09:00 AM
Metals								
Mercury	ug/L	0.1	0.29 ug/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	N/A
Antimony	ug/L	0.5	20000 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	N/A
Arsenic	ug/L	1	1900 ug/L	ND (1)	ND (1)	5	ND (1)	N/A
Barium	ug/L	1	29000 ug/L	88	60	48	123	N/A
Beryllium	ug/L	0.5	67 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	N/A
Boron	ug/L	10	45000 ug/L	66	68	73	42	N/A
Cadmium	ug/L	0.1	2.7 ug/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	N/A
Chromium	ug/L	1	810 ug/L	2	4	ND (1)	ND (1)	N/A
Chromium (VI)	ug/L	10	140 ug/L	ND (10)	ND (10)	ND (10)	ND (10)	N/A
Cobalt	ug/L	0.5	66 ug/L	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	N/A
Copper	ug/L	0.5	87 ug/L	1.3	0.7	ND (0.5)	0.8	N/A
Lead	ug/L	0.1	25 ug/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	N/A
Molybdenum	ug/L	0.5	9200 ug/L	0.8	0.5	30.3	18.3	N/A
Nickel	ug/L	1	490 ug/L	2	2	ND (1)	ND (1)	N/A
Selenium	ug/L	1	63 ug/L	4	5	ND (1)	ND (1)	N/A
Silver	ug/L	0.1	1.5 ug/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	N/A
Sodium	ug/L	200	2300000 ug/L	202000	123000	415000	704000	N/A
Thallium	ug/L	0.1	510 ug/L	ND (0.1)	ND (0.1)	ND (0.1)	ND (0.1)	N/A
Uranium	ug/L	0.1	420 ug/L	4.4	2.6	9.5	0.6	N/A
Vanadium	ug/L	0.5	250 ug/L	5.1	4.5	ND (0.5)	ND (0.5)	N/A
Zinc	ug/L	5	1100 ug/L	ND (5)	ND (5)	ND (5)	ND (5)	N/A

230 Exceeds MECP Table 3
 ND (0.02) Non-detect
 N/A Parameter not analyzed

Parameter	Units	MDL	Regulation	Sample				
				BH1-23-GW1 2324216-01	BH2-23-GW1 2324216-02	BH3-23-GW1 2324216-03	BH4-23-GW1 2324216-04	DUP 2324216-05
Sample Date (m/d/y)			Reg 153/04 (2011)-Table 3 Non-Potable Groundwater, coarse	06/13/2023 09:00 AM	06/13/2023 09:00 AM	06/13/2023 09:00 AM	06/13/2023 09:00 AM	06/13/2023 09:00 AM
Semi-Volatiles								
Acenaphthene	ug/L	0.05	600 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Acenaphthylene	ug/L	0.05	1.8 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Anthracene	ug/L	0.01	2.4 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	N/A
Benzo[a]anthracene	ug/L	0.01	4.7 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	N/A
Benzo[a]pyrene	ug/L	0.01	0.81 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	N/A
Benzo[b]fluoranthene	ug/L	0.05	0.75 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
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)	N/A
Benzo[k]fluoranthene	ug/L	0.05	0.4 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Chrysene	ug/L	0.05	1 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Dibenzo[a,h]anthracene	ug/L	0.05	0.52 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Fluoranthene	ug/L	0.01	130 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	N/A
Fluorene	ug/L	0.05	400 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
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)	N/A
1-Methylnaphthalene	ug/L	0.05	1800 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
2-Methylnaphthalene	ug/L	0.05	1800 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Methylnaphthalene (1&2)	ug/L	0.10	1800 ug/L	ND (0.10)	ND (0.10)	ND (0.10)	ND (0.10)	N/A
Naphthalene	ug/L	0.05	1400 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Phenanthrene	ug/L	0.05	580 ug/L	ND (0.05)	ND (0.05)	ND (0.05)	ND (0.05)	N/A
Pyrene	ug/L	0.01	68 ug/L	ND (0.01)	ND (0.01)	ND (0.01)	ND (0.01)	N/A

230 Exceeds MECP Table 3
 ND (0.02) Non-detect
 N/A Parameter not analyzed

Certificate of Analysis

Paterson Group Consulting Engineers

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Mark St. Pierre

Client PO: 57341
Project: PE6049
Custody:

Report Date: 26-Jun-2023
Order Date: 25-Apr-2023

Revised Report

Order #: 2317215

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

Paracel ID	Client ID
2317215-01	BH1-23-SS2
2317215-02	BH1-23-SS9
2317215-03	BH2-23-SS2
2317215-04	BH2-23-SS9
2317215-05	BH3-23-SS2
2317215-06	BH3-23-SS6
2317215-07	BH4-23-AU1
2317215-08	BH4-23-SS7
2317215-09	BH2-23-SS2 (DUP)

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 57341

Report Date: 26-Jun-2023

Order Date: 25-Apr-2023

Project Description: PE6049

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	26-Apr-23	27-Apr-23
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	21-Jun-23	22-Jun-23
Mercury by CVAA	EPA 7471B - CVAA, digestion	22-Jun-23	23-Jun-23
PHC F1	CWS Tier 1 - P&T GC-FID	26-Apr-23	27-Apr-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	26-Apr-23	27-Apr-23
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	22-Jun-23	22-Jun-23
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	23-Jun-23	23-Jun-23
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	26-Apr-23	27-Apr-23
Solids, %	CWS Tier 1 - Gravimetric	26-Apr-23	26-Apr-23

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

	Client ID:	BH1-23-SS2	BH1-23-SS9	BH2-23-SS2	BH2-23-SS9
	Sample Date:	18-Apr-23 00:00	18-Apr-23 00:00	18-Apr-23 00:00	18-Apr-23 00:00
	Sample ID:	2317215-01	2317215-02	2317215-03	2317215-04
	MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	80.2	62.4	82.6	67.7
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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	6.0	2.6	5.6	2.7
Barium	1.0 ug/g dry	313	320	158	233
Beryllium	0.5 ug/g dry	0.8	0.7	0.6	0.6
Boron	5.0 ug/g dry	9.2	<5.0	8.2	<5.0
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	83.1	91.6	38.3	63.9
Chromium (VI)	0.2 ug/g dry	0.4	<0.2	0.5	<0.2
Cobalt	1.0 ug/g dry	18.2	20.3	10.1	15.8
Copper	5.0 ug/g dry	47.5	47.7	23.5	34.2
Lead	1.0 ug/g dry	34.5	4.1	15.4	3.9
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	<0.1
Molybdenum	1.0 ug/g dry	1.1	1.1	1.4	1.1
Nickel	5.0 ug/g dry	47.7	51.7	22.4	36.6
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	79.5	100	63.3	81.1
Zinc	20.0 ug/g dry	116	115	119	88.8

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	<0.02
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
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

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

	Client ID: Sample Date: Sample ID:	BH1-23-SS2 18-Apr-23 00:00 2317215-01 Soil	BH1-23-SS9 18-Apr-23 00:00 2317215-02 Soil	BH2-23-SS2 18-Apr-23 00:00 2317215-03 Soil	BH2-23-SS9 18-Apr-23 00:00 2317215-04 Soil
	MDL/Units				
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	<0.05
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	<0.05
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	<0.05
4-Bromofluorobenzene	Surrogate	105%	127%	114%	120%
Dibromofluoromethane	Surrogate	101%	89.5%	103%	94.2%
Toluene-d8	Surrogate	102%	112%	103%	105%
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	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	<0.05

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

	Client ID:	BH1-23-SS2	BH1-23-SS9	BH2-23-SS2	BH2-23-SS9
	Sample Date:	18-Apr-23 00:00	18-Apr-23 00:00	18-Apr-23 00:00	18-Apr-23 00:00
	Sample ID:	2317215-01	2317215-02	2317215-03	2317215-04
	MDL/Units	Soil	Soil	Soil	Soil
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
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	<0.05
Toluene-d8	Surrogate	102%	112%	103%	105%

Hydrocarbons

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	29	<8	23	<8
F4 PHCs (C34-C50)	6 ug/g dry	90	<6	31	<6

Semi-Volatiles

Acenaphthene	0.02 ug/g dry	<0.02 [1]	-	0.02 [1]	-
Acenaphthylene	0.02 ug/g dry	<0.02 [1]	-	0.10 [1]	-
Anthracene	0.02 ug/g dry	<0.02 [1]	-	0.08 [1]	-
Benzo [a] anthracene	0.02 ug/g dry	0.03 [1]	-	0.27 [1]	-
Benzo [a] pyrene	0.02 ug/g dry	0.03 [1]	-	0.32 [1]	-
Benzo [b] fluoranthene	0.02 ug/g dry	0.04 [1]	-	0.34 [1]	-
Benzo [g,h,i] perylene	0.02 ug/g dry	0.03 [1]	-	0.26 [1]	-
Benzo [k] fluoranthene	0.02 ug/g dry	<0.02 [1]	-	0.16 [1]	-
Chrysene	0.02 ug/g dry	0.03 [1]	-	0.27 [1]	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02 [1]	-	0.06 [1]	-
Fluoranthene	0.02 ug/g dry	0.06 [1]	-	0.70 [1]	-
Fluorene	0.02 ug/g dry	<0.02 [1]	-	<0.02 [1]	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	0.02 [1]	-	0.22 [1]	-
1-Methylnaphthalene	0.02 ug/g dry	<0.02 [1]	-	0.03 [1]	-
2-Methylnaphthalene	0.02 ug/g dry	<0.02 [1]	-	0.03 [1]	-
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04 [1]	-	0.06 [1]	-
Naphthalene	0.01 ug/g dry	0.02 [1]	-	0.05 [1]	-
Phenanthrene	0.02 ug/g dry	0.05 [1]	-	0.49 [1]	-
Pyrene	0.02 ug/g dry	0.05 [1]	-	0.60 [1]	-
2-Fluorobiphenyl	Surrogate	63.4% [1]	-	66.3% [1]	-
Terphenyl-d14	Surrogate	78.2% [1]	-	77.1% [1]	-

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

	Client ID:	BH3-23-SS2	BH3-23-SS6	BH4-23-AU1	BH4-23-SS7
	Sample Date:	18-Apr-23 00:00	18-Apr-23 00:00	19-Apr-23 00:00	19-Apr-23 00:00
	Sample ID:	2317215-05	2317215-06	2317215-07	2317215-08
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	71.7	61.2	83.3	69.0
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	3.7	2.4	19.7	3.2
Barium	1.0 ug/g dry	325	284	170	196
Beryllium	0.5 ug/g dry	1.0	0.7	0.8	0.8
Boron	5.0 ug/g dry	8.4	6.2	9.1	7.7
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	153	120	63.8	90.4
Chromium (VI)	0.2 ug/g dry	<0.2	0.5	<0.2	0.2
Cobalt	1.0 ug/g dry	26.0	21.8	14.3	18.2
Copper	5.0 ug/g dry	52.5	50.7	47.1	38.9
Lead	1.0 ug/g dry	7.0	4.9	55.1	5.1
Mercury	0.1 ug/g dry	<0.1	<0.1	<0.1	<0.1
Molybdenum	1.0 ug/g dry	<1.0	<1.0	1.3	<1.0
Nickel	5.0 ug/g dry	80.1	63.8	35.3	48.2
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	2.6
Vanadium	10.0 ug/g dry	111	105	63.6	85.8
Zinc	20.0 ug/g dry	130	115	157	96.9
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	<0.02
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
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

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

	Client ID:	BH3-23-SS2	BH3-23-SS6	BH4-23-AU1	BH4-23-SS7
	Sample Date:	18-Apr-23 00:00	18-Apr-23 00:00	19-Apr-23 00:00	19-Apr-23 00:00
	Sample ID:	2317215-05	2317215-06	2317215-07	2317215-08
	MDL/Units	Soil	Soil	Soil	Soil
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	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
1,1,1,2,2-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	<0.05
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	<0.05
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	<0.05
4-Bromofluorobenzene	Surrogate	117%	127%	106%	105%
Dibromofluoromethane	Surrogate	100%	115%	101%	101%
Toluene-d8	Surrogate	105%	114%	100%	105%
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

	Client ID:	BH3-23-SS2	BH3-23-SS6	BH4-23-AU1	BH4-23-SS7
	Sample Date:	18-Apr-23 00:00	18-Apr-23 00:00	19-Apr-23 00:00	19-Apr-23 00:00
	Sample ID:	2317215-05	2317215-06	2317215-07	2317215-08
	MDL/Units	Soil	Soil	Soil	Soil
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
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	<0.05
Toluene-d8	Surrogate	105%	114%	100%	105%

Hydrocarbons

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	<8	50	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	66	<6

Semi-Volatiles

Acenaphthene	0.02 ug/g dry	<0.02 [1]	-	0.02 [1]	-
Acenaphthylene	0.02 ug/g dry	<0.02 [1]	-	0.12 [1]	-
Anthracene	0.02 ug/g dry	<0.02 [1]	-	0.10 [1]	-
Benzo [a] anthracene	0.02 ug/g dry	0.02 [1]	-	0.39 [1]	-
Benzo [a] pyrene	0.02 ug/g dry	0.03 [1]	-	0.45 [1]	-
Benzo [b] fluoranthene	0.02 ug/g dry	0.03 [1]	-	0.49 [1]	-
Benzo [g,h,i] perylene	0.02 ug/g dry	0.03 [1]	-	0.35 [1]	-
Benzo [k] fluoranthene	0.02 ug/g dry	<0.02 [1]	-	0.25 [1]	-
Chrysene	0.02 ug/g dry	0.02 [1]	-	0.35 [1]	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	<0.02 [1]	-	0.10 [1]	-
Fluoranthene	0.02 ug/g dry	0.04 [1]	-	0.70 [1]	-
Fluorene	0.02 ug/g dry	<0.02 [1]	-	0.02 [1]	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	0.03 [1]	-	0.30 [1]	-
1-Methylnaphthalene	0.02 ug/g dry	<0.02 [1]	-	0.03 [1]	-
2-Methylnaphthalene	0.02 ug/g dry	<0.02 [1]	-	0.05 [1]	-
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04 [1]	-	0.07 [1]	-
Naphthalene	0.01 ug/g dry	<0.01 [1]	-	0.05 [1]	-
Phenanthrene	0.02 ug/g dry	0.02 [1]	-	0.35 [1]	-
Pyrene	0.02 ug/g dry	0.03 [1]	-	0.56 [1]	-
2-Fluorobiphenyl	Surrogate	71.8% [1]	-	77.1% [1]	-
Terphenyl-d14	Surrogate	94.0% [1]	-	90.4% [1]	-

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

Client ID:	BH2-23-SS2 (DUP)	-	-	-
Sample Date:	18-Apr-23 00:00	-	-	-
Sample ID:	2317215-09	-	-	-
MDL/Units	Soil	-	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	83.7	-	-	-
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Volatiles

Acetone	0.50 ug/g dry	<0.50 [2]	-	-	-
Benzene	0.02 ug/g dry	<0.02 [2]	-	-	-
Bromodichloromethane	0.05 ug/g dry	<0.05 [2]	-	-	-
Bromoform	0.05 ug/g dry	<0.05 [2]	-	-	-
Bromomethane	0.05 ug/g dry	<0.05 [2]	-	-	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05 [2]	-	-	-
Chlorobenzene	0.05 ug/g dry	<0.05 [2]	-	-	-
Chloroform	0.05 ug/g dry	<0.05 [2]	-	-	-
Dibromochloromethane	0.05 ug/g dry	<0.05 [2]	-	-	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05 [2]	-	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05 [2]	-	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05 [2]	-	-	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05 [2]	-	-	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05 [2]	-	-	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05 [2]	-	-	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05 [2]	-	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05 [2]	-	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05 [2]	-	-	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05 [2]	-	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05 [2]	-	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05 [2]	-	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05 [2]	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05 [2]	-	-	-
Ethylene dibromide (dibromoethane, 1	0.05 ug/g dry	<0.05 [2]	-	-	-
Hexane	0.05 ug/g dry	<0.05 [2]	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50 [2]	-	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50 [2]	-	-	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05 [2]	-	-	-
Methylene Chloride	0.05 ug/g dry	<0.05 [2]	-	-	-
Styrene	0.05 ug/g dry	<0.05 [2]	-	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05 [2]	-	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05 [2]	-	-	-
Tetrachloroethylene	0.05 ug/g dry	<0.05 [2]	-	-	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 57341

Report Date: 26-Jun-2023

Order Date: 25-Apr-2023

Project Description: PE6049

	Client ID:	BH2-23-SS2 (DUP)	-	-	-
	Sample Date:	18-Apr-23 00:00	-	-	-
	Sample ID:	2317215-09	-	-	-
	MDL/Units	Soil	-	-	-
Toluene	0.05 ug/g dry	<0.05 [2]	-	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05 [2]	-	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05 [2]	-	-	-
Trichloroethylene	0.05 ug/g dry	<0.05 [2]	-	-	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05 [2]	-	-	-
Vinyl chloride	0.02 ug/g dry	<0.02 [2]	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05 [2]	-	-	-
o-Xylene	0.05 ug/g dry	<0.05 [2]	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05 [2]	-	-	-
4-Bromofluorobenzene	Surrogate	119% [2]	-	-	-
Dibromofluoromethane	Surrogate	95.9% [2]	-	-	-
Toluene-d8	Surrogate	115% [2]	-	-	-

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

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	0.876		ug/g		65.7	50-140			
Surrogate: Terphenyl-d14	1.09		ug/g		81.9	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						

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	3.38		ug/g		106	50-140			
Surrogate: Dibromofluoromethane	2.61		ug/g		81.6	50-140			
Surrogate: Toluene-d8	3.43		ug/g		107	50-140			
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	3.43		ug/g		107	50-140			

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g	ND			NC	40	
F2 PHCs (C10-C16)	522	4	ug/g	744			35.0	30	QR-04
F3 PHCs (C16-C34)	1120	8	ug/g	1750			43.6	30	QR-04
F4 PHCs (C34-C50)	477	6	ug/g	542			12.6	30	
Metals									
Antimony	ND	1.0	ug/g	1.3			NC	30	
Arsenic	1.8	1.0	ug/g	3.3			NC	30	
Barium	107	1.0	ug/g	112			4.8	30	
Beryllium	ND	0.5	ug/g	0.7			NC	30	
Boron	ND	5.0	ug/g	5.3			NC	30	
Cadmium	ND	0.5	ug/g	1.3			NC	30	
Chromium (VI)	0.3	0.2	ug/g	0.4			36.4	35	QR-05
Chromium	34.9	5.0	ug/g	39.5			12.3	30	
Cobalt	7.7	1.0	ug/g	10.0			25.9	30	
Copper	22.0	5.0	ug/g	25.3			13.6	30	
Lead	4.8	1.0	ug/g	6.7			NC	30	
Mercury	ND	0.1	ug/g	ND			NC	30	
Molybdenum	ND	1.0	ug/g	1.8			NC	30	
Nickel	20.2	5.0	ug/g	24.5			18.9	30	
Selenium	ND	1.0	ug/g	ND			NC	30	
Silver	ND	0.3	ug/g	1.3			NC	30	
Thallium	ND	1.0	ug/g	1.3			NC	30	
Uranium	ND	1.0	ug/g	1.7			NC	30	
Vanadium	34.0	10.0	ug/g	38.2			11.7	30	
Zinc	52.2	20.0	ug/g	57.8			10.2	30	
Physical Characteristics									
% Solids	87.4	0.1	% by Wt.	87.7			0.3	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g	0.022			NC	40	
Acenaphthylene	0.141	0.02	ug/g	0.098			36.5	40	
Anthracene	0.147	0.02	ug/g	0.080			59.0	40	QR-04
Benzo [a] anthracene	0.475	0.02	ug/g	0.270			54.8	40	QR-04
Benzo [a] pyrene	0.532	0.02	ug/g	0.325			48.4	40	QR-04
Benzo [b] fluoranthene	0.538	0.02	ug/g	0.344			43.9	40	QR-04
Benzo [g,h,i] perylene	0.376	0.02	ug/g	0.257			37.8	40	
Benzo [k] fluoranthene	0.263	0.02	ug/g	0.160			48.6	40	QR-04
Chrysene	0.441	0.02	ug/g	0.268			48.7	40	QR-04
Dibenzo [a,h] anthracene	0.100	0.02	ug/g	0.063			45.4	40	QR-04
Fluoranthene	1.17	0.02	ug/g	0.705			49.9	40	QR-04
Fluorene	0.030	0.02	ug/g	ND			NC	40	
Indeno [1,2,3-cd] pyrene	0.332	0.02	ug/g	0.218			41.5	40	QR-04
1-Methylnaphthalene	0.034	0.02	ug/g	0.030			13.9	40	
2-Methylnaphthalene	0.035	0.02	ug/g	0.028			23.8	40	
Naphthalene	0.067	0.01	ug/g	0.046			36.8	40	
Phenanthrene	0.717	0.02	ug/g	0.485			38.6	40	
Pyrene	0.968	0.02	ug/g	0.602			46.7	40	QR-04
Surrogate: 2-Fluorobiphenyl	1.11		ug/g		68.8	50-140			
Surrogate: Terphenyl-d14	1.37		ug/g		85.0	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	

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chloroform	ND	0.05	ug/g	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g	ND			NC	50	
Hexane	ND	0.05	ug/g	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g	ND			NC	50	
Styrene	ND	0.05	ug/g	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	4.29		ug/g		116	50-140			
Surrogate: Dibromofluoromethane	2.91		ug/g		78.8	50-140			
Surrogate: Toluene-d8	4.08		ug/g		110	50-140			
Benzene	ND	0.02	ug/g	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g	ND			NC	50	
Toluene	ND	0.05	ug/g	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g	ND			NC	50	
o-Xylene	ND	0.05	ug/g	ND			NC	50	
Surrogate: Toluene-d8	4.08		ug/g		110	50-140			

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	179	7	ug/g	ND	89.5	80-120			
F2 PHCs (C10-C16)	90	4	ug/g	ND	112	80-120			
F3 PHCs (C16-C34)	1930	8	ug/g	1750	84.9	60-140			
F4 PHCs (C34-C50)	146	6	ug/g	ND	118	80-120			
Metals									
Antimony	37.6	1.0	ug/g	ND	74.2	70-130			
Arsenic	54.0	1.0	ug/g	1.3	105	70-130			
Barium	96.2	1.0	ug/g	45.0	102	70-130			
Beryllium	52.7	0.5	ug/g	ND	105	70-130			
Boron	50.3	5.0	ug/g	ND	96.3	70-130			
Cadmium	48.2	0.5	ug/g	0.5	95.4	70-130			
Chromium (VI)	0.2	0.2	ug/g	ND	88.0	70-130			
Chromium	71.2	5.0	ug/g	15.8	111	70-130			
Cobalt	56.7	1.0	ug/g	4.0	105	70-130			
Copper	60.4	5.0	ug/g	10.1	101	70-130			
Lead	48.1	1.0	ug/g	2.7	90.8	70-130			
Mercury	1.65	0.1	ug/g	ND	110	70-130			
Molybdenum	51.1	1.0	ug/g	ND	101	70-130			
Nickel	61.1	5.0	ug/g	9.8	103	70-130			
Selenium	46.3	1.0	ug/g	ND	92.3	70-130			
Silver	43.1	0.3	ug/g	0.5	85.2	70-130			
Thallium	45.5	1.0	ug/g	ND	90.0	70-130			
Uranium	48.1	1.0	ug/g	ND	94.7	70-130			
Vanadium	70.8	10.0	ug/g	15.3	111	70-130			
Zinc	70.0	20.0	ug/g	23.1	93.8	70-130			
Semi-Volatiles									
Acenaphthene	0.219	0.02	ug/g	0.022	98.0	50-140			
Acenaphthylene	0.294	0.02	ug/g	0.098	97.2	50-140			
Anthracene	0.245	0.02	ug/g	0.080	81.7	50-140			
Benzo [a] anthracene	0.450	0.02	ug/g	0.270	88.8	50-140			
Benzo [a] pyrene	0.496	0.02	ug/g	0.325	84.8	50-140			
Benzo [b] fluoranthene	0.560	0.02	ug/g	0.344	107	50-140			
Benzo [g,h,i] perylene	0.419	0.02	ug/g	0.257	80.5	50-140			
Benzo [k] fluoranthene	0.342	0.02	ug/g	0.160	90.0	50-140			
Chrysene	0.436	0.02	ug/g	0.268	83.1	50-140			
Dibenzo [a,h] anthracene	0.238	0.02	ug/g	0.063	86.9	50-140			
Fluoranthene	0.906	0.02	ug/g	0.705	99.6	50-140			
Fluorene	0.189	0.02	ug/g	ND	93.9	50-140			
Indeno [1,2,3-cd] pyrene	0.384	0.02	ug/g	0.218	82.3	50-140			
1-Methylnaphthalene	0.199	0.02	ug/g	0.030	83.8	50-140			
2-Methylnaphthalene	0.218	0.02	ug/g	0.028	94.2	50-140			
Naphthalene	0.237	0.01	ug/g	0.046	94.8	50-140			
Phenanthrene	0.701	0.02	ug/g	0.485	107	50-140			
Pyrene	0.771	0.02	ug/g	0.602	84.1	50-140			
Surrogate: 2-Fluorobiphenyl	1.13		ug/g		69.9	50-140			
Surrogate: Terphenyl-d14	1.31		ug/g		81.3	50-140			
Volatiles									
Acetone	8.25	0.50	ug/g	ND	82.5	50-140			

Certificate of Analysis

Report Date: 26-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 25-Apr-2023

Client PO: 57341

Project Description: PE6049

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzene	2.80	0.02	ug/g	ND	70.0	60-130			
Bromodichloromethane	2.97	0.05	ug/g	ND	74.2	60-130			
Bromoform	4.65	0.05	ug/g	ND	116	60-130			
Bromomethane	2.83	0.05	ug/g	ND	70.7	50-140			
Carbon Tetrachloride	3.06	0.05	ug/g	ND	76.5	60-130			
Chlorobenzene	4.01	0.05	ug/g	ND	100	60-130			
Chloroform	3.06	0.05	ug/g	ND	76.5	60-130			
Dibromochloromethane	4.65	0.05	ug/g	ND	116	60-130			
Dichlorodifluoromethane	2.93	0.05	ug/g	ND	73.3	50-140			
1,2-Dichlorobenzene	4.05	0.05	ug/g	ND	101	60-130			
1,3-Dichlorobenzene	3.92	0.05	ug/g	ND	98.0	60-130			
1,4-Dichlorobenzene	3.89	0.05	ug/g	ND	97.4	60-130			
1,1-Dichloroethane	2.63	0.05	ug/g	ND	65.9	60-130			
1,2-Dichloroethane	3.00	0.05	ug/g	ND	75.0	60-130			
1,1-Dichloroethylene	3.58	0.05	ug/g	ND	89.6	60-130			
cis-1,2-Dichloroethylene	2.64	0.05	ug/g	ND	66.0	60-130			
trans-1,2-Dichloroethylene	2.64	0.05	ug/g	ND	66.1	60-130			
1,2-Dichloropropane	2.76	0.05	ug/g	ND	69.0	60-130			
cis-1,3-Dichloropropylene	3.10	0.05	ug/g	ND	77.5	60-130			
trans-1,3-Dichloropropylene	2.93	0.05	ug/g	ND	73.2	60-130			
Ethylbenzene	3.92	0.05	ug/g	ND	97.9	60-130			
Ethylene dibromide (dibromoethane, 1,2-	4.25	0.05	ug/g	ND	106	60-130			
Hexane	2.81	0.05	ug/g	ND	70.3	60-130			
Methyl Ethyl Ketone (2-Butanone)	7.46	0.50	ug/g	ND	74.6	50-140			
Methyl Isobutyl Ketone	8.13	0.50	ug/g	ND	81.3	50-140			
Methyl tert-butyl ether	8.37	0.05	ug/g	ND	83.7	50-140			
Methylene Chloride	2.78	0.05	ug/g	ND	69.5	60-130			
Styrene	3.97	0.05	ug/g	ND	99.3	60-130			
1,1,1,2-Tetrachloroethane	4.41	0.05	ug/g	ND	110	60-130			
1,1,2,2-Tetrachloroethane	4.93	0.05	ug/g	ND	123	60-130			
Tetrachloroethylene	3.98	0.05	ug/g	ND	99.6	60-130			
Toluene	4.30	0.05	ug/g	ND	108	60-130			
1,1,1-Trichloroethane	2.93	0.05	ug/g	ND	73.3	60-130			
1,1,2-Trichloroethane	3.07	0.05	ug/g	ND	76.8	60-130			
Trichloroethylene	2.65	0.05	ug/g	ND	66.2	60-130			
Trichlorofluoromethane	2.95	0.05	ug/g	ND	73.9	50-140			
Vinyl chloride	2.70	0.02	ug/g	ND	67.4	50-140			
m,p-Xylenes	8.42	0.05	ug/g	ND	105	60-130			
o-Xylene	4.39	0.05	ug/g	ND	110	60-130			
Surrogate: 4-Bromofluorobenzene	1.65		ug/g		51.7	50-140			
Surrogate: Dibromofluoromethane	2.38		ug/g		74.5	50-140			
Surrogate: Toluene-d8	3.47		ug/g		108	50-140			
Benzene	2.80	0.02	ug/g	ND	70.0	60-130			
Ethylbenzene	3.92	0.05	ug/g	ND	97.9	60-130			
Toluene	4.30	0.05	ug/g	ND	108	60-130			
m,p-Xylenes	8.42	0.05	ug/g	ND	105	60-130			
o-Xylene	4.39	0.05	ug/g	ND	110	60-130			
Surrogate: Toluene-d8	3.47		ug/g		108	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 57341

Report Date: 26-Jun-2023

Order Date: 25-Apr-2023

Project Description: PE6049

Qualifier Notes:

Login Qualifiers :

Sample - F1/BTEX/VOCs (soil) not submitted according to Reg. 153/04, Amended 2011 - not field preserved.
Prepared in the lab as directed by client.

Applies to samples: BH2-23-SS2 (DUP)

Sample - One or more parameter received past hold time - Mercury and CrVI.

Applies to samples: BH1-23-SS9

Sample - One or more parameter received past hold time - Mercury, CrVI, and PAH's.

Applies to samples: BH1-23-SS2, BH2-23-SS2, BH2-23-SS9, BH3-23-SS2, BH3-23-SS6, BH4-23-AU1, BH4-23-SS7

Sample - One or more parameter received past hold time - VOCs.

Applies to samples: BH2-23-SS2 (DUP)

Sample Qualifiers :

1 : Holding time had been exceeded upon receipt of the sample at the laboratory or prior to the analysis being requested.

2 : This analysis was conducted after the accepted holding time had been exceeded.

QR-04 Duplicate results exceeds RPD limits due to non-homogeneous matrix.

QR-05 Duplicate RPDs higher than normally accepted. Remaining batch QA\QC was acceptable. May be sample effect.

Sample Data Revisions

None

Work Order Revisions / Comments:

Revision 1-Revised report includes additional analyses as per client request.

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.



Client Name: Paterson Group	Project Reference: PE6049	Turnaround Time: ☐ 1 Day ☐ 3 Day ☐ 2 Day ☒ Regular Date Required:
Contact Name: Mark St Pierre	Quote #	
Address: 9 Auriga	PO # 57341	
Telephone: 613-226-7381	Email Address: mstpierre@patersongroup.ca	

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

Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)							Required Analyses													
Parcel Order Number:		Matrix	Air Volume	# of Containers	Sample Taken		PHCs F1-F4+BTX	VOCs	PAHs	Metals by ICP				Lead Paint						
					Date	Time				Hg	CrVI	B (HWS)								
Sample ID/Location Name																				
1	BH1-23-SS2	S		2	April.18.2023		☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
2	BH1-23-SS9	P		2	April.18.2023		☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
3	BH2-23-SS2	P		2	April.18.2023		☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
4	BH2-23-SS9	P		2	April.18.2023		☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
5	BH3-23-SS2	P		2	April.18.2023		☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
6	BH3-23-SS6	P		2	April.18.2023		☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
7	BH4-23-AU1	P		2	April.19.2023		☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
8	BH4-23-SS7	P		2	April.19.2023		☒	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
9							☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	
10							☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	☐	

Comments: Method of Delivery: *PARACEL COURIER*

Relinquished By (Sign): <i>[Signature]</i>	Received by Driver/Depot: <i>A. SCARLE</i>	Received at Lab: <i>[Signature]</i>	Verified By: <i>[Signature]</i>
Relinquished By (Print): Mark St Pierre	Date/Time: 25/04/23 14:51	Date/Time: 25/04/23 3:27	Date/Time: 25/04/23 3:58
Date/Time: April 25, 2023	Temperature: °C	Temperature: 8.6°C	pH Verified [] By:

Certificate of Analysis

Paterson Group Consulting Engineers

9 Auriga Drive
Ottawa, ON K2E 7T9
Attn: Mike Beaudoin

Client PO: 57707
Project: PE6049
Custody: 140745

Report Date: 20-Jun-2023
Order Date: 13-Jun-2023

Order #: 2324216

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

Paracel ID	Client ID
2324216-01	BH1-23-GW1
2324216-02	BH2-23-GW1
2324216-03	BH3-23-GW1
2324216-04	BH4-23-GW1
2324216-05	DUP

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 57707

Report Date: 20-Jun-2023

Order Date: 13-Jun-2023

Project Description: PE6049

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent - water	MOE E3056 - colourimetric	16-Jun-23	16-Jun-23
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	14-Jun-23	15-Jun-23
Metals, ICP-MS	EPA 200.8 - ICP-MS	15-Jun-23	16-Jun-23
PHC F1	CWS Tier 1 - P&T GC-FID	15-Jun-23	15-Jun-23
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	16-Jun-23	17-Jun-23
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	19-Jun-23	19-Jun-23
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	15-Jun-23	15-Jun-23

Certificate of Analysis

Report Date: 20-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Jun-2023

Client PO: 57707

Project Description: PE6049

Client ID:	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	BH4-23-GW1
Sample Date:	13-Jun-23 09:00	13-Jun-23 09:00	13-Jun-23 09:00	13-Jun-23 09:00
Sample ID:	2324216-01	2324216-02	2324216-03	2324216-04
MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water

Metals

Mercury	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Antimony	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Arsenic	1 ug/L	<1	<1	5	<1
Barium	1 ug/L	88	60	48	123
Beryllium	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Boron	10 ug/L	66	68	73	42
Cadmium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Chromium	1 ug/L	2	4	<1	<1
Chromium (VI)	10 ug/L	<10	<10	<10	<10
Cobalt	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Copper	0.5 ug/L	1.3	0.7	<0.5	0.8
Lead	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Molybdenum	0.5 ug/L	0.8	0.5	30.3	18.3
Nickel	1 ug/L	2	2	<1	<1
Selenium	1 ug/L	4	5	<1	<1
Silver	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Sodium	200 ug/L	202000	123000	415000	704000
Thallium	0.1 ug/L	<0.1	<0.1	<0.1	<0.1
Uranium	0.1 ug/L	4.4	2.6	9.5	0.6
Vanadium	0.5 ug/L	5.1	4.5	<0.5	<0.5
Zinc	5 ug/L	<5	<5	<5	<5

Volatiles

Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<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	<0.5	<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

Certificate of Analysis

Report Date: 20-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Jun-2023

Client PO: 57707

Project Description: PE6049

	MDL/Units	Client ID:	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	BH4-23-GW1
		Sample Date:	13-Jun-23 09:00	13-Jun-23 09:00	13-Jun-23 09:00	13-Jun-23 09:00
		Sample ID:	2324216-01	2324216-02	2324216-03	2324216-04
			Ground Water	Ground Water	Ground Water	Ground Water
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	<0.5	<0.5	<0.5
Toluene	0.5 ug/L		<0.5	<0.5	2.5	<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	0.8	<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	0.8	<0.5
4-Bromofluorobenzene	Surrogate		107%	108%	106%	110%
Dibromofluoromethane	Surrogate		91.0%	89.8%	96.4%	105%
Toluene-d8	Surrogate		120%	122%	125%	127%

Hydrocarbons

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

Certificate of Analysis

Report Date: 20-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Jun-2023

Client PO: 57707

Project Description: PE6049

	Client ID:	BH1-23-GW1	BH2-23-GW1	BH3-23-GW1	BH4-23-GW1
	Sample Date:	13-Jun-23 09:00	13-Jun-23 09:00	13-Jun-23 09:00	13-Jun-23 09:00
	Sample ID:	2324216-01	2324216-02	2324216-03	2324216-04
	MDL/Units	Ground Water	Ground Water	Ground Water	Ground Water
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100

Semi-Volatiles

Acenaphthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Acenaphthylene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Anthracene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Chrysene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Fluoranthene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
Fluorene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	<0.10	<0.10
Naphthalene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Phenanthrene	0.05 ug/L	<0.05	<0.05	<0.05	<0.05
Pyrene	0.01 ug/L	<0.01	<0.01	<0.01	<0.01
2-Fluorobiphenyl	Surrogate	112%	116%	112%	105%
Terphenyl-d14	Surrogate	101%	111%	99.0%	103%

Certificate of Analysis

Report Date: 20-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Jun-2023

Client PO: 57707

Project Description: PE6049

Client ID:	DUP	-	-	-
Sample Date:	13-Jun-23 09:00	-	-	-
Sample ID:	2324216-05	-	-	-
MDL/Units	Ground Water	-	-	-

Volatiles

Acetone	5.0 ug/L	<5.0	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-
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	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
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	<5.0	-	-	-
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	<0.5	-	-	-

Certificate of Analysis

Report Date: 20-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Jun-2023

Client PO: 57707

Project Description: PE6049

	Client ID:	DUP	-	-	-
	Sample Date:	13-Jun-23 09:00	-	-	-
	Sample ID:	2324216-05	-	-	-
	MDL/Units	Ground Water	-	-	-
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	112%	-	-	-
Dibromofluoromethane	Surrogate	106%	-	-	-
Toluene-d8	Surrogate	132%	-	-	-
Hydrocarbons					
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	-	-	-

Certificate of Analysis

Report Date: 20-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Jun-2023

Client PO: 57707

Project Description: PE6049

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
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	35.2		ug/L		88.1	50-140			
Surrogate: Terphenyl-d14	20.5		ug/L		51.3	50-140			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						

Certificate of Analysis

Report Date: 20-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Jun-2023

Client PO: 57707

Project Description: PE6049

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	91.6		ug/L		114	50-140			
Surrogate: Dibromofluoromethane	86.9		ug/L		109	50-140			
Surrogate: Toluene-d8	72.0		ug/L		89.9	50-140			

Certificate of Analysis

Report Date: 20-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Jun-2023

Client PO: 57707

Project Description: PE6049

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Metals									
Mercury	ND	0.1	ug/L	ND			NC	20	
Antimony	ND	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	489	1	ug/L	490			0.2	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	36	10	ug/L	36			1.0	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	0.56	0.5	ug/L	0.56			0.9	20	
Copper	2.09	0.5	ug/L	2.08			0.5	20	
Lead	1.09	0.1	ug/L	1.07			1.7	20	
Molybdenum	ND	0.5	ug/L	ND			NC	20	
Nickel	2.8	1	ug/L	2.8			0.3	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	15700	200	ug/L	15800			0.4	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	6.64	0.5	ug/L	6.63			0.2	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	12.2	0.5	ug/L	13.1			6.8	30	
Dibromochloromethane	3.46	0.5	ug/L	3.59			3.7	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	

Certificate of Analysis

Report Date: 20-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Jun-2023

Client PO: 57707

Project Description: PE6049

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	87.5		ug/L		109	50-140			
Surrogate: Dibromofluoromethane	86.2		ug/L		108	50-140			
Surrogate: Toluene-d8	101		ug/L		127	50-140			

Certificate of Analysis

Report Date: 20-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Jun-2023

Client PO: 57707

Project Description: PE6049

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1930	25	ug/L	ND		68-117			
F2 PHCs (C10-C16)	1730	100	ug/L	ND	108	60-140			
F3 PHCs (C16-C34)	4400	100	ug/L	ND	112	60-140			
F4 PHCs (C34-C50)	2530	100	ug/L	ND	102	60-140			
Metals									
Mercury	2.72	0.1	ug/L	ND	90.7	70-130			
Arsenic	51.4	1	ug/L	ND	101	80-120			
Barium	43.4	1	ug/L	ND	86.8	80-120			
Beryllium	44.3	0.5	ug/L	ND	88.5	80-120			
Boron	75	10	ug/L	36	77.6	80-120			QM-07
Cadmium	42.8	0.1	ug/L	ND	85.4	80-120			
Chromium (VI)	205	10	ug/L	ND	102	70-130			
Chromium	52.1	1	ug/L	ND	103	80-120			
Cobalt	48.2	0.5	ug/L	0.56	95.3	80-120			
Copper	46.0	0.5	ug/L	2.08	87.9	80-120			
Lead	40.8	0.1	ug/L	1.07	79.5	80-120			QM-07
Molybdenum	43.7	0.5	ug/L	ND	86.8	80-120			
Nickel	48.8	1	ug/L	2.8	92.0	80-120			
Selenium	47.0	1	ug/L	ND	93.8	80-120			
Silver	43.8	0.1	ug/L	ND	87.6	80-120			
Sodium	24300	200	ug/L	15800	85.5	80-120			
Thallium	42.0	0.1	ug/L	ND	84.0	80-120			
Uranium	43.0	0.1	ug/L	ND	86.0	80-120			
Vanadium	52.9	0.5	ug/L	ND	106	80-120			
Zinc	42	5	ug/L	ND	80.3	80-120			
Semi-Volatiles									
Acenaphthene	4.81	0.05	ug/L	ND	96.3	50-140			
Acenaphthylene	4.85	0.05	ug/L	ND	97.1	50-140			
Anthracene	4.31	0.01	ug/L	ND	86.2	50-140			
Benzo [a] anthracene	4.07	0.01	ug/L	ND	81.5	50-140			
Benzo [a] pyrene	3.52	0.01	ug/L	ND	70.5	50-140			
Benzo [b] fluoranthene	3.91	0.05	ug/L	ND	78.2	50-140			
Benzo [g,h,i] perylene	3.53	0.05	ug/L	ND	70.6	50-140			
Benzo [k] fluoranthene	4.05	0.05	ug/L	ND	81.0	50-140			
Chrysene	4.09	0.05	ug/L	ND	81.9	50-140			
Dibenzo [a,h] anthracene	3.59	0.05	ug/L	ND	71.8	50-140			
Fluoranthene	4.07	0.01	ug/L	ND	81.4	50-140			
Fluorene	4.37	0.05	ug/L	ND	87.4	50-140			
Indeno [1,2,3-cd] pyrene	3.38	0.05	ug/L	ND	67.6	50-140			
Naphthalene	5.31	0.05	ug/L	ND	106	50-140			
Phenanthrene	5.06	0.05	ug/L	ND	101	50-140			
Pyrene	3.98	0.01	ug/L	ND	79.5	50-140			
Surrogate: 2-Fluorobiphenyl	35.5		ug/L		88.8	50-140			
Surrogate: Terphenyl-d14	20.1		ug/L		50.3	50-140			
Volatiles									
Acetone	104	5.0	ug/L	ND		50-140			
Benzene	39.3	0.5	ug/L	ND		60-130			
Bromodichloromethane	41.5	0.5	ug/L	ND		60-130			

Certificate of Analysis

Report Date: 20-Jun-2023

Client: Paterson Group Consulting Engineers

Order Date: 13-Jun-2023

Client PO: 57707

Project Description: PE6049

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromoform	42.5	0.5	ug/L	ND		60-130			
Bromomethane	35.1	0.5	ug/L	ND		50-140			
Carbon Tetrachloride	41.3	0.2	ug/L	ND		60-130			
Chlorobenzene	41.9	0.5	ug/L	ND		60-130			
Chloroform	39.6	0.5	ug/L	ND		60-130			
Dibromochloromethane	40.8	0.5	ug/L	ND		60-130			
Dichlorodifluoromethane	41.8	1.0	ug/L	ND		50-140			
1,2-Dichlorobenzene	36.5	0.5	ug/L	ND		60-130			
1,3-Dichlorobenzene	34.7	0.5	ug/L	ND		60-130			
1,4-Dichlorobenzene	34.7	0.5	ug/L	ND		60-130			
1,1-Dichloroethane	40.9	0.5	ug/L	ND		60-130			
1,2-Dichloroethane	40.0	0.5	ug/L	ND		60-130			
1,1-Dichloroethylene	42.0	0.5	ug/L	ND		60-130			
cis-1,2-Dichloroethylene	39.2	0.5	ug/L	ND		60-130			
trans-1,2-Dichloroethylene	40.0	0.5	ug/L	ND		60-130			
1,2-Dichloropropane	38.4	0.5	ug/L	ND		60-130			
cis-1,3-Dichloropropylene	41.0	0.5	ug/L	ND		60-130			
trans-1,3-Dichloropropylene	43.0	0.5	ug/L	ND		60-130			
Ethylbenzene	41.2	0.5	ug/L	ND		60-130			
Ethylene dibromide (dibromoethane, 1,2-	40.5	0.2	ug/L	ND		60-130			
Hexane	45.8	1.0	ug/L	ND	115	60-130			
Methyl Ethyl Ketone (2-Butanone)	102	5.0	ug/L	ND		50-140			
Methyl Isobutyl Ketone	98.3	5.0	ug/L	ND		50-140			
Methyl tert-butyl ether	98.2	2.0	ug/L	ND		50-140			
Methylene Chloride	40.8	5.0	ug/L	ND		60-130			
Styrene	40.2	0.5	ug/L	ND		60-130			
1,1,1,2-Tetrachloroethane	39.6	0.5	ug/L	ND		60-130			
1,1,2,2-Tetrachloroethane	42.1	0.5	ug/L	ND		60-130			
Tetrachloroethylene	42.0	0.5	ug/L	ND		60-130			
Toluene	42.1	0.5	ug/L	ND	105	60-130			
1,1,1-Trichloroethane	40.1	0.5	ug/L	ND		60-130			
1,1,2-Trichloroethane	38.3	0.5	ug/L	ND		60-130			
Trichloroethylene	38.2	0.5	ug/L	ND		60-130			
Trichlorofluoromethane	47.0	1.0	ug/L	ND		60-130			
Vinyl chloride	38.8	0.5	ug/L	ND		50-140			
m,p-Xylenes	81.8	0.5	ug/L	ND		60-130			
o-Xylene	41.8	0.5	ug/L	ND		60-130			
Surrogate: 4-Bromofluorobenzene	76.5		ug/L		95.6	50-140			
Surrogate: Dibromofluoromethane	85.4		ug/L		107	50-140			
Surrogate: Toluene-d8	83.5		ug/L		104	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 57707

Report Date: 20-Jun-2023

Order Date: 13-Jun-2023

Project Description: PE6049

Qualifier Notes:

QC Qualifiers :

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

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

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

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

CCME PHC additional information:

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



Paracel Order Number (Lab Use Only) 2324216	Chain Of Custody (Lab Use Only) No 140745
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Client Name: Paterson	Project Ref: PE 6049	Page <u> </u> of <u> </u>
Contact Name: Mike Beaudoin	Quote #: 	
Address: 644 9 Avriga	PO #: 57707	Turnaround Time ☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone: 513 226 7381	E-mail: Mbeaudoin@patersongroup.ca G.Paterson@patersongroup.ca	
Date Required: <u> </u>		

☒ REG 153/04 ☐ REG 406/19 Other Regulation:		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)		Required Analysis															
☐ Table 1 ☐ Res/Park ☐ Med/Fine ☐ Table 2 ☐ Ind/Comm ☐ Coarse ☐ Table 3 ☐ Agri/Other ☐ Table <u> </u> For RSC: ☐ Yes ☐ No	☐ REG 558 ☐ PWQO ☐ CCME ☐ MISA ☐ SU - Sani ☐ SU - Storm Mun: <u> </u> ☐ Other: <u> </u>	Matrix	Air Volume	# of Containers	Sample Taken Date Time		PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)						
Sample ID/Location Name																			
1 BH1-23-GW1		GW		7	June 13		X	X	X	X	X	X							
2 BH2-23-GW1							X	X	X	X	X	X							
3 BH3-23-GW1							X	X	X	X	X	X							
4 BH4-23-GW1							X	X	X	X	X	X							
5 DUP				3			X	X											
6																			
7																			
8																			
9																			
10																			

Comments:		Method of Delivery: Paracel Courier	
Relinquished By (Sign): G-Pat	Received By Driver/Depot:	Received at Lab: Su-neepawm Blumai	Verified By:
Relinquished By (Print): Grant Paterson	Date/Time:	Date/Time: JUN 13, 2023 03:10	Date/Time: JUNE 14/23 10:40
Date/Time: 13 JUN 2023	Temperature: <u> </u> °C	Temperature: 14.5 °C	pH Verified: <u> </u>