Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Paterson Group Inc.

Consulting Engineers
154 Colonnade Road South
Ottawa (Nepean), Ontario
Canada K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

patersongroup

Phase II Environmental Site Assessment

1400 Bank Street
City of Ottawa, Ontario

Prepared For

SerCo Realty Group

September 24, 2021

Report: PE4632-3

TABLE OF CONTENTS

List of Figures

List of Appendices

EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the property addressed 1400 Bank Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

An initial subsurface investigation was conducted in June 2019. The field program consisted of drilling five (5) boreholes (BH1 to BH5) across the Phase II Property. Three (3) of the boreholes (BH1, BH2 and BH4) were instrumented with groundwater monitoring wells. No unusual visual or olfactory observations were made regarding the soil samples obtained from any of the boreholes, with the exception of some brick fragments at BH3.

Four (4) soil samples were submitted to Paracel Laboratories for metals or PHCs and BTEX analysis. No detectable PHC or BTEX concentrations were identified in the soil samples analysed. All of the metal parameter concentrations identified were found to be in compliance with the MECP Table 3 standards with one (1) exception. The lead concentration identified in soil Sample BH4-SS2 exceeds the MECP Table 3 Residential Standard.

Groundwater samples were recovered from the monitoring wells installed in BH1, BH2 and BH4 on July 2, 2019. Two (2) of the samples (BH1 and BH2) were submitted for PHCs and VOCs analysis. Additionally, one (1) sample (BH4) was submitted for PHCs, BTEX, PAHs and metals analysis. The groundwater was in compliance with the selected MECP Standards.

The current 2021 subsurface investigation consisted of five boreholes (BH1-21 through BH5-21), two (2) of which were instrumented with groundwater monitoring wells. The general soil profile encountered during the field program consisted of a pavement structure, followed by fill material consisting of silty clay with some gravel, sand and traces of topsoil and brick fragments (in BH2-21), underlain by silty clay, overlying glacial till (silty clay with sand, gravel and crushed stone. Bedrock was inferred at practical refusal at a depth of approximate 8.63 mbgs.

Nine (9) soil samples were submitted during this investigation for laboratory analysis of benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, Fractions F_1-F_4), volatile organic compounds (VOCs) and metals (including hydride forming compounds: arsenic (As), Antimony (Sb), Selenium (Se)), mercury (Hg) and hexavalent chromium (CrVI).

All contaminants of potential concern were in compliance with the MECP Table 3 Residential Standards, with the exception of vanadium concentration identified in the fill material at BH5-21.

Groundwater samples from monitoring wells BH3-21 and BH4-21 were collected during the August 3, 2021 sampling event. No free product or petroleum hydrocarbon sheen was noted on the purge water during the groundwater sampling events.

Groundwater samples were analyzed for BTEX, PHCs, VOCs and metals (including hydride forming compounds: arsenic (As), Antimony (Sb), Selenium (Se)), mercury (Hg) and hexavalent chromium (CrVI). All of the groundwater results complied with the MECP Table 3 Standards.

Recommendations

It is our understanding that the Phase II Property will be redeveloped for residential land use and as such, the Phase II Property will require a Record of Site Condition (RSC).

Based on the findings of the Phase II ESA, it is recommended that a soil remediation be carried out to support the filing of an RSC. Given the shallow depth of the impacted fill, it is recommended that the soil remediation be carried out in conjunction with the construction excavation. A representative sample of impacted soil must be submitted for a leachate analysis in accordance with O.Reg. 347/558 prior to disposal at an approved landfill site. It is also recommended that Paterson personnel overs the remediation excavation in order to direct the segregation of impacted soil and to obtain confirmatory soil samples as required.

Any excess soil that meets site standards and requires removal for construction purposes must be handled in accordance with O. Reg. 406/19, On-Site and Excess Soil Management. Additional information regarding O.Reg. 406/19 can be provided upon request.

Monitoring Wells

It is recommended that the monitoring wells installed on the Phase II Property be maintained for possible future monitoring events. Prior to site redevelopment, the monitoring wells must be decommissioned in accordance with O.Reg. 903.

1.0 INTRODUCTION

At the request of SerCo Realty Group, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment at 1400 Bank Street (the Phase II 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 Property during the Phase I ESA conducted by Paterson in August of 2021.

1.1 Site Description

Address:	1400 Bank Street, Ottawa, Ontario
Location:	The Phase II Property is located on the southwest side of the Bank Street and Belanger Avenue intersection, in the City of Ottawa, Ontario. Refer to Figure 1 - Key Plan in Appendix 1 for the site location.
Legal Description:	Part Lots 50, 51, 52 and part Alley, Plan 149, Parts 3 and 4 on RP 4R3367, in the City of Ottawa, Ontario.
PIN:	04147-0007
Latitude and Longitude:	45° 23' 00" N, 75° 40' 19" W

Site Description:

Configuration:	Irregular
Area:	1,833 m^2 (approximately)
Zoning:	AM – Arterial Mainstreet Zone.

1.2 Property Ownership

Paterson was engaged to conduct this Phase II-ESA by Ms. Loredana Porcari, with SerCo Realty Group. The head office of SerCo Realty Group is located at 9 Capella Court, Ottawa, Ontario. Ms. Porcari can be reached by telephone at (613) 226-2221.

1.3 Current and Proposed Future Uses

The Phase II Property is currently occupied by a slab-on-grade commercial retail building with associated parking along the south and west sides of the property.

It is our understanding that the Phase II Property will be redeveloped with a 17-storey residential building consisting of ground level commercial space. Due to the change in land use to a more sensitive land use (commercial to residential), a Record of Site Condition (RSC) will be required as per O.Reg 154/03.

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 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 Property, as the property is not within 30m of an environmentally sensitive area.

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

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

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is located on the southwest corner of Belanger Avenue at Bank Street, in the City of Ottawa, Ontario. The site is situated an urban mixed-used area.

The Phase II Property is occupied by a slab-on-grade commercial retail building with associated parking along the south and west sides of the property. Site drainage consists primarily of sheetflow to catch basins located along the western and eastern portions of the sit and the adjacent streets with some infiltration in the landscaped areas.

The site is relatively flat and at the grade of Bank Street and Belanger Avenue, while the regional topography slopes downwards in a northwesterly/northerly direction.

2.2 Past Investigations

Paterson completed a Phase I ESA in April of 2021 for the Phase II Property. Based on the findings of the Phase I ESA, two (2) on-site historical potentially contaminating activities (PCAs) and three (3) off-site PCAs were considered to have resulted in four (4) areas of potential environmental concern (APECs) on the Phase I Property.

As per Column A of Table 2 of the O.Reg. 153/04, as amended, the following PCAs that generated APECs on the Phase I Property are:

- PCA 34 – "Metal Fabrication," associated with the former use of the Phase I Property as a Sheet Metal Fabrication business (APEC 1).
- PCA 30 – "Importation of Fill Material of Unknown Quality" associated with the lead impacted fill on-site identifed in the 2019 Phase I-II ESA (APEC 2).
- PCA 28 – "Gasoline and Associated Products Storage in Fixed Tanks," associated with the former retail fuel outlet located at 1405 Bank Street (APEC 3).
- PCA 52 – "Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems," associated with the former service garage located at 1405 Bank Street (APEC 3).
- PCA 52 – "Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems," associated with the automotive garage currently located at 1406 Bank Street (APEC 4).

- ❒ PCA Other – "Use of Road Salt for Deicing," across the Phase I Property (APEC 5).

The rationale for identifying the above PCAs and 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.

Paterson conducted an initial subsurface investigation in 2019. The 2019 results and borehole logs have been included in this report.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The initial subsurface investigation was conducted on June 24, 2019. The field program consisted of drilling five (5) boreholes across the site. Three (3) boreholes were completed with monitoring well installations. Boreholes were drilled to a maximum depth of 6.10 m below the ground surface (mbgs).

The current subsurface investigation was conducted on July 22, 2021. The field program consisted of drilling five (5) boreholes to address the APECs identified on the Phase II Property. Two (2) boreholes (BH3-21 and BH4-21) were completed with monitoring well installations. Boreholes were drilled to a maximum depth of 8.63 m below the ground surface (mbgs).

3.2 Media Investigated

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

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

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

According to the Geological Survey of Canada website, the bedrock in the area of the Phase I Property is reported to consist of shale of the Carlsbad Formation. The overburden is reported to consist of off-shore marine sediments of erosional terraces with depths ranging from 5 to 10 m over the entire site.

Fill Placement

Based on the original Phase I-II ESA report, lead-impacted fill material is present on the Phase I Property. The impact fill is likely associated with the redevelopment of the of the Phase I Property.

Areas of Natural Significance

No areas of natural significance were identified in the Phase I Study Area.

Water Bodies

Sawmill Creek was identifed approximately 240 m northwest of the Phase I Property. No other natural water bodies were identified in the Phase I Study Area.

Drinking Water Wells

There are no potable water wells on the Phase I Property, nor are they expected to be present as the subject land is situated in a municipally serviced area.

Existing Buildings and Structures

The Phase I Property is currently occupied by a one (1) storey, two (2) unit commercial retail building. The structure was constructed in 1985 with a concrete slab-on-grade foundation and is finished on the exterior with brick and glass, and a flat, tar and gravel style roof. A florist business (Langdon's Flowers Ltd.) occupies approximately 75% of the total building area while a financial services business (Cash 4 You) occupies the remaining 25%. The subject building is heated and cooled with three (3) rooftop natural gas-fired HVAC units (installed in 2011).

Subsurface Structures and Utilities

The Phase I Property is situated in a municipally serviced area. Underground utilities and/or structures includes electricity, natural gas and municipal water on the eastern side of the property and three (3) catch basins located on the southern and western portions along the paved laneway of the Phase I Property.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area consists of residential, commercial (retailers) and institutional properties.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.1 of the Phase I-ESA report, four (4) PCAs and the resultant APECs are summarized in Table 1, along with their respective locations and contaminants of potential concern (CPCs).

Table 1: Potentially Contaminating Activities and Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1: Resulting from the former presence of a sheet metal business	Central portion of the Phase I Property	PCA 34 – Metal Fabrication	On-site	Metals As, Sb, Se Hg CrVI	Soil and groundwater
APEC 2: Resulting from lead-impacted fill material	Central and southern portion of the Phase I Property	PCA 30 – Importation of Fill Material of Unknown Quality	On-site	Metals As, Sb, Se Hg CrVI	Soil
APEC 3: Resulting from the former presence of a retail fuel outlet and service garage at 1405 Bank Street	Northeastern portion of the Phase I Property	PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	Off-site	BTEX PHCs (F_1-F_4)	Soil and Groundwater

Table 1: Potentially Contaminating Activities and Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 3: Resulting from the former presence of a retail fuel outlet and service garage at 1405 Bank Street	Northeastern portion of the Phase I Property	PCA 52 – Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems	Off-site	BTEX PHCs (F_1-F_4)	Soil and Groundwater
APEC 4: Resulting from the presence of an automotive service garage at 1406 Bank Street	Southern portion of the Phase I Property	PCA 52 – Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems	Off-site	BTEX PHCs (F_1-F_4) VOCs	Soil and Groundwater

Contaminants of Potential Concern

As per Section 7.1 of the Phase I-ESA report, the contaminants of potential concern (CPCs) in soil and/or groundwater include benzene, toluene, ethylbenzene, and xylenes (BTEX), petroleum hydrocarbons (PHCs, F1-F4), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) and metals (including arsenic (As), antimony (Sb) and selenium (Se)), mercury (Hg) and hexavalent chromium (CrVI).

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 on-and off-site PCAs that have resulted in APECs on the Phase I Property.

A variety of independent sources were consulted as part of this assessment, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Deviations from Sampling and Analysis Plan

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

3.5 Impediments

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

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The initial subsurface investigation was conducted on June 24, 2019, which consisted of drilling five (5) boreholes, three (3) of which were completed as groundwater monitoring wells (BH1, BH2 and BH4).

The subsurface investigation conducted for this Phase II ESA on July 22, 2021 consisted of drilling an additional five (5) boreholes (BH1-21 through BH5-21) across the Phase II Property, two (2) of which were completed as groundwater monitoring wells (BH3-21 and BH4-21). The boreholes were drilled to a maximum depth of 8.63m below ground surface (bgs) to intercept groundwater.

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 PE4632-3 - Test Hole Location Plan.

4.2 Soil Sampling

A total of 35 soil samples were obtained from the current 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 and split spoon were obtained from the boreholes are shown as "**AU**" and "**SS**", respectively on the Soil Profile and Test Data Sheets.

The borehole profiles generally consist of either a pavement structure, or topsoil, overlaying a fill material consisting of silty clay with some sand and/or gravel, followed by native silty clay overlying glacial till (silty clay with sand, gravel and cobbles). Practical refusal to augering was encountered at 8.63 mbgs, in which bedrock was inferred.

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 to 7.3 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.

4.4 Groundwater Monitoring Well Installation

In 2019, three (3) groundwater monitoring wells were installed on the Phase II Property and two (2) groundwater monitoring wells installed during this recent investigation. The monitoring wells consisted of 32 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.

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	78.10	6.10	3.10-6.10	2.70-6.10	0.15-2.70	Flushmount
BH2	78.10	6.10	3.10-6.10	2.70-6.10	0.15-2.70	Flushmount
BH4	78.20	5.33	2.33-5.33	2.0-5.33	0.15-2.0	Flushmount
BH3-21	78.47	3.96	2.46-3.96	2.15-3.96	0.15-2.15	Flushmount
BH4-21	78.27	3.88	2.38-3.88	2.10-3.88	0.15-2.10	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.

TABLE 3: Soil Samples Submitted and Analyzed Parameters

Sample ID	Sample Depth Stratigraphic Unit	Parameters Analyzed						Rationale
		BTEX	PHCs (F1-F4)	VOCs	Metals	Hg	CrVI	
June 24, 2019								
BH1-SS6	3.81-4.42m Silty Clay	X	X					Assess the potential soil impact due to the presence of the automotive garage off-site.
BH2-SS5	3.05-3.66m Silty Clay	X	X					Assess the potential soil impact due to the presence of the automotive garage off-site.
BH3-SS2	0.76-1.37m Fill				X			Assess the quality of the fill material.

TABLE 3: Soil Samples Submitted and Analyzed Parameters

Sample ID	Sample Depth Stratigraphic Unit	Parameters Analyzed						Rationale
		BTEX	PHCs (F1-F4)	VOCs	Metals	Hg	CrVI	
BH4-SS2	0.76-1.37m Fill				X			Assess the quality of the fill material.
July 22, 2021								
BH1-21-SS2	0.76-1.37m Fill				X	X	X	Assess the quality of the fill material.
BH4-21-SS2	0.76-1.37m Fill				X	X	X	Assess the quality of the fill material.
BH4-21-SS4	2.29-2.90m Silty Clay	X	X	X				Assess the potential soil impact due to the former presence of a retail fuel outlet and automotive garage off-site.
BH5-21-SS2	0.76-1.37m Fill				X	X	X	Assess the quality of the fill material.
BH5-21-SS3	1.52-2.13m Silty Clay	X	X	X	X			Assess the potential soil impact due to the former on-site sheet metal fabrication business.
DUP	1.52-2.13m Silty Clay				X			Duplicate soil sample (BH5-21-SS3) for QA/QC purposes.

TABLE 4: Groundwater Samples Submitted and Analyzed Parameters

Sample ID	Screened Interval	Parameters Analyzed					Rationale
		BTEX	PHCs (F1-F4)	VOCs	PAHs	Metals	
July 2, 2019							
BH1-GW1	3.10-6.10m	X	X	X			Assess the potential groundwater impact due to the presence of the automotive garage off-site.
BH2-GW1	3.10-6.10m	X	X	X			Assess the potential groundwater impact due to the presence of the automotive garage off-site.
BH4-GW1	2.33-5.33m	X	X		X	X	Assess the potential groundwater impact due to the former on-site sheet metal fabrication business.

TABLE 4: Groundwater Samples Submitted and Analyzed Parameters							
Sample ID	Screened Interval	Parameters Analyzed					Rationale
		BTEX	PHCs (F1-F4)	VOCs	PAHs	Metals	
August 3, 2021							
BH3-21-GW1	2.46-3.96m	X	X	X			Assess the potential groundwater impact due to the presence of the automotive garage off-site.
BH4-21-GW1	2.38-3.88m	X	X	X		X	Assess the potential groundwater impact due to the former presence of a metal fabrication business on-site, and retail fuel outlet and automotive garage off-site.
DUP	2.38-3.88m			X			Duplicate groundwater sample (BH4-21-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 stratigraphy generally consisted of a pavement structure (asphalt concrete over crushed stone) or topsoil over fill material underlain by native silty clay and glacial till (silty clay with sand, gravel and cobbles). The fill material generally consisted of silty sand, some sand and gravel or silty clay and gravel. Trace brick fragments were identified in the fill at BH3 and BH2-21.

Bedrock was not encountered during the subsurface investigation. Bedrock was inferred at practical refusal to augering at 8.63 mbgs at BH2-21. Practical dynamic cone penetration (DCPT) refusal was achieved at 7.77 in BH4-21.

Groundwater was encountered within the overburden at depths ranging from approximately 1.60 to 2.30 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 July 2, 2019 and August 10, 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	78.10	1.62	76.48	July 2, 2019
BH2	78.10	1.49	76.61	July 2, 2019
BH4	78.20	1.81	76.39	July 2, 2019
BH1	78.10	1.75	76.35	August 10, 2021
BH2	78.10	1.60	76.50	August 10, 2021
BH4	78.20	1.94	76.22	August 10, 2021
BH2-21	78.47	2.25	76.22	August 10, 2021
BH3-21	78.27	2.30	75.97	August 10, 2021

Based on the groundwater elevations measured during the August 10, 2021 sampling event, groundwater contour mapping was completed. Groundwater contours are shown on Drawing PE4632-3 – Test Hole Location Plan.

Based on the contour mapping, groundwater flow at the subject site is in a north easterly direction. A horizontal hydraulic gradient of approximately 0.017m/m was calculated.

5.3 Fine-Coarse Soil Texture

Grain-size analysis was not completed for the Phase II 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 7.3 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

Nine (9) soil samples were submitted for BTEX, PHCs (F1-F4), VOCs, and/or metals (including mercury and hexavalent chromium) analysis. The results of the analytical testing are presented below in Tables 6, 7 and 8. The laboratory certificate of analysis is provided in Appendix 1.

TABLE 6: Analytical Test Results – Soil
BTEX and PHCs F_1-F_4

Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 3 Residential Standards (µg/g)
		June 24, 2019		July 22, 2021		
		BH1-SS6 (3.8-4.4m)	BH2-SS5 (3.1-3.7m)	BH4-21-SS4 (2.3-2.9m)	BH5-21-SS3 (0.7-1.4m)	
Benzene	0.02	nd	nd	nd	nd	0.21
Toluene	0.05	nd	nd	nd	nd	2.3
Ethylbenzene	0.05	nd	nd	nd	nd	2
Xylenes	0.05	nd	nd	nd	nd	3.1
PHC F_1	7	nd	nd	nd	nd	55
PHC F_2	4	nd	nd	nd	nd	98
PHC F_3	8	nd	nd	nd	10	300
PHC F_4	6	nd	nd	nd	41	2800

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- As per the Certificates of Analysis, the 2021 soil samples are labeled BH4-SS4 and BH5-SS3

No detectable BTEX parameters were identified in any of the soil samples analyzed. Concentrations of PHC F3 and F4 were detected in soil sample BH5-21-SS3. All of the identified concentrations comply with the MECP Table 3 Residential Standards.

TABLE 7: Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g) July 22, 2021		MECP Table 3 Residential Standards (µg/g)
		BH4-21-SS4 (2.3-2.9m)	BH5-21-SS3 (0.7-1.4m)	
Acetone	0.50	nd	nd	16
Benzene	0.02	nd	nd	0.21
Bromodichloromethane	0.05	nd	nd	13
Bromoform	0.05	nd	nd	0.27
Bromomethane	0.05	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	0.05
Chlorobenzene	0.05	nd	nd	2.4
Chloroform	0.05	nd	nd	0.05
Dibromochloromethane	0.05	nd	nd	9.4
Dichlorodifluoromethane	0.05	nd	nd	16
1,2-Dichlorobenzene	0.05	nd	nd	3.4
1,3-Dichlorobenzene	0.05	nd	nd	4.8
1,4-Dichlorobenzene	0.05	nd	nd	0.083
1,1-Dichloroethane	0.05	nd	nd	3.5
1,2-Dichloroethane	0.05	nd	nd	0.05
1,1-Dichloroethylene	0.05	nd	nd	0.05
cis-1,2-Dichloroethylene	0.05	nd	nd	3.4
trans-1,2-Dichloroethylene	0.05	nd	nd	0.084
1,2-Dichloropropane	0.05	nd	nd	0.05
1,3-Dichloropropene, total	0.05	nd	nd	0.05
Ethylbenzene	0.05	nd	nd	2
Ethylene dibromide (dibromoethane, 1,2-)	0.05	nd	nd	0.05
Hexane	0.05	nd	nd	2.8
Methyl Ethyl Ketone (2-Butanone)	0.50	nd	nd	16
Methyl Isobutyl Ketone	0.50	nd	nd	1.7
Methyl tert-butyl ether	0.05	nd	nd	0.75
Methylene Chloride	0.05	nd	nd	0.1
Styrene	0.05	nd	nd	0.7
1,1,1,2-Tetrachloroethane	0.05	nd	nd	0.058
1,1,2,2-Tetrachloroethane	0.05	nd	nd	0.05
Tetrachloroethylene	0.05	nd	nd	0.28
Toluene	0.05	nd	nd	2.3
1,1,1-Trichloroethane	0.05	nd	nd	0.38
1,1,2-Trichloroethane	0.05	nd	nd	0.05
Trichloroethylene	0.05	nd	nd	0.061
Trichlorofluoromethane	0.05	nd	nd	4
Vinyl Chloride	0.02	nd	nd	0.02
Xylenes, total	0.05	nd	nd	3.1

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- As per the Certificates of Analysis, the 2021 soil samples are labeled BH4-SS4 and BH5-SS3

No detectable VOCs parameters were identified in any of the soil samples analyzed. All of the identified concentrations comply with the MECP Table 3 Residential Standards.

TABLE 7: Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)					MECP Table 3 Residential Standards (µg/g)
		June 24, 2019		July 22, 2021			
		BH3-SS2 (0.7-1.4m)	BH4-SS2 (0.7-1.4m)	BH1-21-SS2 (0.7-1.4m)	BH4-21-SS2 (0.7-1.4m)	BH5-21-SS2 (0.7-1.4m)	
Antimony	1.0	nd	1.8	1.7	1.2	nd	7.5
Arsenic	1.0	3.2	4.5	7.7	2.5	4.3	18
Barium	1.0	95.8	151	278	147	346	390
Beryllium	0.5	nd	0.5	0.7	0.5	0.9	4
Boron	5.0	6.0	9.9	5.5	nd	8.5	120
Cadmium	0.5	nd	nd	nd	nd	nd	1.2
Chromium	5.0	25.2	32.3	71.4	38.0	108	160
Chromium (VI)	0.2	NA	NA	nd	nd	nd	8
Cobalt	1.0	7.7	10.1	17.4	9.0	21.1	22
Copper	5.0	18.5	32.6	30.5	14.0	39.8	140
Lead	1.0	48.7	**196**	53.4	45.3	41.5	120
Mercury	0.1	NA	NA	nd	nd	nd	0.27
Molybdenum	1.0	2.7	2.0	1.1	nd	nd	6.9
Nickel	5.0	17.8	24.4	35.6	17.6	54.6	100
Selenium	1.0	nd	nd	nd	nd	nd	2.4
Silver	0.3	nd	nd	nd	nd	nd	20
Thallium	1.0	nd	nd	nd	nd	nd	1
Uranium	1.0	nd	nd	nd	nd	nd	23
Vanadium	10.0	28.7	38.4	70.8	49.2	**93.9**	86
Zinc	20.0	81.2	146	258	70.1	133	340

Notes:
- MDL – Method Detection Limit
- nd – Not detected above the MDL
- NA – Parameter not analyzed
- **Bold and Underlined** – Parameter exceeds selected MECP Standards

TABLE 7: Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)		MECP Table 3 Residential Standards (µg/g)
		July 22, 2021		
		BH5-21-SS3 (1.52-2.13m)	DUP (1.52-2.13m)	
Antimony	1.0	nd	nd	40
Arsenic	1.0	2.6	2.8	18
Barium	1.0	117	113	670
Beryllium	0.5	0.5	0.5	8
Boron	5.0	6.1	5.9	120
Cadmium	0.5	nd	nd	1.9
Chromium	5.0	32.7	33.4	160
Cobalt	1.0	6.5	6.5	80
Copper	5.0	16.0	15.8	230
Lead	1.0	6.1	5.9	120
Molybdenum	1.0	nd	nd	40
Nickel	5.0	16.8	17.1	270
Selenium	1.0	nd	nd	5.5
Silver	0.3	nd	nd	40
Thallium	1.0	nd	nd	3.3
Uranium	1.0	nd	nd	33
Vanadium	10.0	44.6	44.5	86
Zinc	20.0	45.1	45.7	340

Notes:
- MDL – Method Detection Limit
- nd – Not detected above the MDL
- NA – Parameter not analyzed
- **Bold and Underlined** – Parameter exceeds selected MECP Standards

Metal concentrations were identified in all of the soil samples analyzed. Lead and vanadium concentrations in soil samples BH4-SS4 and BH5-21-SS2, respectively, are in excess of the MECP Table 3 Residential Standards.

The analytical results for BTEX, PHCs, VOCs and Metals, Hg and CrVI tested in soil are shown on Drawings PE4632-4 and PE4632-5 – Analytical Test Plan Soils.

The maximum concentrations of analyzed parameters in the soil at the site are summarized below in Table 9.

TABLE 9: Maximum Concentrations – Soil			
Parameter	**Maximum Concentration (µg/g)**	**Borehole**	**Depth Interval (m BGS)**
PHC F3	10	BH5-21-SS3	1.52-2.13m Silty Clay
PHC F_4	41		
Antimony	1.8	BH4-SS2	0.76-1.37m; Fill
Arsenic	7.7	BH1-21-SS2	0.76-1.37m; Fill
Barium	346	BH5-21-SS2	0.76-1.37m; Fill
Beryllium	0.9		
Boron	9.9	BH4-SS2	0.76-1.37m; Fill
Chromium	108	BH5-21-SS2	0.76-1.37m; Fill
Cobalt	21.1		
Copper	39.8		
Lead	**196**	BH4-SS2	0.76-1.37m; Fill
Molybdenum	2.7	BH3-SS2	0.76-1.37m; Fill
Nickel	54.6	BH5-21-SS2	0.76-1.37m; Fill
Vanadium	**93.9**		
Zinc	258	BH1-21-SS2	0.76-1.37m; Fill

Notes:
- **Bold and Underlined** – Parameter exceeds selected MECP Standards

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

5.6 Groundwater Quality

Groundwater samples from monitoring wells BH1, BH2, BH4, BH3-21 and BH4-21 were submitted for laboratory analysis of BTEX, PHC (fractions, F1-F4), PAHs and/or VOCs analyses. (The groundwater samples from BH1, BH2 and BH4 were obtained slightly above the screened intervals, while groundwater samples from BH3-21 and BH4-21 were obtained within the screened intervals as noted in Table 2). The results of the analytical testing are presented in Tables 10, 11, 12 and 13. The laboratory certificates of analysis are provided in Appendix 1.

]

TABLE 10: Analytical Test Results – Groundwater
BTEX and PHCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)					MECP Table 3 Standards (µg/L)
		July 2, 2019			August 3, 2021		
		BH1-GW1	BH2-GW1	BH4-GW1	BH3-21-GW1	BH4-21-GW1	
Benzene	0.5	nd	nd	nd	nd	nd	44
Toluene	0.5	nd	nd	nd	nd	nd	18000
Ethylbenzene	0.5	nd	nd	nd	nd	nd	2300
Xylenes	0.5	nd	nd	nd	nd	nd	4200
PHC F_1	25	nd	nd	nd	nd	nd	750
PHC F_2	100	nd	nd	nd	nd	nd	150
PHC F_3	100	nd	nd	nd	nd	nd	500
PHC F_4	100	nd	nd	nd	nd	nd	500

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

No detectable BTEX or PHC concentrations were identified in the groundwater samples analyzed. All of the groundwater results comply with the MECP Table 3 Standards.

TABLE 11: Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)		MECP Table 3 Standards (µg/L)
		July 2, 2019	August 3, 2021	
		BH1-GW1	BH4-21-GW1	
Antimony	0.5	nd	nd	20,000
Arsenic	1	1	nd	1,900
Barium	1	164	214	29,000
Beryllium	0.5	nd	nd	67
Boron	10	115	143	45,000
Cadmium	0.1	nd	nd	2.7
Chromium	1	nd	nd	810
Chromium (VI)	10	NA	nd	140
Cobalt	0.5	1.5	1.4	66
Copper	0.5	2.0	0.9	87
Lead	0.1	nd	nd	25
Mercury	0.1	NA	nd	0.29
Molybdenum	0.5	11.4	10.4	9,200
Nickel	1	4	2	490
Selenium	1	nd	nd	63
Silver	0.1	nd	nd	1.5
Sodium	200	379,000	191,000	2,300,000
Thallium	0.1	nd	nd	510
Uranium	0.1	6.2	2.3	420
Vanadium	0.5	2.5	0.9	250
Zinc	5	nd	nd	1,100

Notes:
- MDL – Method Detection Limit
- nd – Not detected above the MDL
- NA – Parameter not analyzed

Metal concentrations were identified in the groundwater samples analyzed. All of the groundwater results comply with the MECP Table 3 Standards.

TABLE 12: Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) July 2, 2019		MECP Table 3 Standards (µg/L)
		BH4-GW1	BH2-GW1	
Acetone	5.0	nd	nd	130,000
Benzene	0.5	nd	nd	44
Bromodichloromethane	0.5	nd	nd	85,000
Bromoform	0.5	nd	nd	380
Bromomethane	0.5	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	630
Chloroform	0.5	nd	nd	2.4
Dibromochloromethane	0.5	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	4,400
1,2-Dichlorobenzene	0.5	nd	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	16
1,3-Dichloropropene, total	0.5	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	2,300
Ethylene dibromide (dibromoethane, 1,2-)	0.2	nd	nd	0.25
Hexane	1.0	nd	nd	51
Methyl Ethyl Ketone (2-Butanone)	5.0	nd	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	140,000
Methyl tert-butyl ether	2.0	nd	nd	190
Methylene Chloride	5.0	nd	nd	610
Styrene	0.5	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	1.6
Toluene	0.5	nd	nd	18,000
1,1,1-Trichloroethane	0.5	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	2,500
Vinyl Chloride	0.5	nd	nd	0.5
Xylenes, total	0.5	nd	nd	4,200

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

TABLE 12 Continued: Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) August 3, 2021			MECP Table 3 Standards (µg/L)
		BH3-21-GW1	BH4-21-GW1	DUP	
Acetone	5.0	nd	nd	nd	130,000
Benzene	0.5	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	85,000
Bromoform	0.5	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	630
Chloroform	0.5	nd	nd	nd	2.4
Dibromochloromethane	0.5	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	4,400
1,2-Dichlorobenzene	0.5	nd	nd	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	16
1,3-Dichloropropene, total	0.5	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	2,300
Ethylene dibromide (dibromoethane, 1,2-)	0.2	nd	nd	nd	0.25
Hexane	1.0	nd	nd	nd	51
Methyl Ethyl Ketone (2-Butanone)	5.0	nd	nd	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	140,000
Methyl tert-butyl ether	2.0	nd	nd	nd	190
Methylene Chloride	5.0	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	1.6
Toluene	0.5	nd	nd	nd	18,000
1,1,1-Trichloroethane	0.5	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	2,500
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes, total	0.5	nd	nd	nd	4,200

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

No detectable VOCs concentrations were identified in the groundwater samples analyzed. All of the groundwater results comply with the MECP Table 3 Standards.

TABLE 13: Analytical Test Results – Groundwater
PAHs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) July 2, 2019	MECP Table 3 Standards (µg/L)
		BH4-GW1	
Acenaphthene	0.05	nd	600
Acenaphthylene	0.05	nd	1.8
Anthracene	0.01	nd	2.4
Benzo[a]anthracene	0.01	nd	4.7
Benzo[a]pyrene	0.01	nd	0.81
Benzo[b]fluoranthene	0.05	nd	0.75
Benzo[g,h,i]perylene	0.05	nd	0.2
Benzo[k]fluoranthene	0.05	nd	0.4
Chrysene	0.05	nd	1
Dibenzo[a,h]anthracene	0.05	nd	0.52
Fluoranthene	0.01	nd	130
Fluorene	0.05	nd	400
Indeno[1,2,3-cd]pyrene	0.05	nd	0.2
1-Methylnaphthalene	0.05	nd	1,800
2-Methylnaphthalene	0.05	nd	1,800
Methylnaphthalene (1&2)	0.10	nd	1,800
Naphthalene	0.05	nd	1,400
Phenanthrene	0.05	nd	580
Pyrene	0.01	nd	68

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

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

The analytical results for PAHs tested in groundwater are shown on Drawing PE4632-6–Analytical Testing Plan – Groundwater.

The maximum concentrations of analyzed parameters in the groundwater at the site are summarized below in Table 14.

TABLE 14: Maximum Concentrations – Groundwater			
Parameter	**Maximum Concentration (µg/L)**	**Borehole**	**Screened Interval (m BGS)**
Arsenic	1	BH1-GW1	3.10-6.10
Beryllium	214	BH4-21-GW1	2.38-3.88
Boron	143		
Cobalt	1.5	BH1-GW1	3.10-6.10
Copper	2.0		
Molybdenum	11.4		
Nickel	4		
Sodium	379000		
Uranium	6.2		
Vanadium	2.5		

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 June 2019 and August 2021 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 (DUP) was obtained from BH5-21-SS3 and analyzed for metals. The relative percent difference of the concentrations that were detected are presented in Table 14.

TABLE 14: QA/QC– Soil (Metals)				
Parameter	**BH5-21-SS3**	**DUP**	**RDP (%)**	**QA/QC**
Arsenic	2.6	2.8	7	Within acceptable range
Barium	117	113	3	Within acceptable range
Beryllium	0.5	0.5	0	Within acceptable range
Boron	6.1	5.9	3	Within acceptable range
Chromium	32.7	33.4	2	Within acceptable range
Cobalt	6.5	6.5	0	Within acceptable range
Copper	16.0	15.8	1	Within acceptable range
Lead	6.1	5.9	3	Within acceptable range
Nickel	16.8	17.1	2	Within acceptable range
Vanadium	44.6	44.5	0	Within acceptable range
Zinc	45.1	45.7	1	Within acceptable range

A duplicate groundwater sample (DUP) was obtained from BH4-21-GW1 and analyzed for VOCs. Test results for the duplicate groundwater samples were not detectable.

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 general 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, five (5) PCAs were considered to represent APECs, which have been 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, and xylenes (BTEX), petroleum hydrocarbons (PHCs, F1-F4), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs) and metals (including arsenic (As), antimony (Sb) and selenium (Se)), mercury (Hg) and hexavalent chromium (CrVI).

Subsurface Structures and Utilities

The Phase II Property is situated in a municipally serviced area. Underground utilities and/or structures includes electricity, natural gas and municipal water on the eastern side of the property and three (3) catch basins located on the southern and western portions along the paved laneway of the Phase II Property.

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

Physical Setting

Site Stratigraphy

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is illustrated on Drawings PE4632-4A, 4B, 5A, 5B 6A and 6B. The stratigraphy consists of:

- A pavement structure or topsoil, approximately 0.08 m thick, overlies a granular fill material consisting of crush stone and silty sand. The fill material extended to depths of approximately 0.30 to 0.76 mbgs. Groundwater was not encountered in this layer.
- Fill material was encountered in all of the boreholes, extending to depths of approximately 1.07 to 1.58 mbgs. The fill material consisted of silty clay or silty sand and gravel with traces of sand and topsoil or brick fragments. Groundwater was not encountered in this layer.
- Silty clay was encountered in all of the boreholes, extending to depths of approximately 3.50 to 7.01 mbgs. Groundwater was encountered in this layer.
- Glacial till consisting of a silty clay and soil matrix was encountered in BH2-21, extending to a depth of approximately 8.63 mbgs. Groundwater was encountered in this layer.

Hydrogeological Characteristics

Groundwater at the Phase II Property was encountered in the native silty clay. During the most recent groundwater monitoring event, groundwater flow was measured in a north-easterly direction, with a hydraulic gradient of 0.017 m/m. Groundwater contours are shown on Drawing PE4632-3 – Test Hole Location Plan.

Approximate Depth to Bedrock

Bedrock was not confirmed during the investigation, but rather inferred at refusal to augering at depths ranging from 7.77 to 8.63 MBGS, at a depth of approximately 8.63 mbgs.

Approximate Depth to Water Table

The depth to the water table at the subject site ranges from approximately 1.60 to 2.30m below existing grade.

Sections 41 and 43.1 of the Regulation

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

Fill Placement

The fill material consisted of silty clay with some gravel and sand and was identified in all of the boreholes, which extended to depths of 0.97 to 1.58 mbgs.

Existing Buildings and Structures

The Phase II Property is currently occupied by a one (1) storey, two (2) unit commercial retail building. The structure was constructed in 1985 with a concrete slab-on-grade foundation and is finished on the exterior with brick and glass, and a flat, tar and gravel style roof. A florist business (Langdon's Flowers Ltd.) occupies approximately 75% of the total building area while a financial services business (Cash 4 You) occupies the remaining 25%. The subject building is heated and cooled with three (3) rooftop natural gas-fired HVAC units (installed in 2011).

Proposed Buildings and Other Structures

The proposed site development for the Phase II Property will include a 17-storey residential building with ground level commercial space. Due to the more sensitive change in land use to a more sensitive land use (commercial to residential), a Record of Site Condition (RSC) will be required as per O.Reg 154/03.

Areas of Natural Significance

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

Water Bodies

Sawmill Creek was identifed approximately 240 m northwest of the Phase II Property. No other natural water bodies were identified in the Phase I Study Area.

Environmental Condition

Areas Where Contaminants are Present

Based on the analytical results for soil, metals (lead and vanadium concentrations) exceeding the MECP Table 3 standards were identified in the fill material on the western portion of the Phase II Property.

Based on the analytical results, groundwater beneath the Phase II Property complies with the MECP Table 3 standards.

Types of Contaminants

Based on the analytical results, lead and vanadium concentrations in excess of the selected standards are present in the fill material on the Phase II Property.

Contaminated Media

Based on the analytical results for soil and groundwater, fill material on the central west portion of the Phase II Property is impacted with lead and vanadium.

Groundwater beneath the Phase II Property complies with the MECP Table 3 standards.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of the Phase II ESA, soil (fill material) on the western portion of the Phase II Property is impacted with lead and vanadium. The fill material is considered to have been imported for grading purposes when the Phase II Property was redeveloped.

There are no other contaminants present on or beneath the Phase II Property.

Distribution and Migration of Contaminants

Based on the findings of the Phase II ESA, the metal impacts are considered to be confined to the western portion of the site. No significant migration of contaminants is considered to have occurred on the Phase II Property.

Discharge of Contaminants

Based on the findings of the Phase II ESA, discharge of the contaminants is considered to be associated with the importation of poorquality fill material.

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.

Given that the Phase II Property is largely covered with asphalt, brick pavers and a building, the potential downward leaching of contaminants via infiltration is significantly reduced.

Based on the findings of the Phase II ESA, groundwater beneath the Phase II Property complies wit the site standards and therefore, groundwater flow and fluctuation levels are not considered to have contributed to the migration of contaminants.

No significant contaminant distribution is considered to have occurred on the Phase II Property.

Potential for Vapour Intrusion

Based on the nature of the contaminants, their location outside the building footprint and the slab-on-grade construction of the building, there is no potential for vapour intrusion on the Phase II Property.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the property addressed 1400 Bank Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

An initial subsurface investigation was conducted in June 2019. The field program consisted of drilling five (5) boreholes (BH1 to BH5) across the Phase II Property. Three (3) of the boreholes (BH1, BH2 and BH4) were instrumented with groundwater monitoring wells. No unusual visual or olfactory observations were made regarding the soil samples obtained from any of the boreholes, with the exception of some brick fragments at BH3.

Four (4) soil samples were submitted to Paracel Laboratories for metals or PHCs and BTEX analysis. No detectable PHC or BTEX concentrations were identified in the soil samples analysed. All of the metal parameter concentrations identified were found to be in compliance with the MECP Table 3 standards with one (1) exception. The lead concentration identified in soil Sample BH4-SS2 exceeds the MECP Table 3 Residential Standard.

Groundwater samples were recovered from the monitoring wells installed in BH1, BH2 and BH4 on July 2, 2019. Two (2) of the samples (BH1 and BH2) were submitted for PHCs and VOCs analysis. Additionally, one (1) sample (BH4) was submitted for PHCs, BTEX, PAHs and metals analysis. The groundwater was in compliance with the selected MECP Standards.

The current 2021 subsurface investigation consisted of five boreholes (BH1-21 through BH5-21), two (2) of which were instrumented with groundwater monitoring wells. The general soil profile encountered during the field program consisted of a pavement structure, followed by fill material consisting of silty clay with some gravel, sand and traces of topsoil and brick fragments (in BH2-21), underlain by silty clay, overlying glacial till (silty clay with sand, gravel and crushed stone. Bedrock was inferred at practical refusal at a depth of approximate 8.63 mbgs.

Nine (9) soil samples were submitted during this investigation for laboratory analysis of benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, Fractions F_1-F_4), volatile organic compounds (VOCs) and metals (including hydride forming compounds: arsenic (As), Antimony (Sb), Selenium (Se)), mercury (Hg) and hexavalent chromium (CrVI).

All contaminants of potential concern were in compliance with the MECP Table 3 Residential Standards, with the exception of vanadium concentration identified in the fill material at BH5-21.

Groundwater samples from monitoring wells BH3-21 and BH4-21 were collected during the August 3, 2021 sampling event. No free product or petroleum hydrocarbon sheen was noted on the purge water during the groundwater sampling events.

Groundwater samples were analyzed for BTEX, PHCs, VOCs and metals (including hydride forming compounds: arsenic (As), Antimony (Sb), Selenium (Se)), mercury (Hg) and hexavalent chromium (CrVI). All of the groundwater results complied with the MECP Table 3 Standards.

Recommendations

It is our understanding that the Phase II Property will be redeveloped for residential land use and as such, the Phase II Property will require a Record of Site Condition (RSC).

Based on the findings of the Phase II ESA, it is recommended that a soil remediation be carried out to support the filing of an RSC. Given the shallow depth of the impacted fill, it is recommended that the soil remediation be carried out in conjunction with the construction excavation. A representative sample of impacted soil must be submitted for a leachate analysis in accordance with O.Reg. 347/558 prior to disposal at an approved landfill site. It is also recommended that Paterson personnel overs the remediation excavation in order to direct the segregation of impacted soil and to obtain confirmatory soil samples as required.

Any excess soil that meets site standards and requires removal for construction purposes must be handled in accordance with O. Reg. 406/19, On-Site and Excess Soil Management. Additional information regarding O.Reg. 406/19 can be provided upon request.

Monitoring Wells

It is recommended that the monitoring wells installed on the Phase II Property be maintained for possible future monitoring events. Prior to site redevelopment, the monitoring wells must be decommissioned in accordance with O.Reg. 903.

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. 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 SerCo Realty Group. Notification from SerCo Realty Group and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.

Mandy Witteman, B.Eng., M.A.Sc.

Karyn Munch, P.Eng., QP_{ESA}

Report Distribution:

- SerCo Realty Group
- Paterson Group

FIGURES

Figure 1 - Key Plan

Drawing PE4632-3 – Test Hole Location Plan & Groundwater Contour Plan

Drawing PE4632-4 – Analytical Testing Plan – Soil (Metals)

Drawing PE4632-4A – Cross-section A – A' – Soil (Metals)

Drawing PE4632-4B – Cross-section B – B' – Soil (Metals)

Drawing PE4632-5 – Analytical Testing Plan – Soil (BTEX, PHCs & VOCs)

Drawing PE4632-5A – Cross-section A – A' – Soil (BTEX, PHCs & VOCs)

Drawing PE4632-5B – Cross-section B – B' – Soil (BTEX, PHCs & VOCs)

Drawing PE4632-6 – Analytical Testing Plan – Groundwater

Drawing PE4632-6A – Cross-section A – A' – Groundwater

Drawing PE4632-6B – Cross-section B – B' – Groundwater

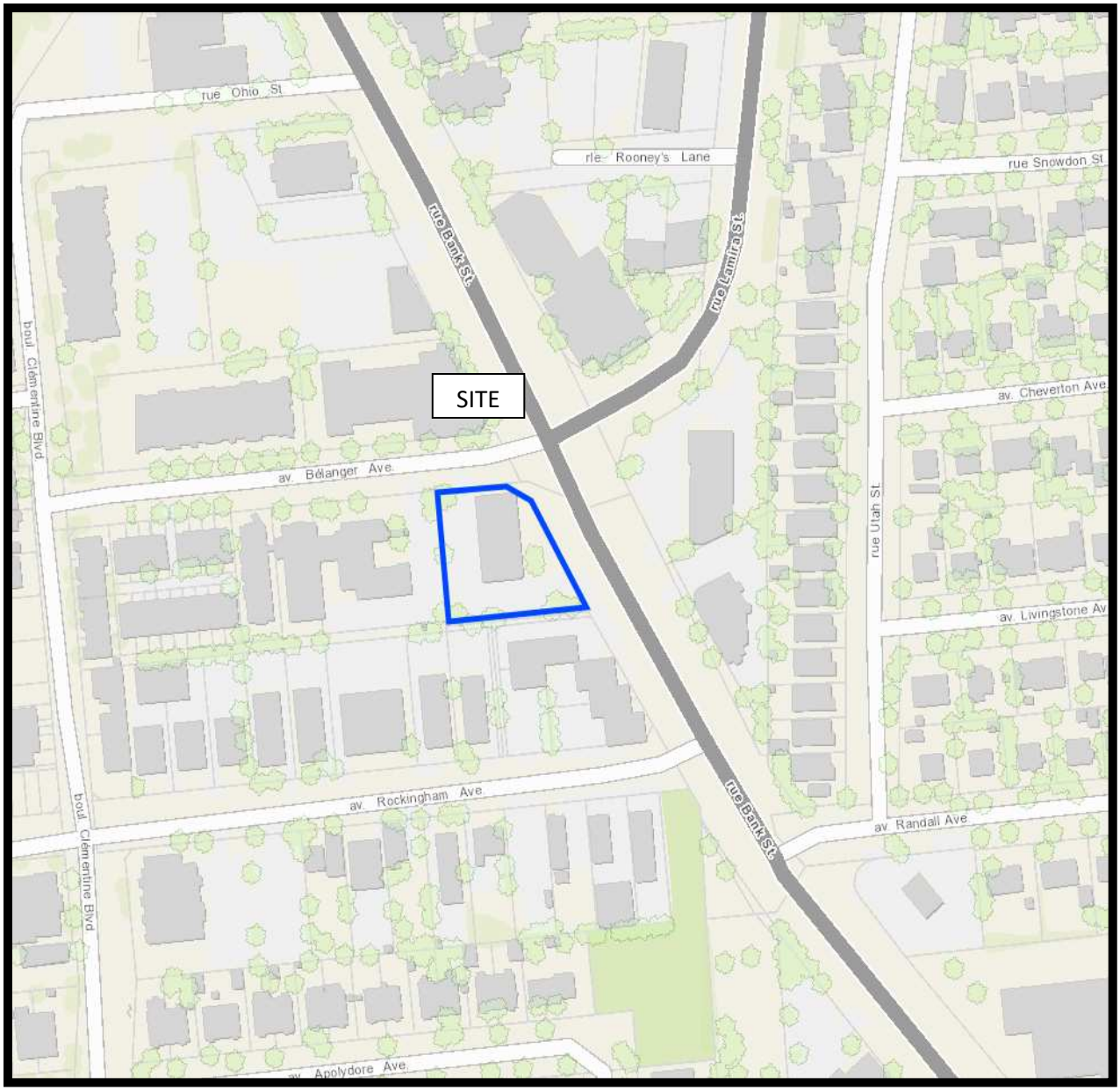
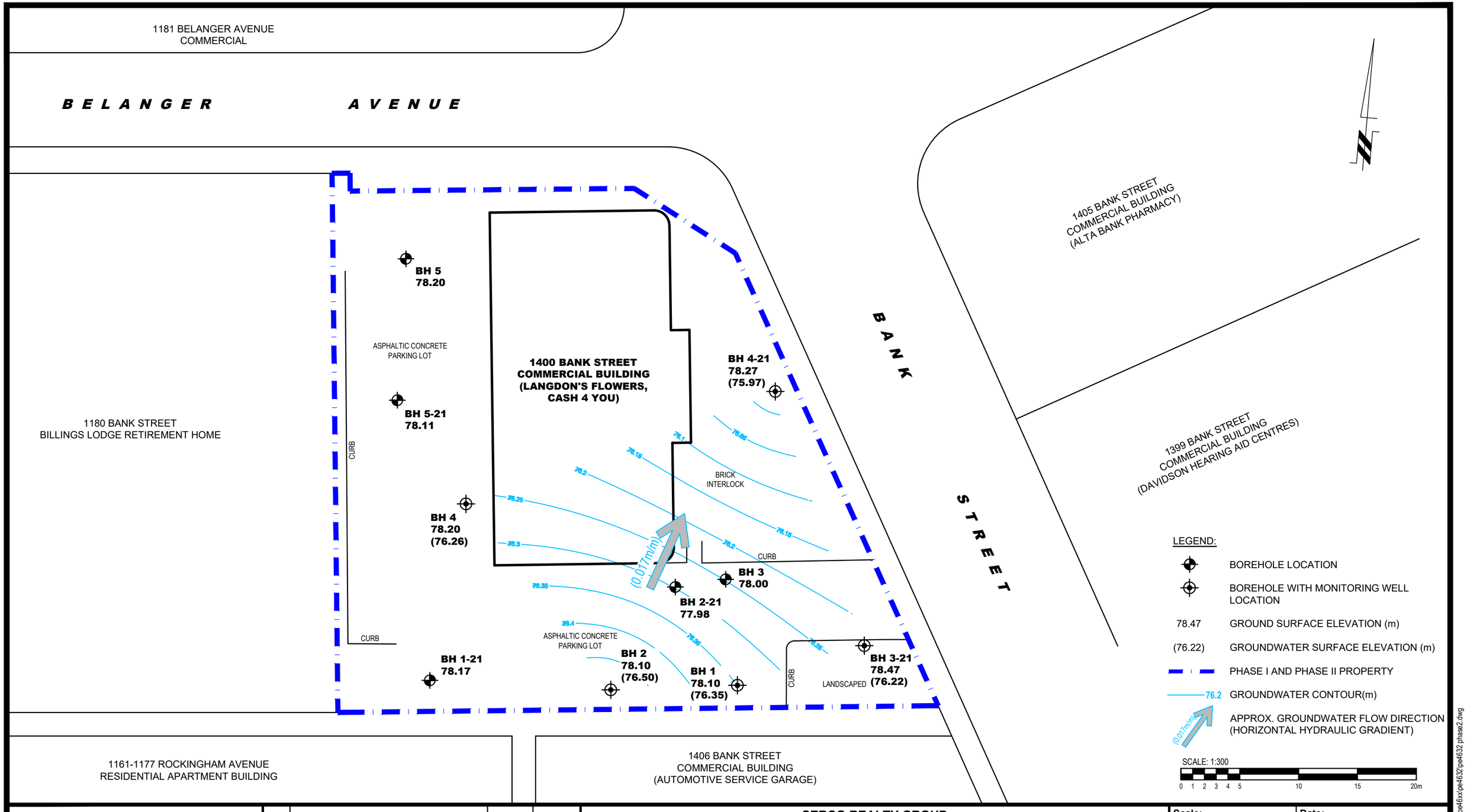


FIGURE 1

KEY PLAN



patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

SERCO REALTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1400 BANK STREET

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:300	Date: 08/2021
Drawn by: MPG	Report No.: PE4632-3
Checked by: MW	Dwg No.: PE4632-3
Approved by: MSD	Revision No.:

p:\autocad drawings\environmental\pe4fx\xx\pe4632\pe4632 phase2.dwg

1181 BELANGER AVENUE
COMMERCIAL

B E L A N G E R A V E N U E

BH5-21-SS2 0.76-1.37m 22-July-21

Parameter	Results	Table 3 (ug/g)
Vanadium	93.9	86

All other metals, Hg and CrVI comply with MECP Table 3

BH5-21-SS3 1.52-2.13m 22-July-21
Metals comply with MECP Table 3 standards

DUP(BH5-21-SS3) 1.52-2.13m 22-July-21
Metals comply with MECP Table 3 standards

BH4-SS2 0.76-1.37m 24-June-21

Parameter	Results	Table 3 (ug/g)
Lead	196	120

All other metals comply with MECP Table 3

BH4-21-SS2 0.76-1.37m 22-July-21
Metals, Hg and CrVI comply with MECP Table 3

BH3-SS2 0.76-1.37m 24-June-19
Metals comply with MECP Table 3 standards

BH1-21-SS2 0.76-1.37m 22-July-21
Metals, Hg and CrVI comply with MECP Table 3

B

BH 5
78.20

BH 5-21
78.11

BH 4
78.20
(76.26)

ASPHALTIC CONCRETE
PARKING LOT

CURB

1400 BANK STREET
COMMERCIAL BUILDING
(LANGDON'S FLOWERS,
CASH 4 YOU)

BH 4-21
78.27
(75.97)

BRICK
INTERLOCK

BANK STREET

CURB

BH 3
78.00

BH 2-21
77.98

BH 3-21
78.47
(76.22)

ASPHALTIC CONCRETE
PARKING LOT

A

BH 1-21
78.17

BH 1
78.10
(76.35)

A'

BH 2
78.10
(76.50)

CURB

LANDSCAPED

B'

1406 BANK STREET
COMMERCIAL BUILDING
(AUTOMOTIVE SERVICE GARAGE)

LEGEND:

SOIL PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL PARAMETERS EXCEED MECP TABLE 3 STANDARDS

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 78.47 GROUND SURFACE ELEVATION (m)
- (76.22) GROUNDWATER SURFACE ELEVATION (m)
- PHASE I AND PHASE II PROPERTY
- A — A' CROSS-SECTION LOCATION

NOTE: METALS INCLUDES As, Sb AND Se

SCALE: 1:300

0 1 2 3 4 5 10 15 20m

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

SERCO REALTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1400 BANK STREET

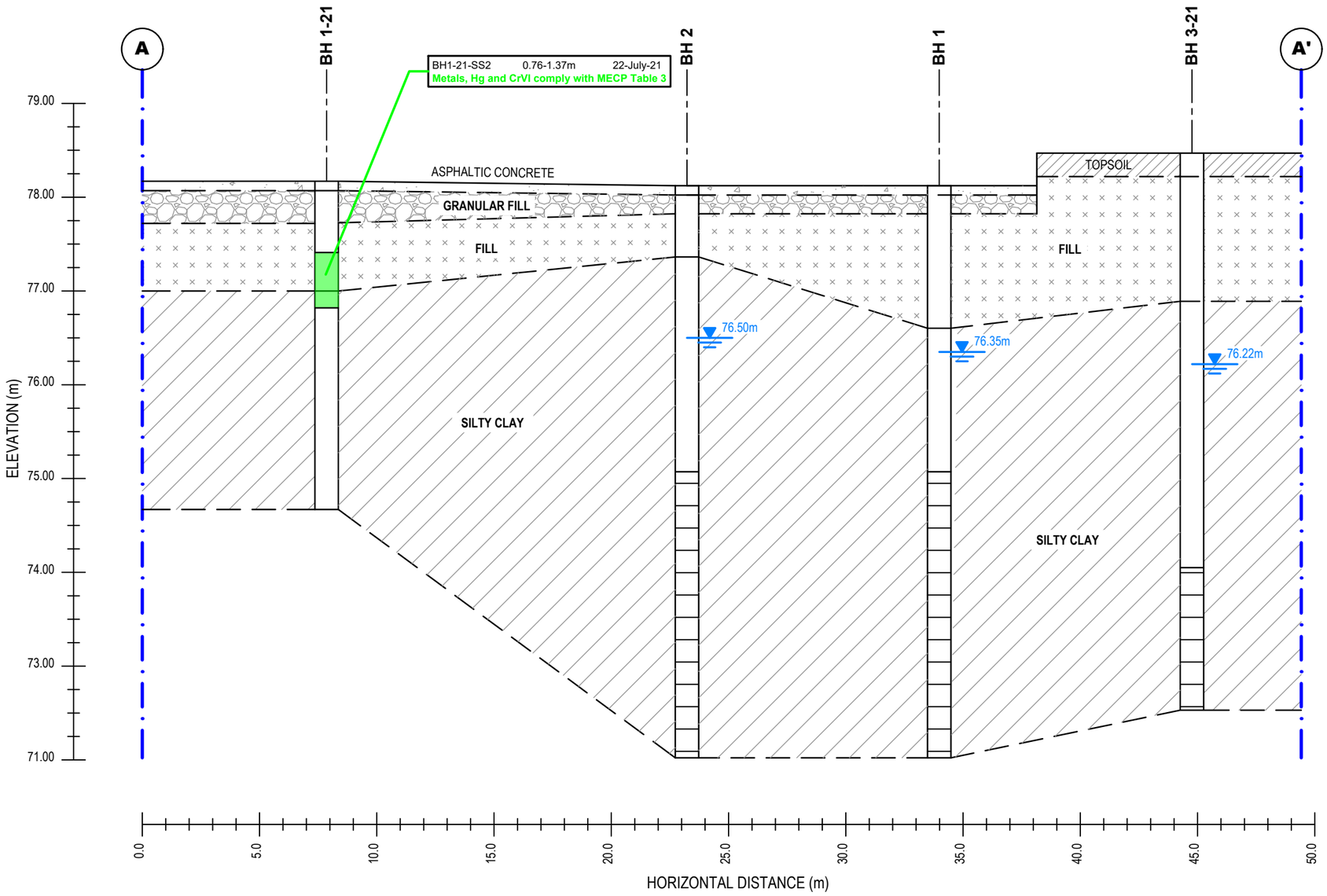
OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (METALS, Hg & CrVI)

Scale: 1:300	Date: 08/2021
Drawn by: MPG	Report No.: PE4632-3
Checked by: MW	Dwg No.: PE4632-4
Approved by: MSD	Revision No.:

p:\autocad drawings\environmental\pe4f6xx\pe4632\pe4632 phase2.dwg



SOIL PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

SERCO REALTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1400 BANK STREET

OTTAWA, ONTARIO

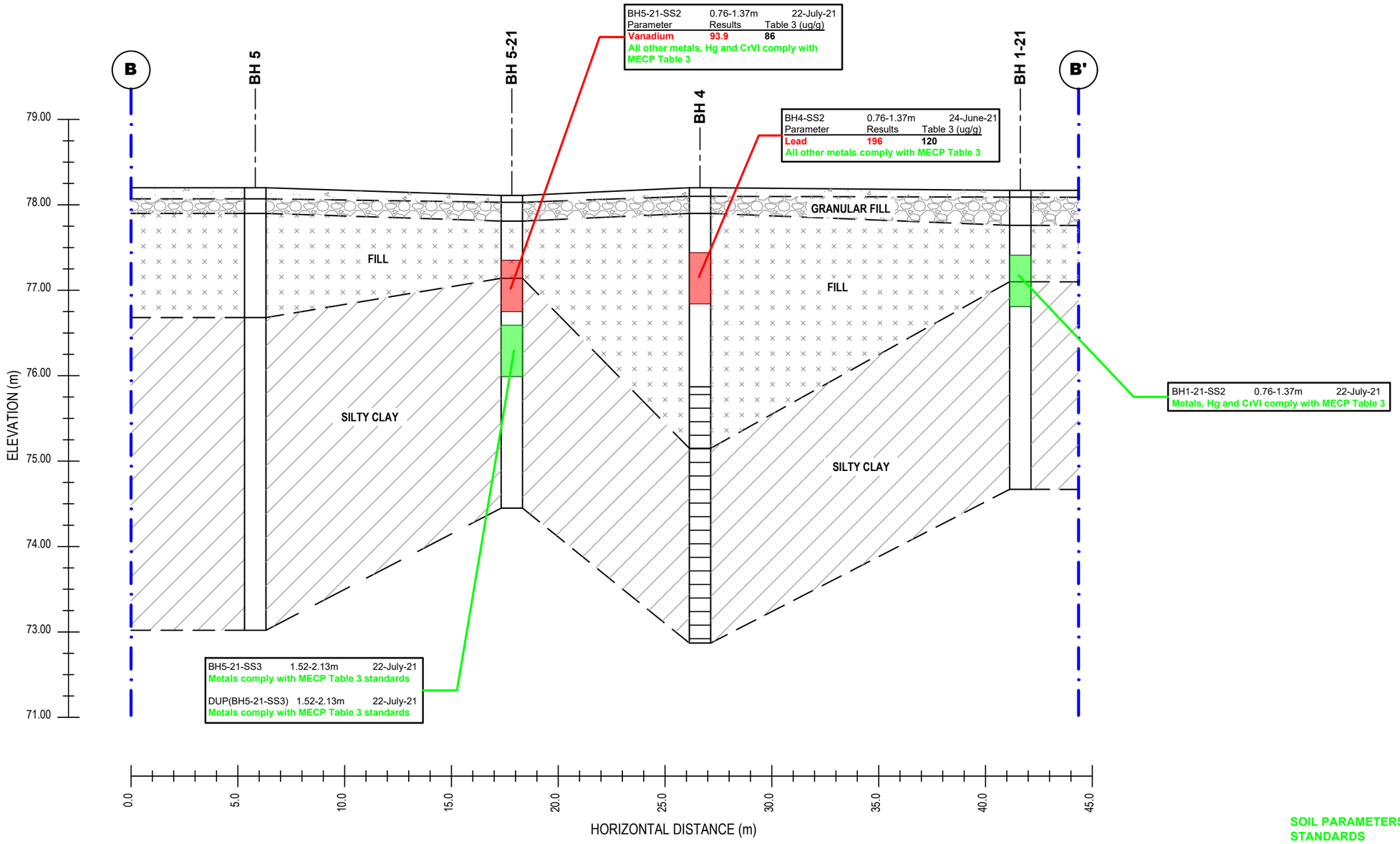
Title:

CROSS-SECTION A-A' - SOIL (METALS, Hg & CrVI)

Scale: AS SHOWN	Date: 08/2021
Drawn by: MPG	Report No.: PE4632-3
Checked by: MW	Dwg. No.: PE4632-4A
Approved by: MSD	Revision No.:

11x17

p:\autocad drawings\environmental\pe4fx\xx\pe4632\pe4632 sections.dwg



SOIL PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL PARAMETERS EXCEEND MECP TABLE 3 STANDARDS

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

SERCO REALTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1400 BANK STREET

OTTAWA, ONTARIO

Title:
CROSS-SECTION B-B' - SOIL (METALS, Hg & CrVI)

Scale: AS SHOWN	Date: 08/2021
Drawn by: MPG	Report No.: PE4632-3
Checked by: MW	Dwg. No.: PE4632-4B
Approved by: MSD	Revision No.:

p:\autocad drawings\environmental\pe4fxx\pe4632\pe4632 sections.dwg

11x17

1181 BELANGER AVENUE
COMMERCIAL

B E L A N G E R A V E N U E

B

BH5-21-SS3 1.52-2.13m 22-July-21
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH1-SS6 3.81-4.42m 24-June-19
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH2-SS5 3.05-3.66m 24-June-19
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH4-21-SS4 2.29-2.90m 22-July-21
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH 5
78.20

BH 5-21
78.11

BH 4
78.20
(76.26)

BH 4-21
78.27
(75.97)

BH 3
78.00

BH 2-21
77.98

BH 3-21
78.47
(76.22)

BH 1-21
78.17

BH 2
78.10
(76.50)

BH 1
78.10
(76.35)

ASPHALTIC CONCRETE
PARKING LOT

ASPHALTIC CONCRETE
PARKING LOT

CURB

CURB

CURB

CURB

BRICK
INTERLOCK

LANDSCAPED

1400 BANK STREET
COMMERCIAL BUILDING
(LANGDON'S FLOWERS,
CASH 4 YOU)

BANK STREET

A

A'

B'

1406 BANK STREET
COMMERCIAL BUILDING
(AUTOMOTIVE SERVICE GARAGE)

LEGEND:

SOIL PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 78.47 GROUND SURFACE ELEVATION (m)
- (76.22) GROUNDWATER SURFACE ELEVATION (m)
- PHASE I AND PHASE II PROPERTY
- A — A' CROSS-SECTION LOCATION

SCALE: 1:300

0 1 2 3 4 5 10 15 20m

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

SERCO REALTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1400 BANK STREET

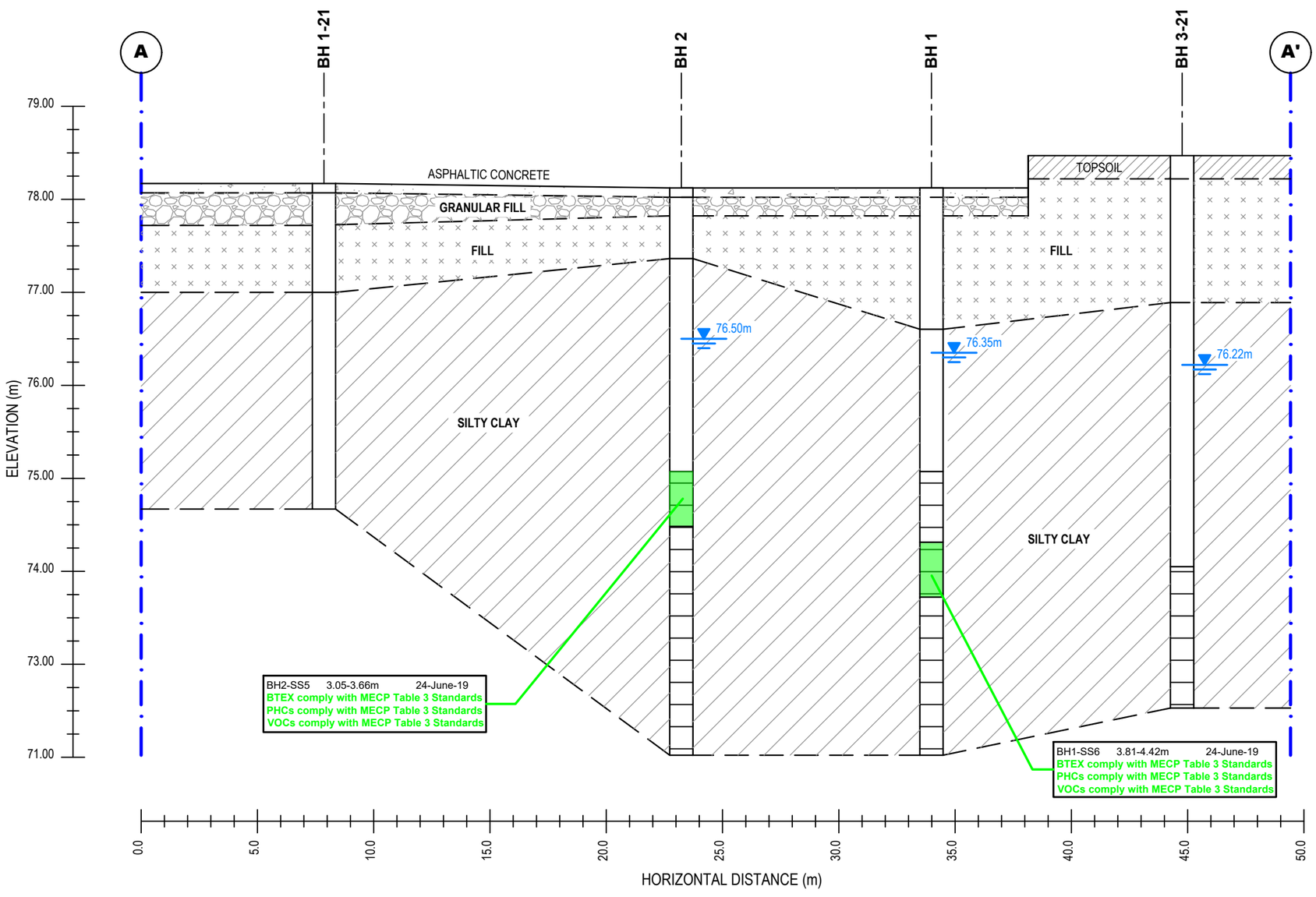
OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (BTEX, PHCs & VOCs)

Scale: 1:300	Date: 08/2021
Drawn by: MPG	Report No.: PE4632-3
Checked by: MW	Dwg No.: PE4632-5
Approved by: MSD	Revision No.:

p:\autocad drawings\environmental\pe4fx\xx\pe4632\pe4632 phase2.dwg



SOIL PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

SERCO REALTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1400 BANK STREET

OTTAWA, ONTARIO

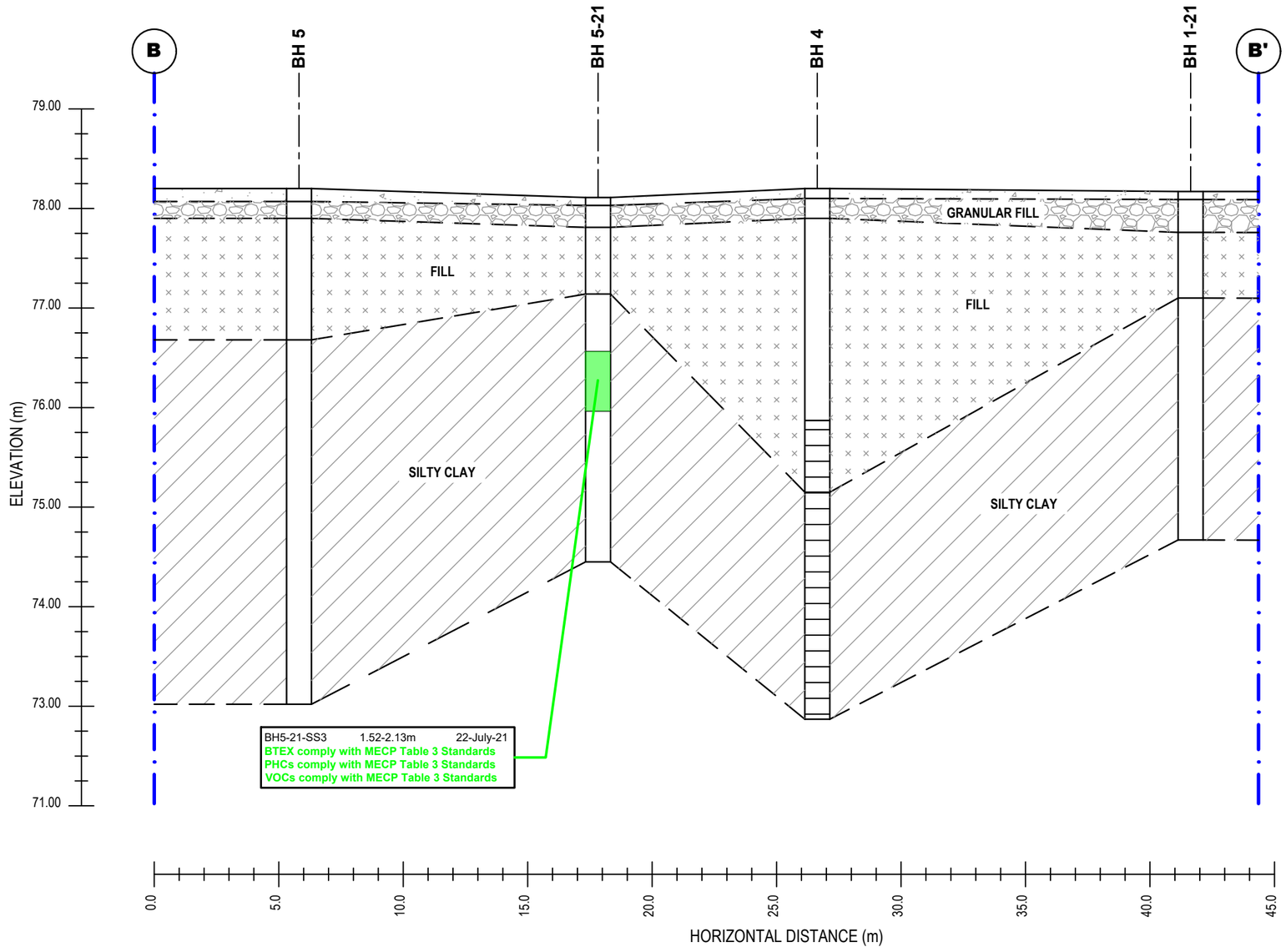
Title:

CROSS-SECTION A-A' - SOIL (BTEX, PHCs & VOCs)

Scale: AS SHOWN	Date: 08/2021
Drawn by: MPG	Report No.: PE4632-3
Checked by: MW	Dwg. No.: PE4632-5A
Approved by: MSD	Revision No.:

11x17

p:\autocad drawings\environmental\pe46xx\pe4632\pe4632 sections.dwg



SOIL PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

SERCO REALTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1400 BANK STREET

OTTAWA, ONTARIO

Title:

CROSS-SECTION B-B' - SOIL (BTEX, PHCs & VOCs)

Scale: AS SHOWN	Date: 08/2021
Drawn by: MPG	Report No.: PE4632-3
Checked by: MW	Dwg. No.: PE4632-5B
Approved by: MSD	Revision No.:

11x17

p:\autocad drawings\environmental\pe46xx\pe4632\pe4632 sections.dwg

1181 BELANGER AVENUE
COMMERCIAL

B E L A N G E R A V E N U E

B

BH 5
78.20

ASPHALTIC CONCRETE
PARKING LOT

BH 5-21
78.11

CURB

BH 4
78.20
(76.26)

1400 BANK STREET
COMMERCIAL BUILDING
(LANGDON'S FLOWERS,
CASH 4 YOU)

BH 4-21
78.27
(75.97)

BRICK
INTERLOCK

BANK STREET

CURB

ASPHALTIC CONCRETE
PARKING LOT

BH 2-21
77.98

BH 3
78.0

BH 3-21
78.47
(76.22)

CURB

A

BH 1-21
78.17

BH 1
78.10
(76.35)

BH 2
78.10
(76.50)

CURB

LANDSCAPED

A'

B'

BH4-GW1 2.28-5.33m 2-July-19
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
PAHs comply with MECP Table 3 Standards
Metals comply with MECP Table 3 Standards

BH1-GW1 3.05-6.10m 2-July-19
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH2-GW1 3.05-6.10m 2-July-19
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

BH4-21-GW1 2.44-3.96m 3-Aug-21
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards
Metals comply with MECP Table 3 Standards

DUP BH4-21-GW1 2.44-3.96m 3-Aug-21
VOCS comply with MECP Table 3 Standards

BH3-21-GW1 2.44-3.96m 3-Aug-21
BTEX comply with MECP Table 3 Standards
PHCs comply with MECP Table 3 Standards
VOCs comply with MECP Table 3 Standards

1161-1177 ROCKINGHAM AVENUE
RESIDENTIAL APARTMENT BUILDING

1406 BANK STREET
COMMERCIAL BUILDING
(AUTOMOTIVE SERVICE GARAGE)

LEGEND:

GROUNDWATER PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 78.47 GROUND SURFACE ELEVATION (m)
- (76.22) GROUNDWATER SURFACE ELEVATION (m)
- PHASE I AND PHASE II PROPERTY
- A — A' CROSS-SECTION LOCATION

NOTE: METALS INCLUDE As, Sb AND Se

SCALE: 1:300

0 1 2 3 4 5 10 15 20m

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

SERCO REALTY GROUP

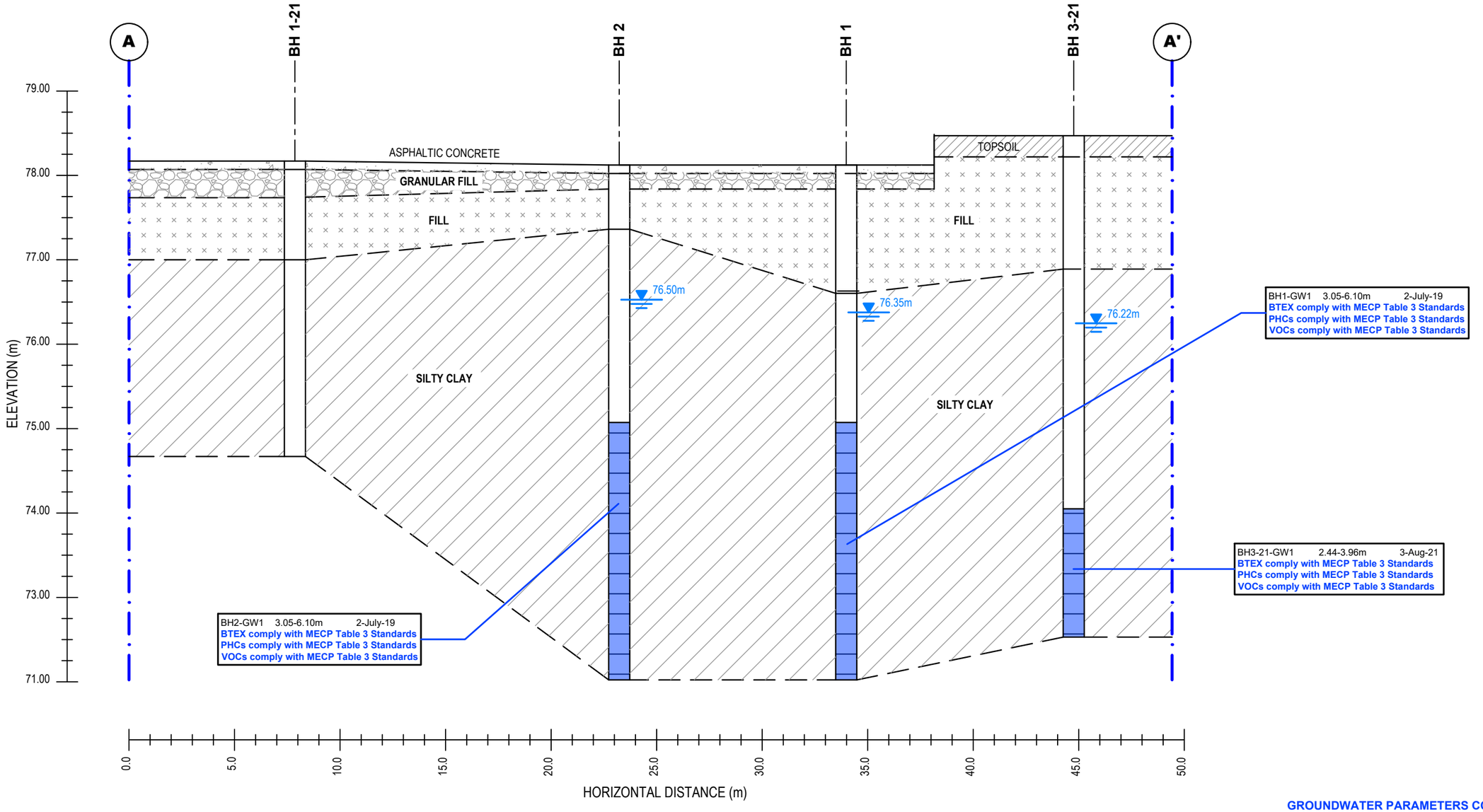
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1400 BANK STREET

OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - GROUNDWATER

Scale: 1:300	Date: 08/2021
Drawn by: MPG	Report No.: PE4632-3
Checked by: MW	Dwg No.: PE4632-6
Approved by: MSD	Revision No.:

p:\autocad drawings\environmental\pe4f6xx\pe4632\pe4632 phase2.dwg



GROUNDWATER PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

SERCO REALTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1400 BANK STREET

OTTAWA, ONTARIO

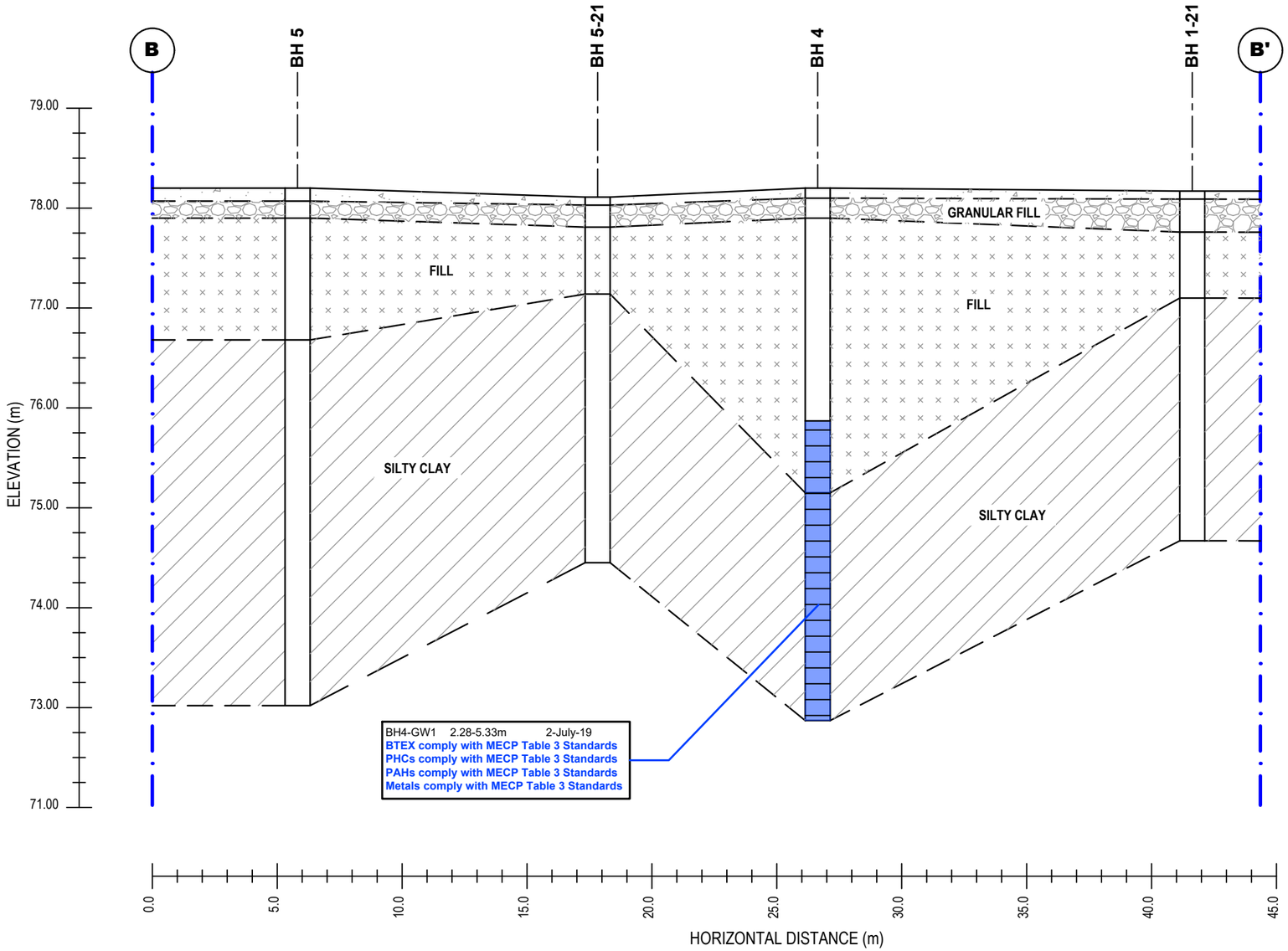
Title:

CROSS-SECTION A-A' - GROUNDWATER

Scale: AS SHOWN	Date: 08/2021
Drawn by: MPG	Report No.: PE4632-3
Checked by: MW	Dwg. No.: PE4632-6A
Approved by: MSD	Revision No.:

11x17

p:\autocad drawings\environmental\pe46xx\pe4632\pe4632 sections.dwg



GROUNDWATER PARAMETERS COMPLY WITH MECP TABLE 3 STANDARDS

patersongroup
consulting engineers

154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

NO.	REVISIONS	DATE	INITIAL
0			

SERCO REALTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1400 BANK STREET

OTTAWA, ONTARIO

Title:

CROSS-SECTION B-B' - GROUNDWATER

Scale: AS SHOWN	Date: 08/2021
Drawn by: MPG	Report No.: PE4632-3
Checked by: MW	Dwg. No.: PE4632-6B
Approved by: MSD	Revision No.:

11x17

p:\autocad drawings\environmental\pe46xx\pe4632\pe4632 sections.dwg

APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Paterson Group Inc.

Consulting Engineers
154 Colonnade Road South
Ottawa (Nepean), Ontario
Canada K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

patersongroup

Sampling & Analysis Plan

Phase II Environmental Site Assessment
1400 Bank Street
Ottawa, Ontario

Prepared For

SerCo Realty Group

July 2021

Report: PE4632-SAP

TABLE OF CONTENTS

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Ms. Loredana Porcari, with SerCo Realty Group to conduct a Phase II Environmental Site Assessment (ESA) for the Phase II ESA Property addressed 1400 Bank Street, Ottawa, Ontario.

The Phase II ESA was carried out to address the APECs identified in the Paterson Phase I ESA, dated July 2021. The following subsurface investigation program was developed to identify and delineate potential environmental concerns.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-21	Assess soil conditions on the Phase I Property due to APEC 4.	Borehole to be advanced to approximately 3.50m to intercept the native soil.
BH2-21	Assess soil and or groundwater conditions on the Phase I Property.	Borehole to be advanced to refusal for geotechnical purposes.
BH3-21	Assess soil and/or groundwater conditions on the Phase I Property due to APEC 4.	Borehole to be advanced to approximately 6.0m to intercept the groundwater table.
BH4-21	Assess soil and/or groundwater conditions on the Phase I Property due to APEC 3.	Borehole to be advanced to approximately 5.0m to intercept the groundwater table.
BH5-21	Assess soil conditions on and beneath the Phase I Property due to APECs 1 and 2.	Borehole to be advanced to approximately 3.50m to intercept the native soil.

At each borehole, split-spoon samples of overburden soils will be obtained at 0.76 m (2'6") intervals until groundwater was intercepted. 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's 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.

After drilling is completed a plan with the borehole locations must be provided. Distances should be measured using a measuring tape or wheel rather than paced off. Elevations were surveyed at geodetic elevations by Paterson personnel.

Drilling Procedure

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

- ❒ Continuous split spoon samples (every 0.6 m or 2') or semi-continuous (every 0.76 m or 2'6") are required.

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

Spoon Washing Procedure

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

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

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

Screening Procedure

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

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

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

3.2 Monitoring Well Installation Procedure

Equipment

- ❒ 5' x 2" [1.52 m x 50 mm] threaded sections of Schedule 40 PVC slotted well screen (5' x 1 ¼" [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 ¼" [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.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
1400 Bank Street
Ottawa, Ontario

DATUM Approximate geodetic

FILE NO. PE4632

REMARKS

HOLE NO. BH 1

BORINGS BY CME 55 Power Auger **DATE** June 24, 2019

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.10
Asphaltic concrete 0.10							
FILL: Brown silty sand with gravel		AU	1				
0.76							
FILL: Brown silty clay, trace sand		SS	2	18	10	1	77.10
1.52							
		SS	3	67	10	2	76.10
		SS	4	96	6		
Brown **SILTY CLAY**						3	75.10
		SS	5	100	4		
- grey by 3.8m depth						4	74.10
		SS	6	100	2		
		SS	7	100	2	5	73.10
		SS	8	100	W		
6.10						6	72.10
End of Borehole							
(GWL @ 1.75m - August 10, 2021)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

Monitoring Well Construction

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
1400 Bank Street
Ottawa, Ontario

DATUM Approximate geodetic

FILE NO. PE4632

REMARKS

HOLE NO. BH 2

BORINGS BY CME 55 Power Auger **DATE** June 24, 2019

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.10
Asphaltic concrete 0.10							
FILL: Brown silty sand with gravel		AU	1				
0.76						1	77.10
		SS	2	54	11		
		SS	3	50	8	2	76.10
Brown **SILTY CLAY,** trace sand		SS	4	96	5		
- grey by 3.0m depth						3	75.10
		SS	5	100	3		
		SS	6	100	2	4	74.10
		SS	7	100	2	5	73.10
		SS	8	100	2		
6.10						6	72.10
End of Borehole							
(GWL @ 1.60m - August 10, 2021)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
1400 Bank Street
Ottawa, Ontario

DATUM Approximate geodetic

FILE NO. PE4632

REMARKS

HOLE NO. BH 3

BORINGS BY CME 55 Power Auger **DATE** June 26, 2019

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.10						0	78.00		
FILL: Brown silty sand with gravel, trace brick		AU	1						
		SS	2	21	8	1	77.00		
1.52									
		SS	3	58	5	2	76.00		
		SS	4	96	4				
Grey **SILTY CLAY**		SS	5	100	2	3	75.00		
		SS	6	100	2	4	74.00		
		SS	7	100	W	5	73.00		
5.18									
End of Borehole									

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

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
1400 Bank Street
Ottawa, Ontario

DATUM Approximate geodetic

FILE NO. PE4632

REMARKS

HOLE NO. BH 4

BORINGS BY CME 55 Power Auger **DATE** June 26, 2019

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.20
Asphaltic concrete 0.10		AU	1				
		SS	2	58	15	1	77.20
FILL: Brown silty sand with gravel		SS	3	21	18	2	76.20
		SS	4	54	7		
3.05		SS	5	29	3	3	75.20
Brown **SILTY CLAY**							
- grey by 3.7m depth		SS	6	54	2	4	74.20
		SS	7	100	W	5	73.20
5.33							
End of Borehole							
(GWL @ 1.94m - August 10, 2021)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
1400 Bank Street
Ottawa, Ontario

DATUM Approximate geodetic

FILE NO. PE4632

REMARKS

HOLE NO. BH 5

BORINGS BY CME 55 Power Auger **DATE** June 26, 2019

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.13						0	78.20		
		AU	1						
FILL: Brown silty sand with gravel		SS	2	46	15	1	77.20		
1.52									
		SS	3	54	12	2	76.20		
		SS	4	100	4				
Brown **SILTY CLAY**						3	75.20		
		SS	5	100	3				
- grey by 3.8m depth						4	74.20		
		SS	6	100	2				
		SS	7	100	1	5	73.20		
5.18									
End of Borehole									

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

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1400 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4632

REMARKS

HOLE NO. BH 1-21

BORINGS BY CME-55 Low Clearance Drill **DATE** July 22, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.08		AU	1			0	78.17		
FILL: Crushed stone with brown silty sand 0.41									
FILL: Brown silty clay with topsoil, trace sand and gravel 1.07		SS	2	42	16	1	77.17		
		SS	3	58	6	2	76.17		
Hard to very stiff, brown **SILTY CLAY**		SS	4	83	6				
						3	75.17		
3.50									
End of Borehole									

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

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1400 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4632

REMARKS

HOLE NO. BH 2-21

BORINGS BY CME-55 Low Clearance Drill **DATE** July 22, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.08		AU	1			0	77.98		
FILL: Crushed stone with sand 0.46									
FILL: Brown silty clay, some sand and gravel, trace brick		SS	2	58	6	1	76.98		
1.55		SS	3	67	7	2	75.98		
		SS	4	83	5				
Very stiff, brown **SILTY CLAY**		SS	5	75	2	3	74.98		
- firm to stiff by 3.7m depth						4	73.98		
- silt content increasing with depth		SS	6	83	P	5	72.98		
		SS	7	100	P				
		SS	8	83	2	6	71.98		
7.01		SS	9	58	35	7	70.98		
GLACIAL TILL: Grey silty clay with sand, gravel, cobbles and boulders		SS	10	67	64	8	69.98		
- clay content decreasing with depth									
8.63		SS	11	67	50+				
End of Borehole									
Practical refusal to augering at 8.63m depth.									

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

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1400 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4632

REMARKS

HOLE NO. BH 3-21

BORINGS BY CME-55 Low Clearance Drill **DATE** July 22, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	78.47
TOPSOIL 0.25							
FILL: Brown silty sand, some crushed stone and gravel 0.76		AU	1				
FILL: Brown silty clay with sand and gravel 1.58		SS	2	33	12	1	77.47
		SS	3	33	12	2	76.47
		SS	4	75	10		
Very stiff to stiff, brown **SILTY CLAY**		SS	5	83	5	3	75.47
		SS	6	83	P	4	74.47
- firm and grey by 4.6m depth		SS	7	75	P	5	73.47
		SS	8		P		
5.94							
End of Borehole							
(GWL @ 2.25m - August 10, 2021)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1400 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4632

REMARKS

HOLE NO. BH 4-21

BORINGS BY CME-55 Low Clearance Drill **DATE** July 22, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Patio stone 0.05						0	78.27
FILL: Crushed stone with sand		AU	1				
0.76							
FILL: Brown silty clay, trace sand, gravel and topsoil 1.22		SS	2	33	9	1	77.27
		SS	3	50	9	2	76.27
Hard to very stiff, brown **SILTY CLAY**		SS	4	83	7		
		SS	5	83	3	3	75.27
- stiff to firm and grey by 3.7m depth		SS	6		P	4	74.27
		SS	7		1		
5.18						5	73.27
Dynamic Cone Penetration Test commenced at 5.18m depth. Practical DCPT refusal at 7.77m depth. Borehole terminated.							
(GWL @ 2.30m - August 10, 2021)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1400 Bank Street
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE4632

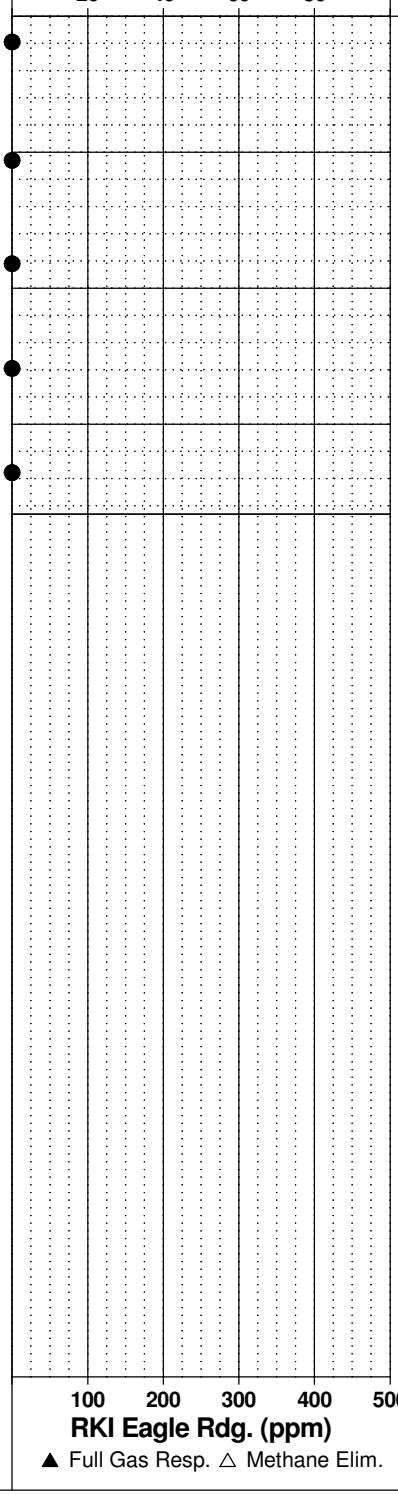
REMARKS

HOLE NO. BH 5-21

BORINGS BY CME-55 Low Clearance Drill **DATE** July 22, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.08		AU	1			0	78.11
FILL: Crushed stone with sand 0.30							
FILL: Brown silty clay, some sand and gravel, trace topsoil 0.97		SS	2	42	13	1	77.11
		SS	3	33	14	2	76.11
Hard to very stiff, brown **SILTY CLAY,** trace sand		SS	4	58	5		
		SS	5	75	3	3	75.11
3.66							
End of Borehole							

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



▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

The standard terminology to describe the strength of cohesionless soils is the relative density, 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.

Relative Density	'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 vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

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 is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

Terminology used for describing soil strata based upon texture, or the proportion of individual particle sizes present is provided on the Textural Soil Classification Chart at the end of this information package.

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 NXL size core. However, it can be used on smaller core sizes, such as BX, 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
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

MC%	-	Natural moisture 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 which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2$ / (D10 x D60)
Cu	-	Uniformity coefficient = D60 / D10

Cc and Cu are used to assess the grading of sands and gravels:
Well-graded gravels have: $1 < Cc < 3$ and $Cu > 4$
Well-graded sands have: $1 < Cc < 3$ and $Cu > 6$
Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.
Cc and Cu are not applicable for the description of soils with more than 10% silt and clay
(more than 10% finer than 0.075 mm or the #200 sieve)

CONSOLIDATION TEST

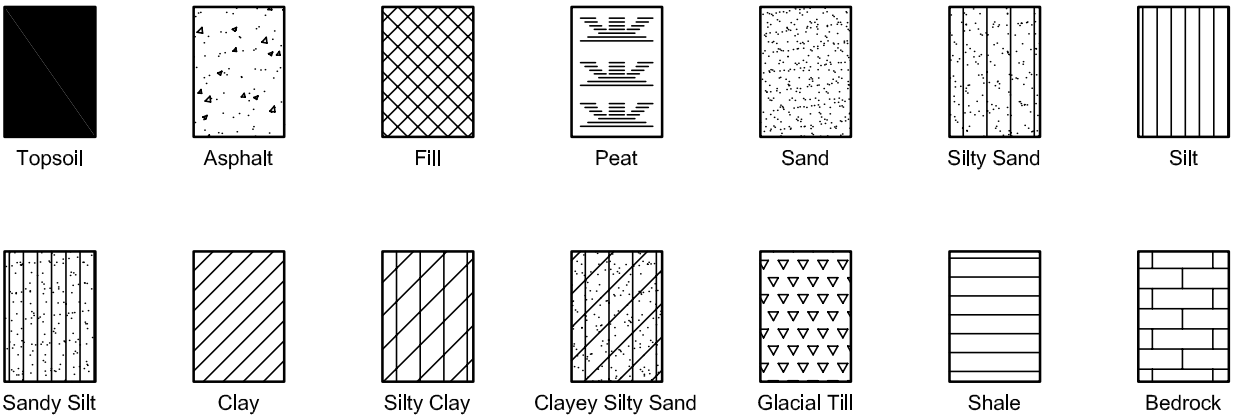
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

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

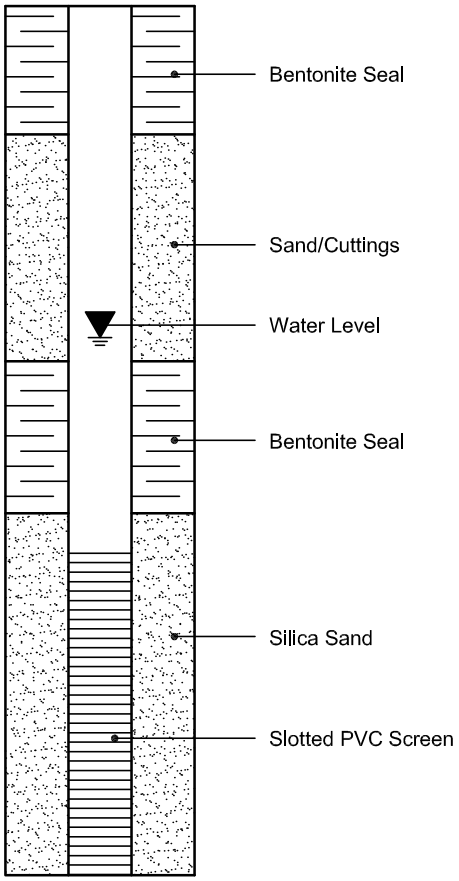
SYMBOLS AND TERMS (continued)

STRATA PLOT

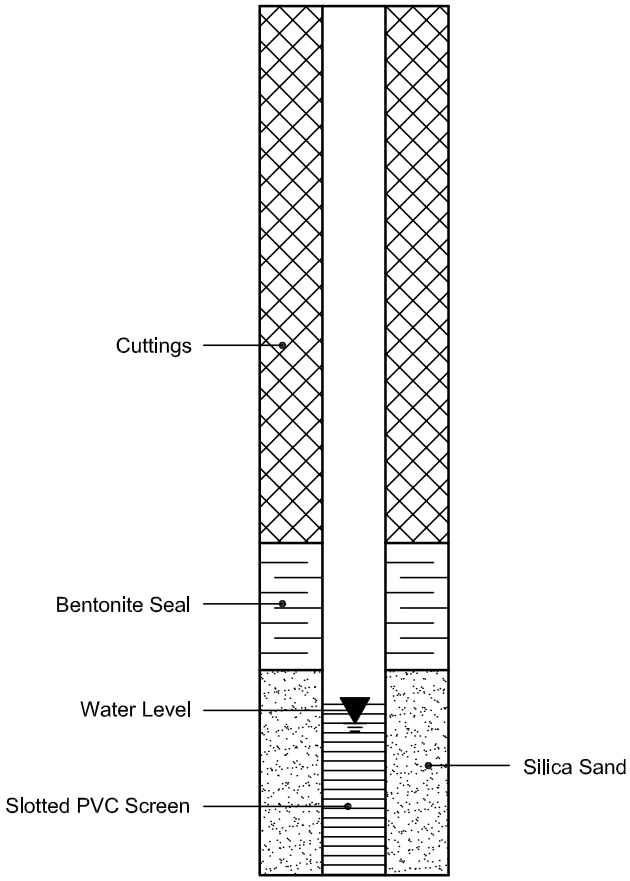


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



PARACEL LABORATORIES LTD.

TRUSTED.
RESPONSIVE.
RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mandy Witteman

Client PO: 32510
Project: PE4632
Custody: 133023

Report Date: 29-Jul-2021
Order Date: 23-Jul-2021

Order #: 2130687

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

Paracel ID	Client ID
2130687-01	BH1-SS2
2130687-03	BH4-SS2
2130687-04	BH4-SS4
2130687-05	BH5-SS2
2130687-06	BH5-SS3

Approved By:

Alex Enfield, MSc
Lab Manager

Certificate of Analysis

Report Date: 29-Jul-2021

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2021

Client PO: 32510

Project Description: PE4632

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	23-Jul-21	27-Jul-21
Mercury by CVAA	EPA 7471B - CVAA, digestion	28-Jul-21	28-Jul-21
PHC F1	CWS Tier 1 - P&T GC-FID	26-Jul-21	27-Jul-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	23-Jul-21	29-Jul-21
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	28-Jul-21	28-Jul-21
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	26-Jul-21	27-Jul-21
Solids, %	Gravimetric, calculation	26-Jul-21	26-Jul-21

Certificate of Analysis

Report Date: 29-Jul-2021

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2021

Client PO: 32510

Project Description: PE4632

	Client ID:	BH1-SS2	BH4-SS2	BH4-SS4	BH5-SS2
	Sample Date:	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21
	Sample ID:	2130687-01	2130687-03	2130687-04	2130687-05
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	83.5	83.4	75.0	76.7
Metals					
Antimony	1.0 ug/g dry	1.7	1.2	-	<1.0
Arsenic	1.0 ug/g dry	7.7	2.5	-	4.3
Barium	1.0 ug/g dry	278	147	-	346
Beryllium	0.5 ug/g dry	0.7	0.5	-	0.9
Boron	5.0 ug/g dry	5.5	<5.0	-	8.5
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	<0.5
Chromium	5.0 ug/g dry	71.4	38.0	-	108
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	-	<0.2
Cobalt	1.0 ug/g dry	17.4	9.0	-	21.1
Copper	5.0 ug/g dry	30.5	14.0	-	39.8
Lead	1.0 ug/g dry	53.4	45.3	-	41.5
Mercury	0.1 ug/g dry	<0.1	<0.1	-	<0.1
Molybdenum	1.0 ug/g dry	1.1	<1.0	-	<1.0
Nickel	5.0 ug/g dry	35.6	17.6	-	54.6
Selenium	1.0 ug/g dry	<1.0	<1.0	-	<1.0
Silver	0.3 ug/g dry	<0.3	<0.3	-	<0.3
Thallium	1.0 ug/g dry	<1.0	<1.0	-	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	-	<1.0
Vanadium	10.0 ug/g dry	70.8	49.2	-	93.9
Zinc	20.0 ug/g dry	258	70.1	-	133
Volatiles					
Acetone	0.50 ug/g dry	-	-	<0.50	-
Benzene	0.02 ug/g dry	-	-	<0.02	-
Bromodichloromethane	0.05 ug/g dry	-	-	<0.05	-
Bromoform	0.05 ug/g dry	-	-	<0.05	-
Bromomethane	0.05 ug/g dry	-	-	<0.05	-
Carbon Tetrachloride	0.05 ug/g dry	-	-	<0.05	-
Chlorobenzene	0.05 ug/g dry	-	-	<0.05	-
Chloroform	0.05 ug/g dry	-	-	<0.05	-
Dibromochloromethane	0.05 ug/g dry	-	-	<0.05	-
Dichlorodifluoromethane	0.05 ug/g dry	-	-	<0.05	-
1,2-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	-
1,3-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	-

Certificate of Analysis

Report Date: 29-Jul-2021

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2021

Client PO: 32510

Project Description: PE4632

	Client ID:	BH1-SS2	BH4-SS2	BH4-SS4	BH5-SS2
	Sample Date:	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21
	Sample ID:	2130687-01	2130687-03	2130687-04	2130687-05
	MDL/Units	Soil	Soil	Soil	Soil
1,4-Dichlorobenzene	0.05 ug/g dry	-	-	<0.05	-
1,1-Dichloroethane	0.05 ug/g dry	-	-	<0.05	-
1,2-Dichloroethane	0.05 ug/g dry	-	-	<0.05	-
1,1-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	-	<0.05	-
1,2-Dichloropropane	0.05 ug/g dry	-	-	<0.05	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	-	<0.05	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	-	<0.05	-
1,3-Dichloropropene, total	0.05 ug/g dry	-	-	<0.05	-
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	-
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	-	-	<0.05	-
Hexane	0.05 ug/g dry	-	-	<0.05	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	-	<0.50	-
Methyl Isobutyl Ketone	0.50 ug/g dry	-	-	<0.50	-
Methyl tert-butyl ether	0.05 ug/g dry	-	-	<0.05	-
Methylene Chloride	0.05 ug/g dry	-	-	<0.05	-
Styrene	0.05 ug/g dry	-	-	<0.05	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	-	<0.05	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	-	<0.05	-
Tetrachloroethylene	0.05 ug/g dry	-	-	<0.05	-
Toluene	0.05 ug/g dry	-	-	<0.05	-
1,1,1-Trichloroethane	0.05 ug/g dry	-	-	<0.05	-
1,1,2-Trichloroethane	0.05 ug/g dry	-	-	<0.05	-
Trichloroethylene	0.05 ug/g dry	-	-	<0.05	-
Trichlorofluoromethane	0.05 ug/g dry	-	-	<0.05	-
Vinyl chloride	0.02 ug/g dry	-	-	<0.02	-
m,p-Xylenes	0.05 ug/g dry	-	-	<0.05	-
o-Xylene	0.05 ug/g dry	-	-	<0.05	-
Xylenes, total	0.05 ug/g dry	-	-	<0.05	-
4-Bromofluorobenzene	Surrogate	-	-	96.3%	-
Dibromofluoromethane	Surrogate	-	-	97.5%	-
Toluene-d8	Surrogate	-	-	108%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	-	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	-	-	<4	-

Certificate of Analysis

Report Date: 29-Jul-2021

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2021

Client PO: 32510

Project Description: PE4632

	Client ID:	BH1-SS2	BH4-SS2	BH4-SS4	BH5-SS2
	Sample Date:	22-Jul-21	22-Jul-21	22-Jul-21	22-Jul-21
	Sample ID:	2130687-01	2130687-03	2130687-04	2130687-05
	MDL/Units	Soil	Soil	Soil	Soil
F3 PHCs (C16-C34)	8 ug/g dry	-	-	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	-	-	<6	-

Certificate of Analysis

Report Date: 29-Jul-2021

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2021

Client PO: 32510

Project Description: PE4632

	Client ID:	BH5-SS3	-	-	-
	Sample Date:	22-Jul-21	-	-	-
	Sample ID:	2130687-06	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	78.5	-	-	-
Volatiles					
Acetone	0.50 ug/g dry	<0.50	-	-	-
Benzene	0.02 ug/g dry	<0.02	-	-	-
Bromodichloromethane	0.05 ug/g dry	<0.05	-	-	-
Bromoform	0.05 ug/g dry	<0.05	-	-	-
Bromomethane	0.05 ug/g dry	<0.05	-	-	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	-	-	-
Chlorobenzene	0.05 ug/g dry	<0.05	-	-	-
Chloroform	0.05 ug/g dry	<0.05	-	-	-
Dibromochloromethane	0.05 ug/g dry	<0.05	-	-	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	-	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Ethylene dibromide (dibromoethane, 1	0.05 ug/g dry	<0.05	-	-	-
Hexane	0.05 ug/g dry	<0.05	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	-	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	-	-	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	-	-	-
Methylene Chloride	0.05 ug/g dry	<0.05	-	-	-
Styrene	0.05 ug/g dry	<0.05	-	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-

Certificate of Analysis

Report Date: 29-Jul-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 23-Jul-2021

Client PO: **32510**

Project Description: PE4632

	Client ID:	BH5-SS3	-	-	-
	Sample Date:	22-Jul-21	-	-	-
	Sample ID:	2130687-06	-	-	-
	MDL/Units	Soil	-	-	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	-	-	-
Trichloroethylene	0.05 ug/g dry	<0.05	-	-	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	-	-	-
Vinyl chloride	0.02 ug/g dry	<0.02	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05	-	-	-
4-Bromofluorobenzene	Surrogate	94.7%	-	-	-
Dibromofluoromethane	Surrogate	98.7%	-	-	-
Toluene-d8	Surrogate	106%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	-	-
F3 PHCs (C16-C34)	8 ug/g dry	10	-	-	-
F4 PHCs (C34-C50)	6 ug/g dry	41	-	-	-

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						
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
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						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*8.69*		*ug/g*		*109*	*50-140*			
Surrogate: Dibromofluoromethane	*8.44*		*ug/g*		*105*	*50-140*			
Surrogate: Toluene-d8	*8.37*		*ug/g*		*105*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g wet	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Metals									
Antimony	ND	1.0	ug/g dry	ND			NC	30	
Arsenic	2.6	1.0	ug/g dry	3.0			13.9	30	
Barium	68.8	1.0	ug/g dry	73.5			6.6	30	
Beryllium	0.5	0.5	ug/g dry	0.5			8.4	30	
Boron	5.5	5.0	ug/g dry	5.6			1.5	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	19.7	5.0	ug/g dry	20.4			3.5	30	
Cobalt	6.0	1.0	ug/g dry	6.2			3.5	30	
Copper	11.6	5.0	ug/g dry	12.0			3.6	30	
Lead	22.9	1.0	ug/g dry	28.7			22.5	30	
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	12.3	5.0	ug/g dry	12.7			3.7	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	31.3	10.0	ug/g dry	32.7			4.5	30	
Zinc	28.8	20.0	ug/g dry	30.1			4.5	30	
Physical Characteristics									
% Solids	87.9	0.1	% by Wt.	85.8			2.4	25	
Volatiles									
Acetone	ND	0.50	ug/g wet	ND			NC	50	
Benzene	ND	0.02	ug/g wet	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g wet	ND			NC	50	
Bromoform	ND	0.05	ug/g wet	ND			NC	50	
Bromomethane	ND	0.05	ug/g wet	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g wet	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g wet	ND			NC	50	
Chloroform	ND	0.05	ug/g wet	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g wet	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g wet	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g wet	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g wet	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g wet	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g wet	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g wet	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g wet	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g wet	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g wet	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g wet	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g wet	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g wet	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g wet	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g wet	ND			NC	50	
Hexane	ND	0.05	ug/g wet	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g wet	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g wet	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g wet	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g wet	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Styrene	ND	0.05	ug/g wet	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g wet	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g wet	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g wet	ND			NC	50	
Toluene	ND	0.05	ug/g wet	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g wet	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g wet	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g wet	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g wet	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g wet	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g wet	ND			NC	50	
o-Xylene	ND	0.05	ug/g wet	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	*7.54*		*ug/g wet*		*94.3*	*50-140*			
Surrogate: Dibromofluoromethane	*8.14*		*ug/g wet*		*102*	*50-140*			
Surrogate: Toluene-d8	*8.46*		*ug/g wet*		*106*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	180	7	ug/g	ND	89.8	80-120			
F2 PHCs (C10-C16)	86	4	ug/g	ND	93.8	60-140			
F3 PHCs (C16-C34)	222	8	ug/g	ND	99.1	60-140			
F4 PHCs (C34-C50)	159	6	ug/g	ND	112	60-140			
Metals									
Antimony	59.7	1.0	ug/g	ND	119	70-130			
Arsenic	59.4	1.0	ug/g	1.2	116	70-130			
Barium	85.8	1.0	ug/g	29.4	113	70-130			
Beryllium	54.9	0.5	ug/g	ND	109	70-130			
Boron	46.4	5.0	ug/g	ND	88.4	70-130			
Cadmium	55.6	0.5	ug/g	ND	111	70-130			
Chromium (VI)	0.1	0.2	ug/g	ND	52.0	70-130			QM-05
Chromium	68.0	5.0	ug/g	8.2	120	70-130			
Cobalt	59.6	1.0	ug/g	2.5	114	70-130			
Copper	59.2	5.0	ug/g	ND	109	70-130			
Lead	64.0	1.0	ug/g	11.5	105	70-130			
Mercury	1.48	0.1	ug/g	ND	98.7	70-130			
Molybdenum	54.7	1.0	ug/g	ND	109	70-130			
Nickel	59.3	5.0	ug/g	5.1	108	70-130			
Selenium	46.9	1.0	ug/g	ND	93.5	70-130			
Silver	34.9	0.3	ug/g	ND	69.8	70-130			QM-07
Thallium	48.3	1.0	ug/g	ND	96.5	70-130			
Uranium	55.7	1.0	ug/g	ND	111	70-130			
Vanadium	74.5	10.0	ug/g	13.1	123	70-130			
Zinc	62.6	20.0	ug/g	ND	101	70-130			
Volatiles									
Acetone	10.4	0.50	ug/g	ND	104	50-140			
Benzene	4.72	0.02	ug/g	ND	118	60-130			
Bromodichloromethane	4.15	0.05	ug/g	ND	104	60-130			
Bromoform	3.98	0.05	ug/g	ND	99.6	60-130			
Bromomethane	4.94	0.05	ug/g	ND	123	50-140			
Carbon Tetrachloride	3.81	0.05	ug/g	ND	95.3	60-130			
Chlorobenzene	5.11	0.05	ug/g	ND	128	60-130			
Chloroform	4.71	0.05	ug/g	ND	118	60-130			
Dibromochloromethane	4.32	0.05	ug/g	ND	108	60-130			
Dichlorodifluoromethane	4.80	0.05	ug/g	ND	120	50-140			
1,2-Dichlorobenzene	4.22	0.05	ug/g	ND	106	60-130			
1,3-Dichlorobenzene	4.11	0.05	ug/g	ND	103	60-130			
1,4-Dichlorobenzene	4.27	0.05	ug/g	ND	107	60-130			
1,1-Dichloroethane	4.51	0.05	ug/g	ND	113	60-130			
1,2-Dichloroethane	4.37	0.05	ug/g	ND	109	60-130			
1,1-Dichloroethylene	4.38	0.05	ug/g	ND	110	60-130			
cis-1,2-Dichloroethylene	4.36	0.05	ug/g	ND	109	60-130			
trans-1,2-Dichloroethylene	4.30	0.05	ug/g	ND	107	60-130			
1,2-Dichloropropane	4.94	0.05	ug/g	ND	123	60-130			
cis-1,3-Dichloropropylene	4.10	0.05	ug/g	ND	103	60-130			
trans-1,3-Dichloropropylene	4.02	0.05	ug/g	ND	100	60-130			
Ethylbenzene	4.85	0.05	ug/g	ND	121	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Ethylene dibromide (dibromoethane, 1,2-	4.31	0.05	ug/g	ND	108	60-130			
Hexane	4.64	0.05	ug/g	ND	116	60-130			
Methyl Ethyl Ketone (2-Butanone)	10.7	0.50	ug/g	ND	107	50-140			
Methyl Isobutyl Ketone	10.9	0.50	ug/g	ND	109	50-140			
Methyl tert-butyl ether	11.0	0.05	ug/g	ND	110	50-140			
Methylene Chloride	3.34	0.05	ug/g	ND	83.5	60-130			
Styrene	4.76	0.05	ug/g	ND	119	60-130			
1,1,1,2-Tetrachloroethane	3.76	0.05	ug/g	ND	94.1	60-130			
1,1,2,2-Tetrachloroethane	5.05	0.05	ug/g	ND	126	60-130			
Tetrachloroethylene	4.58	0.05	ug/g	ND	114	60-130			
Toluene	4.48	0.05	ug/g	ND	112	60-130			
1,1,1-Trichloroethane	4.36	0.05	ug/g	ND	109	60-130			
1,1,2-Trichloroethane	4.47	0.05	ug/g	ND	112	60-130			
Trichloroethylene	4.46	0.05	ug/g	ND	112	60-130			
Trichlorofluoromethane	4.65	0.05	ug/g	ND	116	50-140			
Vinyl chloride	4.70	0.02	ug/g	ND	118	50-140			
m,p-Xylenes	8.37	0.05	ug/g	ND	105	60-130			
o-Xylene	4.73	0.05	ug/g	ND	118	60-130			
Surrogate: 4-Bromofluorobenzene	*7.31*		*ug/g*		*91.3*	*50-140*			
Surrogate: Dibromofluoromethane	*8.13*		*ug/g*		*102*	*50-140*			
Surrogate: Toluene-d8	*8.76*		*ug/g*		*110*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Container and COC sample IDs don't match - Jar reads "BH1-21-SS2"

Applies to samples: BH1-SS2

Container and COC sample IDs don't match - Jar reads "BH1-21-SS3"

Applies to samples: BH4-SS2, BH4-SS4, BH5-SS2, BH5-SS3

QC Qualifiers :

QM-05 : The spike recovery was outside acceptance limits for the matrix spike due to matrix interference.

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

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

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

PARACEL LABORATORIES LTD. | TRUSTED. RESPONSIV RELIABLE.

Paracel ID: 2130687

Chain Of Custody
(Lab Use Only)

№ 133023

Client Name: Paterson Group	Project Ref: PE4632	Page __ of __
Contact Name: Mandy Witteman	Quote #:	Turnaround Time
Address: 154 Colonnade Rd	PO #: 32510	☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone:	E-mail: mwitteman@patersongroup.ca	Date Required:

☒ REG 153/04 ☐ REG 406/19

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

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	HOLD
1	BH1-SS2	S		1	July 22/2024					X	X	X		
2	BH1-SS3	S		1										X
3	BH4-SS2	S		1						X	X	X		
4	BH4-SS4	S		2			X	X						
5	BH5-SS2	S		1						X	X	X		
6	BH5-SS3	S		2			X	X						
7														
8														
9														
10														

Comments: BH1-SS3 on hold.

Method of Delivery: Swift

Relinquished By (Sign): Kat Linscott	Received By Driver/Depot:	Received at Lab: C	Verified By: C
Relinquished By (Print): Kat Linscott	Date/Time:	Date/Time: 3:15 July 23 2024	Date/Time: 3:45 July 23 2024
Date/Time: July 23/2024	Temperature: °C	Temperature: 8.5 °C	pH Verified: ☐ By:

PARACEL LABORATORIES LTD.

TRUSTED.
RESPONSIVE.
RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mandy Witteman

Client PO: 32091
Project: PE4632
Custody: 132411

Report Date: 31-Aug-2021
Order Date: 25-Aug-2021

Order #: 2135552

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

Paracel ID	Client ID
2135552-01	BH5-21-SS3
2135552-02	DUP

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 31-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 25-Aug-2021

Client PO: 32091

Project Description: PE4632

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	30-Aug-21	30-Aug-21
Solids, %	Gravimetric, calculation	26-Aug-21	27-Aug-21

Certificate of Analysis

Report Date: 31-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 25-Aug-2021

Client PO: 32091

Project Description: PE4632

	Client ID:	BH5-21-SS3	DUP	-	-
	Sample Date:	22-Jul-21 09:00	22-Jul-21 09:00	-	-
	Sample ID:	2135552-01	2135552-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	80.1	80.1	-	-
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	-	-
Arsenic	1.0 ug/g dry	2.6	2.8	-	-
Barium	1.0 ug/g dry	117	113	-	-
Beryllium	0.5 ug/g dry	0.5	0.5	-	-
Boron	5.0 ug/g dry	6.1	5.9	-	-
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	-
Chromium	5.0 ug/g dry	32.7	33.4	-	-
Cobalt	1.0 ug/g dry	6.5	6.5	-	-
Copper	5.0 ug/g dry	16.0	15.8	-	-
Lead	1.0 ug/g dry	6.1	5.9	-	-
Molybdenum	1.0 ug/g dry	<1.0	<1.0	-	-
Nickel	5.0 ug/g dry	16.8	17.1	-	-
Selenium	1.0 ug/g dry	<1.0	<1.0	-	-
Silver	0.3 ug/g dry	<0.3	<0.3	-	-
Thallium	1.0 ug/g dry	<1.0	<1.0	-	-
Uranium	1.0 ug/g dry	<1.0	<1.0	-	-
Vanadium	10.0 ug/g dry	44.6	44.5	-	-
Zinc	20.0 ug/g dry	45.1	45.7	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	1.3	1.0	ug/g dry	ND			NC	30	
Arsenic	4.1	1.0	ug/g dry	4.1			0.6	30	
Barium	78.6	1.0	ug/g dry	79.4			0.9	30	
Beryllium	0.7	0.5	ug/g dry	0.7			1.1	30	
Boron	7.9	5.0	ug/g dry	8.2			3.6	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium	29.3	5.0	ug/g dry	30.0			2.4	30	
Cobalt	5.9	1.0	ug/g dry	6.2			4.8	30	
Copper	14.4	5.0	ug/g dry	14.9			3.3	30	
Lead	12.7	1.0	ug/g dry	12.1			5.4	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	16.9	5.0	ug/g dry	17.4			2.8	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	28.0	10.0	ug/g dry	29.3			4.7	30	
Zinc	58.6	20.0	ug/g dry	60.6			3.4	30	
Physical Characteristics									
% Solids	78.0	0.1	% by Wt.	79.0			1.3	25	

Certificate of Analysis

Report Date: 31-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 25-Aug-2021

Client PO: 32091

Project Description: PE4632

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	48.7	1.0	ug/g	ND	97.3	70-130			
Arsenic	51.1	1.0	ug/g	1.6	99.0	70-130			
Barium	76.5	1.0	ug/g	31.8	89.5	70-130			
Beryllium	49.1	0.5	ug/g	ND	97.6	70-130			
Boron	49.1	5.0	ug/g	ND	91.7	70-130			
Cadmium	45.5	0.5	ug/g	ND	90.7	70-130			
Chromium	60.8	5.0	ug/g	12.0	97.6	70-130			
Cobalt	51.8	1.0	ug/g	2.5	98.8	70-130			
Copper	53.6	5.0	ug/g	6.0	95.2	70-130			
Lead	51.1	1.0	ug/g	4.8	92.6	70-130			
Molybdenum	49.8	1.0	ug/g	ND	99.2	70-130			
Nickel	55.7	5.0	ug/g	7.0	97.5	70-130			
Selenium	46.8	1.0	ug/g	ND	92.9	70-130			
Silver	43.1	0.3	ug/g	ND	86.2	70-130			
Thallium	46.3	1.0	ug/g	ND	92.4	70-130			
Uranium	49.6	1.0	ug/g	ND	98.5	70-130			
Vanadium	60.8	10.0	ug/g	11.7	98.2	70-130			
Zinc	71.7	20.0	ug/g	24.3	94.9	70-130			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

PARA LABORATORI

Paracel ID: 2135552

Laurent Blvd.
ario K1G 4J8
-1947
aracellabs.com
llabs.com

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2135552	№ 132411

Client Name: Paterson Group
Contact Name: Mandy Witteman
Address: 154 Colonnade Rd S
Telephone: 613-226-7381

Project Ref: PE4632
Quote #:
PO #: 32091
E-mail: mwitteman@patersongroup.ca
mdarcy @ " " "

Page 1 of 1

Turnaround Time
☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular
Date Required:

Regulation 153/04
☐ Table 1 ☐ Res/Park ☐ Med/Fine
☐ Table 2 ☒ Ind/Comm ☒ Coarse
☒ Table 3 ☐ Agri/Other
☐ Table
For RSC: ☐ Yes ☒ No

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

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
1	BH5-21-SS3	S	/	1	22-Jul-21	/				X			
2	DUP	S	/	1	22-Jul-21	/				X			
3													
4													
5													
6													
7													
8													
9													
10													

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): [signature]
Relinquished By (Print): Jesse Andrechuk
Date/Time: 25-AUG-21 12PM

Received By Driver/Depot: T. KOUSE
Date/Time: 25/08/21 3:07
Temperature: °C 21.

Received at Lab:
Date/Time: Aug 25 2021 5:09
Temperature: 16.6 °C

Verified By:
Date/Time: Aug 25 221 1201
pH Verified: ☐ By: NA

PARACEL LABORATORIES LTD.

TRUSTED.
RESPONSIVE.
RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Eric Leveque

Client PO: 22915
Project: PE4632
Custody: 122410

Report Date: 5-Jul-2019
Order Date: 25-Jun-2019

Order #: 1926252

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

Paracel ID	Client ID
1926252-01	BH1-SS6
1926252-02	BH2-SS5
1926252-03	BH3-SS2
1926252-04	BH4-SS2

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 22915

Report Date: 05-Jul-2019
Order Date: 25-Jun-2019
Project Description: PE4632

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	28-Jun-19	30-Jun-19
PHC F1	CWS Tier 1 - P&T GC-FID	28-Jun-19	30-Jun-19
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	28-Jun-19	29-Jun-19
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	2-Jul-19	4-Jul-19
Solids, %	Gravimetric, calculation	2-Jul-19	2-Jul-19

PARACEL LABORATORIES LTD.

Order #: 1926252

Certificate of Analysis

Report Date: 05-Jul-2019

Client: Paterson Group Consulting Engineers

Order Date: 25-Jun-2019

Client PO: 22915

Project Description: PE4632

	Client ID:	BH1-SS6	BH2-SS5	BH3-SS2	BH4-SS2
	Sample Date:	24-Jun-19 09:00	24-Jun-19 09:00	24-Jun-19 09:00	24-Jun-19 09:00
	Sample ID:	1926252-01	1926252-02	1926252-03	1926252-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	64.9	72.0	93.6	93.1
Metals					
Antimony	1.0 ug/g dry	-	-	<1.0	1.8
Arsenic	1.0 ug/g dry	-	-	3.2	4.5
Barium	1.0 ug/g dry	-	-	95.8	151
Beryllium	0.5 ug/g dry	-	-	<0.5	0.5
Boron	5.0 ug/g dry	-	-	6.0	9.9
Cadmium	0.5 ug/g dry	-	-	<0.5	<0.5
Chromium	5.0 ug/g dry	-	-	25.2	32.3
Cobalt	1.0 ug/g dry	-	-	7.7	10.1
Copper	5.0 ug/g dry	-	-	18.5	32.6
Lead	1.0 ug/g dry	-	-	48.7	196
Molybdenum	1.0 ug/g dry	-	-	2.7	2.0
Nickel	5.0 ug/g dry	-	-	17.8	24.4
Selenium	1.0 ug/g dry	-	-	<1.0	<1.0
Silver	0.3 ug/g dry	-	-	<0.3	<0.3
Thallium	1.0 ug/g dry	-	-	<1.0	<1.0
Uranium	1.0 ug/g dry	-	-	<1.0	<1.0
Vanadium	10.0 ug/g dry	-	-	28.7	38.4
Zinc	20.0 ug/g dry	-	-	81.2	146
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	93.3%	93.6%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	<6	-	-

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	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*7.63*		*ug/g*		*95.4*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND				30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND				30	
Metals									
Antimony	1.0	1.0	ug/g dry	1.1			7.7	30	
Arsenic	6.0	1.0	ug/g dry	6.0			1.3	30	
Barium	78.8	1.0	ug/g dry	79.5			0.8	30	
Beryllium	1.0	0.5	ug/g dry	1.0			3.5	30	
Boron	13.8	5.0	ug/g dry	14.3			3.5	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium	24.9	5.0	ug/g dry	24.0			3.9	30	
Cobalt	12.5	1.0	ug/g dry	12.5			0.5	30	
Copper	34.9	5.0	ug/g dry	33.8			3.3	30	
Lead	10.5	1.0	ug/g dry	10.2			2.5	30	
Molybdenum	ND	1.0	ug/g dry	5.0			0.0	30	
Nickel	27.5	5.0	ug/g dry	27.3			0.7	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	ND	0.3	ug/g dry	ND			0.0	30	
Thallium	ND	1.0	ug/g dry	ND			0.0	30	
Uranium	ND	1.0	ug/g dry	ND			0.0	30	
Vanadium	33.9	10.0	ug/g dry	33.2			2.0	30	
Zinc	66.2	20.0	ug/g dry	64.9			1.9	30	
Physical Characteristics									
% Solids	96.1	0.1	% by Wt.	96.2			0.1	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: Toluene-d8	*7.71*		*ug/g dry*		*92.7*	*50-140*			

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 22915

Report Date: 05-Jul-2019
Order Date: 25-Jun-2019
Project Description: PE4632

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	181	7	ug/g		90.6	80-120			
F2 PHCs (C10-C16)	132	4	ug/g	ND	107	60-140			
F3 PHCs (C16-C34)	349	8	ug/g	ND	116	60-140			
F4 PHCs (C34-C50)	222	6	ug/g	ND	116	60-140			
Metals									
Antimony	41.8		ug/L	ND	82.8	70-130			
Arsenic	50.7		ug/L	2.4	96.6	70-130			
Barium	76.6		ug/L	31.8	89.6	70-130			
Beryllium	49.4		ug/L	ND	98.0	70-130			
Boron	49.3		ug/L	5.7	87.2	70-130			
Cadmium	46.2		ug/L	ND	92.4	70-130			
Chromium	58.7		ug/L	9.6	98.2	70-130			
Cobalt	52.9		ug/L	5.0	95.8	70-130			
Copper	60.6		ug/L	13.5	94.1	70-130			
Lead	51.9		ug/L	4.1	95.7	70-130			
Molybdenum	46.1		ug/L	2.0	88.3	70-130			
Nickel	58.6		ug/L	10.9	95.4	70-130			
Selenium	49.0		ug/L	ND	97.6	70-130			
Silver	45.6		ug/L	ND	91.1	70-130			
Thallium	46.9		ug/L	ND	93.7	70-130			
Uranium	49.6		ug/L	ND	98.7	70-130			
Vanadium	64.5		ug/L	13.3	102	70-130			
Zinc	72.7		ug/L	26.0	93.4	70-130			
Volatiles									
Benzene	3.19	0.02	ug/g		79.7	60-130			
Ethylbenzene	3.18	0.05	ug/g		79.5	60-130			
Toluene	2.75	0.05	ug/g		68.6	60-130			
m,p-Xylenes	6.18	0.05	ug/g		77.2	60-130			
o-Xylene	3.32	0.05	ug/g		83.0	60-130			
Surrogate: Toluene-d8	*6.61*		*ug/g*		*82.6*	*50-140*			

Qualifier Notes:

None

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.

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

CCME PHC additional information:

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

PARACEL LABORATORIES LTD.

TRU RES REI **PARACEL WO: 1926252**

Head Office
300-2319 St. Laurent Blvd.
Ottawa, Ontario K1G 4J8
p: 1-800-749-1947
e: paracel@paracellabs.com

Chain of Custody
(Lab Use Only)
№ 122410

Page ___ of ___

Client Name: PATERSON GROUP	Project Reference: PE4632	**Turnaround Time:**
Contact Name: ERIC LEVESQUE	Quote #	☐ 1 Day ☐ 3 Day
Address: 154 COLONNADE ROAD S. OTTAWA ONT	PO # 22915	☐ 2 Day ☑ Regular
Telephone: 226-7381	Email Address: elevesque@patersongroup.ca	Date Required:

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

	Paracel Order Number: 1926252 / Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)						
1	BH1-SS6	S		2	JUNE 24/2019		✓											- 250ml+1vial-	✓
2	BH2-SS5	S		2	"	"	✓											↓	✓
3	BH3-SS2	S		1	"	"				✓								- 250ml-	✓
4	BH4-SS2	S		1	"	"				✓								↓	✓
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Paracel

Relinquished By (Sign):	Received by Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Mike Laflamme	Date/Time: 25/06/19 10 50 AM	Date/Time: JUN 25 2019 05:22	Date/Time: 26 Jun 19
Date/Time:	Temperature: °C	Temperature: 23.4 °C	pH Verified [ ] By:

PARACEL LABORATORIES LTD.

TRUSTED.
RESPONSIVE.
RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mandy Witteman

Client PO: 32542
Project: PE4632
Custody: 132991

Report Date: 9-Aug-2021
Order Date: 3-Aug-2021

Order #: 2132170

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

Paracel ID	Client ID
2132170-01	BH3-21-GW1
2132170-02	BH4-21-GW1
2132170-03	DUP-1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 09-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 3-Aug-2021

Client PO: 32542

Project Description: PE4632

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent - water	MOE E3056 - colourimetric	5-Aug-21	5-Aug-21
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	5-Aug-21	6-Aug-21
Metals, ICP-MS	EPA 200.8 - ICP-MS	6-Aug-21	6-Aug-21
PHC F1	CWS Tier 1 - P&T GC-FID	5-Aug-21	6-Aug-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	5-Aug-21	6-Aug-21
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	5-Aug-21	6-Aug-21

Certificate of Analysis

Report Date: 09-Aug-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 3-Aug-2021

Client PO: 32542

Project Description: PE4632

	Client ID:	BH3-21-GW1	BH4-21-GW1	DUP-1	-
	Sample Date:	03-Aug-21 09:00	03-Aug-21 09:00	03-Aug-21 09:00	-
	Sample ID:	2132170-01	2132170-02	2132170-03	-
	MDL/Units	Water	Water	Water	-
Metals					
Mercury	0.1 ug/L	-	<0.1	-	-
Antimony	0.5 ug/L	-	<0.5	-	-
Arsenic	1 ug/L	-	<1	-	-
Barium	1 ug/L	-	214	-	-
Beryllium	0.5 ug/L	-	<0.5	-	-
Boron	10 ug/L	-	143	-	-
Cadmium	0.1 ug/L	-	<0.1	-	-
Chromium	1 ug/L	-	<1	-	-
Chromium (VI)	10 ug/L	-	<10	-	-
Cobalt	0.5 ug/L	-	1.4	-	-
Copper	0.5 ug/L	-	0.9	-	-
Lead	0.1 ug/L	-	<0.1	-	-
Molybdenum	0.5 ug/L	-	10.4	-	-
Nickel	1 ug/L	-	2	-	-
Selenium	1 ug/L	-	<1	-	-
Silver	0.1 ug/L	-	<0.1	-	-
Sodium	200 ug/L	-	191000	-	-
Thallium	0.1 ug/L	-	<0.1	-	-
Uranium	0.1 ug/L	-	2.3	-	-
Vanadium	0.5 ug/L	-	0.9	-	-
Zinc	5 ug/L	-	<5	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	-
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-

Certificate of Analysis

Report Date: 09-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 3-Aug-2021

Client PO: 32542

Project Description: PE4632

	Client ID:	BH3-21-GW1	BH4-21-GW1	DUP-1	-
	Sample Date:	03-Aug-21 09:00	03-Aug-21 09:00	03-Aug-21 09:00	-
	Sample ID:	2132170-01	2132170-02	2132170-03	-
	MDL/Units	Water	Water	Water	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	-
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	-
4-Bromofluorobenzene	Surrogate	106%	107%	105%	-
Dibromofluoromethane	Surrogate	91.1%	90.6%	90.7%	-
Toluene-d8	Surrogate	106%	108%	108%	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	-	-

Certificate of Analysis

Report Date: 09-Aug-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 3-Aug-2021

Client PO: **32542**

Project Description: PE4632

	Client ID:	BH3-21-GW1	BH4-21-GW1	DUP-1	-
	Sample Date:	03-Aug-21 09:00	03-Aug-21 09:00	03-Aug-21 09:00	-
	Sample ID:	2132170-01	2132170-02	2132170-03	-
	MDL/Units	Water	Water	Water	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-

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

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 32542

Report Date: 09-Aug-2021

Order Date: 3-Aug-2021

Project Description: PE4632

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*85.1*		*ug/L*		*106*	*50-140*			
Surrogate: Dibromofluoromethane	*75.4*		*ug/L*		*94.2*	*50-140*			
Surrogate: Toluene-d8	*85.3*		*ug/L*		*107*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
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	20.8	1	ug/L	20.7			0.1	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	19	10	ug/L	19			0.0	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	ND	0.5	ug/L	ND			NC	20	
Copper	1.12	0.5	ug/L	1.16			2.8	20	
Lead	ND	0.1	ug/L	0.10			NC	20	
Molybdenum	1.30	0.5	ug/L	1.30			0.3	20	
Nickel	ND	1	ug/L	ND			NC	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	14800	200	ug/L	15600			5.8	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	12	5	ug/L	12			5.8	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 32542

Report Date: 09-Aug-2021

Order Date: 3-Aug-2021

Project Description: PE4632

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	*83.4*		*ug/L*		*104*	*50-140*			
Surrogate: Dibromofluoromethane	*72.4*		*ug/L*		*90.4*	*50-140*			
Surrogate: Toluene-d8	*85.7*		*ug/L*		*107*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	2200	25	ug/L	ND	110	68-117			
F2 PHCs (C10-C16)	1360	100	ug/L	ND	85.0	60-140			
F3 PHCs (C16-C34)	3550	100	ug/L	ND	90.7	60-140			
F4 PHCs (C34-C50)	2430	100	ug/L	ND	98.1	60-140			
Metals									
Mercury	3.41	0.1	ug/L	ND	114	70-130			
Antimony	43.3	0.5	ug/L	ND	86.3	80-120			
Arsenic	48.8	1	ug/L	ND	96.6	80-120			
Barium	64.0	1	ug/L	20.7	86.4	80-120			
Beryllium	45.1	0.5	ug/L	ND	90.1	80-120			
Boron	59	10	ug/L	19	80.9	80-120			
Cadmium	42.7	0.1	ug/L	ND	85.4	80-120			
Chromium (VI)	192	10	ug/L	ND	96.0	70-130			
Chromium	48.1	1	ug/L	ND	95.6	80-120			
Cobalt	47.4	0.5	ug/L	ND	94.8	80-120			
Copper	46.1	0.5	ug/L	1.16	89.9	80-120			
Lead	45.2	0.1	ug/L	0.10	90.3	80-120			
Molybdenum	48.3	0.5	ug/L	1.30	94.0	80-120			
Nickel	46.0	1	ug/L	ND	91.1	80-120			
Selenium	47.5	1	ug/L	ND	94.8	80-120			
Silver	41.7	0.1	ug/L	ND	83.3	80-120			
Sodium	23400	200	ug/L	15600	77.2	80-120			QM-07
Thallium	42.2	0.1	ug/L	ND	84.3	80-120			
Uranium	48.4	0.1	ug/L	ND	96.9	80-120			
Vanadium	48.4	0.5	ug/L	ND	96.4	80-120			
Zinc	55	5	ug/L	12	87.2	80-120			
Volatiles									
Acetone	139	5.0	ug/L	ND	139	50-140			
Benzene	40.6	0.5	ug/L	ND	102	60-130			
Bromodichloromethane	34.1	0.5	ug/L	ND	85.4	60-130			
Bromoform	30.2	0.5	ug/L	ND	75.6	60-130			
Bromomethane	39.3	0.5	ug/L	ND	98.3	50-140			
Carbon Tetrachloride	32.7	0.2	ug/L	ND	81.8	60-130			
Chlorobenzene	39.3	0.5	ug/L	ND	98.2	60-130			
Chloroform	36.8	0.5	ug/L	ND	91.9	60-130			
Dibromochloromethane	37.4	0.5	ug/L	ND	93.5	60-130			
Dichlorodifluoromethane	34.0	1.0	ug/L	ND	85.0	50-140			
1,2-Dichlorobenzene	35.8	0.5	ug/L	ND	89.6	60-130			
1,3-Dichlorobenzene	35.1	0.5	ug/L	ND	87.8	60-130			
1,4-Dichlorobenzene	35.1	0.5	ug/L	ND	87.7	60-130			
1,1-Dichloroethane	39.3	0.5	ug/L	ND	98.2	60-130			
1,2-Dichloroethane	39.8	0.5	ug/L	ND	99.6	60-130			
1,1-Dichloroethylene	36.3	0.5	ug/L	ND	90.8	60-130			
cis-1,2-Dichloroethylene	36.9	0.5	ug/L	ND	92.4	60-130			
trans-1,2-Dichloroethylene	37.0	0.5	ug/L	ND	92.4	60-130			
1,2-Dichloropropane	38.7	0.5	ug/L	ND	96.7	60-130			
cis-1,3-Dichloropropylene	40.8	0.5	ug/L	ND	102	60-130			
trans-1,3-Dichloropropylene	39.6	0.5	ug/L	ND	99.1	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Ethylbenzene	37.0	0.5	ug/L	ND	92.4	60-130			
Ethylene dibromide (dibromoethane, 1,2-	31.8	0.2	ug/L	ND	79.4	60-130			
Hexane	40.1	1.0	ug/L	ND	100	60-130			
Methyl Ethyl Ketone (2-Butanone)	111	5.0	ug/L	ND	111	50-140			
Methyl Isobutyl Ketone	100	5.0	ug/L	ND	100	50-140			
Methyl tert-butyl ether	107	2.0	ug/L	ND	107	50-140			
Methylene Chloride	37.5	5.0	ug/L	ND	93.7	60-130			
Styrene	35.4	0.5	ug/L	ND	88.5	60-130			
1,1,1,2-Tetrachloroethane	29.0	0.5	ug/L	ND	72.6	60-130			
1,1,2,2-Tetrachloroethane	33.3	0.5	ug/L	ND	83.2	60-130			
Tetrachloroethylene	35.0	0.5	ug/L	ND	87.4	60-130			
Toluene	41.4	0.5	ug/L	ND	104	60-130			
1,1,1-Trichloroethane	30.4	0.5	ug/L	ND	76.0	60-130			
1,1,2-Trichloroethane	38.4	0.5	ug/L	ND	95.9	60-130			
Trichloroethylene	38.8	0.5	ug/L	ND	97.1	60-130			
Trichlorofluoromethane	32.6	1.0	ug/L	ND	81.4	60-130			
Vinyl chloride	34.5	0.5	ug/L	ND	86.3	50-140			
m,p-Xylenes	72.2	0.5	ug/L	ND	90.3	60-130			
o-Xylene	38.4	0.5	ug/L	ND	95.9	60-130			
Surrogate: 4-Bromofluorobenzene	*86.6*		*ug/L*		*108*	*50-140*			
Surrogate: Dibromofluoromethane	*82.3*		*ug/L*		*103*	*50-140*			
Surrogate: Toluene-d8	*84.2*		*ug/L*		*105*	*50-140*			

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 LABORATORIES LTD. | TRUSTED. RESPONSIVE RELIABLE.

Paracel ID: 2132170

Chain Of Custody
(Lab Use Only)
№ 132991

Client Name: Paterson Group	Project Ref: PE4632	Page __ of __
Contact Name: WANDY WHITTEMAN	Quote #:	Turnaround Time
Address: 154 COLONNADE RD	PO #: 32542	☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone:	E-mail: WWITTEMAN@PATERSONGROUP.CA	Date Required:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+~~BTEX~~	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)						
1	BH3-21-GW1	GW		3	Aug 03/2021	am	X	X											
2	BH4-21-GW1	GW		6	↓	↓	X	X		X	X	X							
3	DUP-1	GW		2	↓	↓		X											
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Drop box

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Karl Linnett	Date/Time:	Date/Time: 5:00 Aug 3 2021	Date/Time: Aug 4 2021 11:16
Date/Time: Aug 03/2021	Temperature: °C	Temperature: 19.5 °C	pH Verified: ☑ By:

5:55

PARACEL LABORATORIES LTD.
TRUSTED. RESPONSIVE. RELIABLE.

300 - 2319 St. Laurent Blvd
Ottawa, ON, K1G 4J8
1-800-749-1947
www.paracellabs.com

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Eric Leveque

Client PO: 26986
Project: PE4632
Custody: 122421

Report Date: 8-Jul-2019
Order Date: 2-Jul-2019

Order #: 1927120

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

Paracel ID	Client ID
1927120-01	BH1-GW1
1927120-02	BH2-GW1
1927120-03	BH4-GW1

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 26986

Report Date: 08-Jul-2019
Order Date: 2-Jul-2019
Project Description: PE4632

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	7-Jul-19	7-Jul-19
Metals, ICP-MS	EPA 200.8 - ICP-MS	8-Jul-19	8-Jul-19
PHC F1	CWS Tier 1 - P&T GC-FID	5-Jul-19	7-Jul-19
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	2-Jul-19	5-Jul-19
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	5-Jul-19	5-Jul-19
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	5-Jul-19	7-Jul-19

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 26986

Report Date: 08-Jul-2019
Order Date: 2-Jul-2019
Project Description: PE4632

	Client ID:	BH1-GW1	BH2-GW1	BH4-GW1	-
	Sample Date:	02-Jul-19 12:00	02-Jul-19 09:00	02-Jul-19 12:00	-
	Sample ID:	1927120-01	1927120-02	1927120-03	-
	MDL/Units	Water	Water	Water	-
Metals					
Antimony	0.5 ug/L	-	-	<0.5	-
Arsenic	1 ug/L	-	-	1	-
Barium	1 ug/L	-	-	164	-
Beryllium	0.5 ug/L	-	-	<0.5	-
Boron	10 ug/L	-	-	115	-
Cadmium	0.1 ug/L	-	-	<0.1	-
Chromium	1 ug/L	-	-	<1	-
Cobalt	0.5 ug/L	-	-	1.5	-
Copper	0.5 ug/L	-	-	2.0	-
Lead	0.1 ug/L	-	-	<0.1	-
Molybdenum	0.5 ug/L	-	-	11.4	-
Nickel	1 ug/L	-	-	4	-
Selenium	1 ug/L	-	-	<1	-
Silver	0.1 ug/L	-	-	<0.1	-
Sodium	200 ug/L	-	-	379000	-
Thallium	0.1 ug/L	-	-	<0.1	-
Uranium	0.1 ug/L	-	-	6.2	-
Vanadium	0.5 ug/L	-	-	2.5	-
Zinc	5 ug/L	-	-	<5	-
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	-	-
Benzene	0.5 ug/L	<0.5	<0.5	-	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	-	-
Bromoform	0.5 ug/L	<0.5	<0.5	-	-
Bromomethane	0.5 ug/L	<0.5	<0.5	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	-	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
Chloroform	0.5 ug/L	<0.5	<0.5	-	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	-	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 26986

Report Date: 08-Jul-2019
Order Date: 2-Jul-2019
Project Description: PE4632

	Client ID:	BH1-GW1	BH2-GW1	BH4-GW1	-
	Sample Date:	02-Jul-19 12:00	02-Jul-19 09:00	02-Jul-19 12:00	-
	Sample ID:	1927120-01	1927120-02	1927120-03	-
	MDL/Units	Water	Water	Water	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	-	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	-	-
Ethylene dibromide (dibromoethan	0.2 ug/L	<0.2	<0.2	-	-
Hexane	1.0 ug/L	<1.0	<1.0	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	-	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	-	-
Styrene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Toluene	0.5 ug/L	<0.5	<0.5	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	-	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	-	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	-	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	-	-
o-Xylene	0.5 ug/L	<0.5	<0.5	-	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	-	-
4-Bromofluorobenzene	Surrogate	112%	116%	-	-
Dibromofluoromethane	Surrogate	86.5%	88.3%	-	-
Toluene-d8	Surrogate	103%	105%	-	-
Benzene	0.5 ug/L	-	-	<0.5	-
Ethylbenzene	0.5 ug/L	-	-	<0.5	-
Toluene	0.5 ug/L	-	-	<0.5	-
m,p-Xylenes	0.5 ug/L	-	-	<0.5	-
o-Xylene	0.5 ug/L	-	-	<0.5	-
Xylenes, total	0.5 ug/L	-	-	<0.5	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 26986

Report Date: 08-Jul-2019

Order Date: 2-Jul-2019

Project Description: PE4632

	Client ID:	BH1-GW1	BH2-GW1	BH4-GW1	-
	Sample Date:	02-Jul-19 12:00	02-Jul-19 09:00	02-Jul-19 12:00	-
	Sample ID:	1927120-01	1927120-02	1927120-03	-
	MDL/Units	Water	Water	Water	-
Toluene-d8	Surrogate	-	-	106%	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	-
Semi-Volatiles					
Acenaphthene	0.05 ug/L	-	-	<0.05	-
Acenaphthylene	0.05 ug/L	-	-	<0.05	-
Anthracene	0.01 ug/L	-	-	<0.01	-
Benzo [a] anthracene	0.01 ug/L	-	-	<0.01	-
Benzo [a] pyrene	0.01 ug/L	-	-	<0.01	-
Benzo [b] fluoranthene	0.05 ug/L	-	-	<0.05	-
Benzo [g,h,i] perylene	0.05 ug/L	-	-	<0.05	-
Benzo [k] fluoranthene	0.05 ug/L	-	-	<0.05	-
Chrysene	0.05 ug/L	-	-	<0.05	-
Dibenzo [a,h] anthracene	0.05 ug/L	-	-	<0.05	-
Fluoranthene	0.01 ug/L	-	-	<0.01	-
Fluorene	0.05 ug/L	-	-	<0.05	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	-	-	<0.05	-
1-Methylnaphthalene	0.05 ug/L	-	-	<0.05	-
2-Methylnaphthalene	0.05 ug/L	-	-	<0.05	-
Methylnaphthalene (1&2)	0.10 ug/L	-	-	<0.10	-
Naphthalene	0.05 ug/L	-	-	<0.05	-
Phenanthrene	0.05 ug/L	-	-	<0.05	-
Pyrene	0.01 ug/L	-	-	<0.01	-
2-Fluorobiphenyl	Surrogate	-	-	69.7%	-
Terphenyl-d14	Surrogate	-	-	116%	-

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									
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
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	*18.2*		*ug/L*		*91.0*	*50-140*			
Surrogate: Terphenyl-d14	*23.9*		*ug/L*		*119*	*50-140*			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	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	*93.2*		*ug/L*		*117*	*50-140*			
Surrogate: Dibromofluoromethane	*71.6*		*ug/L*		*89.5*	*50-140*			
Surrogate: Toluene-d8	*80.5*		*ug/L*		*101*	*50-140*			
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: Toluene-d8	*80.5*		*ug/L*		*101*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Metals									
Antimony	ND	0.5	ug/L	0.56			0.0	20	
Arsenic	ND	1	ug/L	ND			0.0	20	
Barium	22.0	1	ug/L	20.8			5.7	20	
Beryllium	ND	0.5	ug/L	ND			0.0	20	
Boron	18	10	ug/L	18			0.8	20	
Cadmium	ND	0.1	ug/L	ND			0.0	20	
Chromium	ND	1	ug/L	ND			0.0	20	
Cobalt	ND	0.5	ug/L	ND			0.0	20	
Copper	1.20	0.5	ug/L	1.21			1.1	20	
Lead	ND	0.1	ug/L	ND			0.0	20	
Molybdenum	1.08	0.5	ug/L	1.00			7.9	20	
Nickel	ND	1	ug/L	ND			0.0	20	
Selenium	ND	1	ug/L	ND			0.0	20	
Silver	ND	0.1	ug/L	ND			0.0	20	
Sodium	15800	200	ug/L	16500			4.5	20	
Thallium	ND	0.1	ug/L	ND			0.0	20	
Uranium	ND	0.1	ug/L	ND			0.0	20	
Vanadium	ND	0.5	ug/L	ND			0.0	20	
Zinc	9	5	ug/L	9			8.7	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroform	3.34	0.5	ug/L	2.37			34.0	30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Ethylene dibromide (dibromoethane	ND	0.2	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	*87.6*		*ug/L*		*110*	*50-140*			
Surrogate: Dibromofluoromethane	*75.2*		*ug/L*		*94.0*	*50-140*			
Surrogate: Toluene-d8	*84.1*		*ug/L*		*105*	*50-140*			
Benzene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: Toluene-d8	*84.1*		*ug/L*		*105*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1730	25	ug/L		86.5	68-117			
F2 PHCs (C10-C16)	1720	100	ug/L		107	60-140			
F3 PHCs (C16-C34)	4320	100	ug/L		110	60-140			
F4 PHCs (C34-C50)	2450	100	ug/L		98.6	60-140			
Metals									
Antimony	42.2		ug/L	0.56	83.4	80-120			
Arsenic	50.2		ug/L	ND	99.5	80-120			
Barium	66.9		ug/L	20.8	92.3	80-120			
Beryllium	47.2		ug/L	ND	94.3	80-120			
Boron	66		ug/L	18	97.1	80-120			
Cadmium	45.6		ug/L	ND	91.2	80-120			
Chromium	48.9		ug/L	ND	97.5	80-120			
Cobalt	46.1		ug/L	ND	92.2	80-120			
Copper	49.1		ug/L	1.21	95.8	80-120			
Lead	45.1		ug/L	ND	90.1	80-120			
Molybdenum	45.0		ug/L	1.00	88.0	80-120			
Nickel	47.7		ug/L	ND	94.5	80-120			
Selenium	49.4		ug/L	ND	98.5	80-120			
Silver	45.5		ug/L	ND	91.0	80-120			
Sodium	17900		ug/L	6940	109	80-120			
Thallium	44.3		ug/L	ND	88.6	80-120			
Uranium	45.8		ug/L	ND	91.6	80-120			
Vanadium	49.0		ug/L	ND	97.7	80-120			
Zinc	56		ug/L	9	93.5	80-120			
Semi-Volatiles									
Acenaphthene	4.66	0.05	ug/L		93.1	50-140			
Acenaphthylene	4.32	0.05	ug/L		86.4	50-140			
Anthracene	4.23	0.01	ug/L		84.7	50-140			
Benzo [a] anthracene	5.52	0.01	ug/L		110	50-140			
Benzo [a] pyrene	4.44	0.01	ug/L		88.8	50-140			
Benzo [b] fluoranthene	5.61	0.05	ug/L		112	50-140			
Benzo [g,h,i] perylene	4.11	0.05	ug/L		82.2	50-140			
Benzo [k] fluoranthene	5.52	0.05	ug/L		110	50-140			
Chrysene	5.57	0.05	ug/L		111	50-140			
Dibenzo [a,h] anthracene	4.25	0.05	ug/L		84.9	50-140			
Fluoranthene	5.18	0.01	ug/L		104	50-140			
Fluorene	4.68	0.05	ug/L		93.6	50-140			
Indeno [1,2,3-cd] pyrene	4.36	0.05	ug/L		87.1	50-140			
1-Methylnaphthalene	4.18	0.05	ug/L		83.6	50-140			
2-Methylnaphthalene	4.53	0.05	ug/L		90.5	50-140			
Naphthalene	4.35	0.05	ug/L		87.1	50-140			
Phenanthrene	3.88	0.05	ug/L		77.5	50-140			
Pyrene	5.57	0.01	ug/L		111	50-140			
Surrogate: 2-Fluorobiphenyl	*17.4*		*ug/L*		*86.8*	*50-140*			
Volatiles									
Acetone	83.3	5.0	ug/L		83.3	50-140			
Benzene	30.3	0.5	ug/L		75.6	60-130			
Bromodichloromethane	30.1	0.5	ug/L		75.2	60-130			
Bromoform	48.8	0.5	ug/L		122	60-130			
Bromomethane	28.5	0.5	ug/L		71.3	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Carbon Tetrachloride	31.4	0.2	ug/L		78.6	60-130			
Chlorobenzene	39.6	0.5	ug/L		99.1	60-130			
Chloroform	30.0	0.5	ug/L		75.1	60-130			
Dibromochloromethane	45.4	0.5	ug/L		113	60-130			
Dichlorodifluoromethane	27.4	1.0	ug/L		68.6	50-140			
1,2-Dichlorobenzene	43.4	0.5	ug/L		108	60-130			
1,3-Dichlorobenzene	43.2	0.5	ug/L		108	60-130			
1,4-Dichlorobenzene	35.9	0.5	ug/L		89.7	60-130			
1,1-Dichloroethane	30.2	0.5	ug/L		75.6	60-130			
1,2-Dichloroethane	32.4	0.5	ug/L		81.0	60-130			
1,1-Dichloroethylene	28.4	0.5	ug/L		71.0	60-130			
cis-1,2-Dichloroethylene	33.5	0.5	ug/L		83.8	60-130			
trans-1,2-Dichloroethylene	29.3	0.5	ug/L		73.3	60-130			
1,2-Dichloropropane	30.1	0.5	ug/L		75.2	60-130			
cis-1,3-Dichloropropylene	38.4	0.5	ug/L		95.9	60-130			
trans-1,3-Dichloropropylene	40.6	0.5	ug/L		102	60-130			
Ethylbenzene	49.4	0.5	ug/L		124	60-130			
Ethylene dibromide (dibromoethane	45.8	0.2	ug/L		114	60-130			
Hexane	40.4	1.0	ug/L		101	60-130			
Methyl Ethyl Ketone (2-Butanone)	87.3	5.0	ug/L		87.3	50-140			
Methyl Isobutyl Ketone	92.2	5.0	ug/L		92.2	50-140			
Methyl tert-butyl ether	81.5	2.0	ug/L		81.5	50-140			
Methylene Chloride	27.4	5.0	ug/L		68.6	60-130			
Styrene	48.3	0.5	ug/L		121	60-130			
1,1,1,2-Tetrachloroethane	50.4	0.5	ug/L		126	60-130			
1,1,2,2-Tetrachloroethane	50.5	0.5	ug/L		126	60-130			
Tetrachloroethylene	44.1	0.5	ug/L		110	60-130			
Toluene	39.6	0.5	ug/L		99.0	60-130			
1,1,1-Trichloroethane	31.1	0.5	ug/L		77.8	60-130			
1,1,2-Trichloroethane	29.8	0.5	ug/L		74.4	60-130			
Trichloroethylene	30.5	0.5	ug/L		76.2	60-130			
Trichlorofluoromethane	29.4	1.0	ug/L		73.5	60-130			
Vinyl chloride	49.8	0.5	ug/L		124	50-140			
m,p-Xylenes	89.4	0.5	ug/L		112	60-130			
o-Xylene	49.0	0.5	ug/L		123	60-130			
Benzene	30.3	0.5	ug/L		75.6	60-130			
Ethylbenzene	49.4	0.5	ug/L		124	60-130			
Toluene	39.6	0.5	ug/L		99.0	60-130			
m,p-Xylenes	89.4	0.5	ug/L		112	60-130			
o-Xylene	49.0	0.5	ug/L		123	60-130			

Qualifier Notes:

Login Qualifiers :

Sample - Not field filtered -
Applies to samples: BH4-GW1

Sample - Not preserved -
Applies to samples: BH4-GW1

QC Qualifiers :

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

Sample Data Revisions

None

Work Order Revisions / Comments:

Sub Sampled for Metals from general

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.

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 WO: 1927120

PARACEL | T R RI

LABORATORIES LTD.

Head Office
300-2319 St. Laurent Blvd.
Ottawa, Ontario K1G 4J8
p: 1-800-749-1947
e: paracel@paracellabs.com

Chain of Custody
(Lab Use Only)
№ 122421

Page 1 of 1

Client Name: Paterson Group
Contact Name: Eric Leveque
Address: 154 Colonnade Rd, Ottawa
Telephone: 613 226 7381

Project Reference: PE4632
Quote #
PO # 26986
Email Address: Eleveque@Patersongroup.ca

Turnaround Time:
☐ 1 Day ☐ 3 Day
☐ 2 Day ☑ Regular
Date Required:

Criteria: ☑ O. Reg. 153/04 (As Amended) Table __ ☐ 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)

Paracel Order Number: 1927120

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Date	Time	PHCs F1-F4	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	BTEX					
1	BH1-GW1	W		3	2 July	PM	✓	✓											
2	BH2-GW1	W		3	2 July	AM	✓	✓											
3	* BH4-GW1	W		5	2 July	PM	✓		✓	✓				✓					
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments: * Recieved general bottle, No metals bottle. SUBSAMPLE + Qualify per Eric. [illegible]

Method of Delivery: Swift

Relinquished By (Sign): [signature]
Relinquished By (Print): Philip Price
Date/Time:

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

Received at Lab: [signature]
Date/Time: 07-2-19 16:40
Temperature: 20.1 °C

Verified By: [signature]
Date/Time: 07-2-19 16:54
pH Verified [ ] By: