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Phase II Environmental Site Assessment

91 and 93 Holland Avenue
Ottawa, Ontario

Prepared For

Nicholson Gluckstein

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Report: PE5171-2

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the property addressed 91 and 93 Holland Avenue in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the areas of potential environmental concern (APECs) that were identified on the Phase II Property during the Phase I ESA.

The Phase II ESA was carried out in conjunction with a Geotechnical Investigation and consisted of drilling three (3) boreholes on the Phase II Property, all of which were cored into the bedrock and completed with groundwater monitoring well installations at depths ranging from approximately 6.9 to 7.4 m below grade.

The site stratigraphy generally consists of a pavement structure consisting of 0.05m of asphalt over 0.61m of sand and gravel) or granular fill (mixed with silty sand) over a layer of fill material at (BH2-21 and BH3-21), followed by silty clay, silty sand glacial till and limestone bedrock. The fill material generally consists of brown silty sand with gravel. Possible coal fragments and traces of building mortar were identified in the fill material at BH2-21.

Soil samples were obtained from the boreholes and screened based on visual observations. No olfactory evidence or contamination were identified during the subsurface investigation. Additionally, field screening of the soil samples collected during drilling resulted in organic vapour readings of less than 5.0 ppm.

Based on the screening results in combination with sample depth and location, five (5) soil samples, including a duplicate were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), petroleum hydrocarbons (PHCs, F_1-F_4), PAHs, and/or metals, Hg and CrVI. Tetrachloroethylene was identified in soil Samples BH1-21 and BH2-21 at concentrations exceeding the MECP Table 3 standards for a residential land use. No other VOC parameters were identified in the soil samples analysed. Various PAH parameters identified in soil Sample BH2-SS2 were considered to exceed the MECP Table 3 standards due to elevated method detection limits above the site standards. According to the laboratory Certificate of Analysis, method detection limits were elevated due to the nature of the sample matrix. The PAH parameters identified in soil Sample BH3-SS2 comply with the MECP Table 3 standards. No BTEX or PHC parameters were identified in the samples analysed.

Groundwater samples were recovered and analyzed for BTEX, PHCs, and VOCs. No free-phase product was observed on the groundwater at any of the monitoring well locations during the groundwater sampling events. A tetrachloroethylene concentration below the MECP Table 3 standard was identified in BH3. No other VOC parameters and no BTEX or PHC parameters were identified in the samples analysed. The groundwater results comply 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 depth of tetrachloroethylene-impacted soil, 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.

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. Prior to construction activities, it is recommended that a test pit program be completed to fully delineate the extent of the PAH and VOC impacted soil and determine the quality of any excess soil for off-site disposal purposes.

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 Nicholson Gluckstein, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the properties addressed 91 and 93 Holland Avenue, in the City of Ottawa, Ontario, herein referred to as the Phase II Property. The purpose of this Phase II ESA was to address areas of potential environmental concern (APECs) identified during the Phase I ESA conducted by Paterson.

1.1 Site Description

Address:	91 and 93 Holland Avenue, Ottawa, Ontario
Legal Description:	Lot 1539 and Part of lot 1537, Registered Plan 157, The City of Ottawa.
Location:	The Phase II Property is located on the east side of Holland Avenue between Spencer Street and Wellington Street West, in the City of Ottawa. The Phase II Property is shown on Figure 1 - Key Plan following the body of this report.
Latitude and Longitude:	45° 24' 2" N, 75° 43' 56" W
Zoning:	MC16 – Mixed Use Centre Zone
Area:	0.07 hectares (approximate)

1.2 Property Ownership

The Phase II Property is currently owned by Nicholson Gluckstein. Paterson was engaged to conduct this Phase II ESA by Mr. Joe Tallis on behalf of Nicholson Gluckstein. The offices of Nicholson Gluckstein are located at 249 McLeod Street, Ottawa, Ontario. Mr. Joe Tallis can be reached at 613-223-1947.

1.3 Current and Proposed Future Uses

The Phase II Property is occupied by two former residential dwellings that are currently operated as commercial restaurants. Parking areas are present to the south and east of the subject buildings.

It is our understanding the proposed development consists of a nine-storey residential apartment building with one (1) underground parking level that will occupy the majority of the Phase II Property.

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 Ministry of the Environment, Conservation and Parks (MECP), April 2011. The selected MECP Table 3 Standards are based on the following considerations:

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

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

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

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

The Residential Standards have been selected for the purpose of this Phase II ESA based on the proposed development.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is situated in a primarily residential area with some commercial uses.

The Phase II Property is occupied by two former residential dwellings that are currently operated as commercial restaurants. Both buildings are wood-framed structures with stone wall foundations and sloped shingled roofs.

The remaining portion of the Phase II Property, not occupied by the buildings, consists of gravel parking to the east and an asphalt laneway on the southern portion of the Phase II Property. The Phase II Property is relatively flat and at the grade of the adjacent streets and neighbouring lands. Site drainage occurs through sheet flow to catch basins located on Holland Avenue. immediately west of the Phase II Property.

The regional topography slopes down in a northerly direction towards the Ottawa River. Groundwater in the area is anticipated to flow in a northerly direction.

2.2 Past Investigations

Paterson completed a Phase I ESA in April of 2021 for the Phase II ESA Property. Based on the findings of the Phase I ESA, two (2) potentially contaminating activities (PCAs) were determined to result in areas of potential environmental concern (APECs) on the Phase II ESA Property:

- ❑ APEC 1 - Fill material of unknown quality (PCA 30);
- ❑ APEC 2 - Use of salt for deicing purposes (as noted in Section 3.3, the exemption outlined in Section 49.1 is being relied up for APEC 2); and
- ❑ APEC 3 - Former off-site gasoline service station and dry cleaner (PCA 28 and PCA 37).

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

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was completed in conjunction with a Geotechnical Investigation, on March 8, 2021. The field program consisted of drilling three (3) boreholes, all of which were cored into the bedrock and completed with groundwater monitoring wells to access the water table. Boreholes were drilled to depths ranging from 6.86 to 7.37 m below the ground surface (mbgs).

3.2 Media Investigated

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

Phase I ESA. These CPCs include benzene, toluene, ethylbenzene and xylene (BTEX); petroleum hydrocarbons (PHCs, F1-F4), polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and metals (including hydride forming compounds: arsenic (As), antimony (Sb) and selenium (se)), mercury (Hg) and hexavalent chromium (CrVI).

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

The Geological Survey of Canada website on the Urban Geology of the National Capital Area was consulted as part of this assessment. It was determined that the Phase I Property is located on the Gull River Formations, which consist of interbedded limestone and dolomite. Surficial geology consists of till, with a drift thickness on the order to 2 to 3 m.

Based on local and regional topography in combination with our knowledge of the Ottawa area, groundwater beneath the Phase I Property is expected to flow in a northerly direction toward the Ottawa River.

Existing Buildings and Structures

The Phase I Property is occupied by two former residential dwellings which were constructed in the early 1900s and were later converted to commercial restaurants in the 1960s. The original portions of each building were constructed with stone and mortar foundations. The buildings both have two stories with a full basement level and are finished on the exterior with stucco and sloped, shingled roofs. The buildings are heated with natural gas-fired equipment.

No other buildings or above-grade structures are present on the Phase I Property.

Water Bodies

There are no water bodies on the Phase I Property or within the Phase I study area. The closest body of water is the Ottawa River, located approximately 1.28km north of the Phase I Property.

Areas of Natural Significance

No areas of natural significance were identified on the Phase I Property or within the Phase I study area.

Drinking Water Wells

No drinking water wells are located on the Phase I Property or within the Phase I study area.

Monitoring Wells

No monitoring wells are located on the Phase I Property. Based on a search of the MECP wells records mapping system, 96 records of monitoring wells and/or abandoned monitoring wells were identified within the Phase I study area.

The monitoring wells are associated with previously discussed PCAs within the study area.

Neighbouring Land Use

Currently, neighbouring land use in the Phase I study area is primarily residential, with some commercial land use further to the north and south of the Phase I Property.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.1 of the Phase I ESA report (Report: PE5171-1), three (3) PCAs are considered to result in APECs on the Phase I Property. These APECs are summarized in Table 1, along with their respective locations and contaminants of potential concern (CPCs) on the Phase I Property.

Table 1: 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 importation of fill material of unknown quality	Southern and eastern portions of the Phase I Property	PCA 30 – Importation of Fill Material of Unknown Quality	On-site	Metals Hg, CrVI PAHs	Soil
APEC 2[1]: Resulting from the use of salt for deicing purposes for pedestrian and vehicular safety	Western portion of the Phase I Property	Other – Use of Salt for Deicing Purposes	On-site	EC SAR	Soil

1 – In accordance with Section 49.1 of O.Reg. 153/04 standards are deemed to be met if an applicable site condition standard is exceeded at a property solely because the qualified person has determined that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both. The exemption outlined in Section 49.1 is being relied up with respect to the Phase I Property.

Table 1 (Continued): 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 a former off-site gasoline service station and dry cleaner.	Southern portion of the Phase I Property	PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	Off-site	BTEX PHCs	Soil Groundwater
		PCA 37 - Operation of Dry Cleaning Equipment (where chemicals are used)	Off-site	VOCs	Soil Groundwater

1 – In accordance with Section 49.1 of O.Reg. 153/04 standards are deemed to be met if an applicable site condition standard is exceeded at a property solely because the qualified person has determined that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both. The exemption outlined in Section 49.1 is being relied up with respect to the Phase I Property.

Several off-site PCAs were identified within the Phase I Study Area, however, based on separation distances and/or cross-gradient orientation with respect to the subject land, as groundwater is considered to flow in a north westerly direction, other PCAs were not considered to represent APECs on the Phase I Property.

The rationale for identifying the on-and-off site PCAs are based on aerial photographs, FIPs, city directories and field observations within the Phase I Study Area as well as personal interviews.

Contaminants of Potential Concern

As per the APECs identified in Section 7.1, the contaminants of potential concern (CPCs) in soil and/or groundwater include:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX);
- Petroleum hydrocarbons (PHCs, Fractions F_1-F_4);
- Polycyclic aromatic compounds (PAHs);
- Metals (including As, Sb, Se), Hg and CrVI; and
- Volatile organic compounds (VOCs).

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 areas of potential environmental concern on the Phase II Property. The presence of potentially contaminating activities was confirmed by a variety of independent sources, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

3.4 Deviations from Sampling and Analysis Plan

The Sampling and Analysis Plan for this project is included in Appendix 1 of this report. No deviations form the sampling and analysis plan occurred during the investigation with the exception of obtaining water quality parameters. During the groundwater sampling portion, equipment was not available to obtain water quality parameters. However, based on the visual and olfactory observations of the purged water during the sampling events, no concerns were identified.

3.5 Impediments

No impediments were encountered during the Phase II ESA investigation.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was completed in conjunction with a Geotechnical Investigation, on March 8, 2021. The field program consisted of drilling three (3) boreholes, all of which were cored into the bedrock and completed with groundwater monitoring wells to access the water table. Boreholes were drilled to depths ranging from 6.86 to 7.37 m below the ground surface (mbgs).

The boreholes were drilled using a low-clearance track mounted drill rig provided by Downing Drilling, of Hawksbury, Ontario, under the full-time supervision of Paterson personnel. The borehole locations are indicated on the attached Drawing PE5171-3 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

A total of sixteen (16) soil samples were obtained from the boreholes by means of grab sampling from auger flights and split spoon sampling. Split spoon samples were taken at approximate 0.76 m intervals. The depths at which auger samples, split spoon samples and rock core samples were obtained from the boreholes are

shown as "**AU**" and "**SS**" on the Soil Profile and Test Data Sheets appended to this report.

The site stratigraphy generally consists of a pavement structure consisting of 0.05m of asphalt over 0.61m of sand and gravel) or granular fill (mixed with silty sand) over a layer of fill material at (BH2-21 and BH3-21), followed by silty clay, silty sand glacial till and limestone bedrock. The fill material generally consists of brown silty sand with gravel. Possible coal fragments and traces of building mortar were identified in the fill material at BH2-21.

4.3 Field Screening Measurements

All soil samples collected underwent a preliminary screening procedure, which included visual screening for colour and evidence of deleterious fill, as well as screening with a photo ionization detector (PID). The detection limit is 0.1 ppm, with a precision of +/- 2 ppm or 10% of the reading.

The soil vapours were measured by inserting the analyzer probe into the nominal headspace above the soil sample. Samples were then agitated, and the peak readings recorded. The vapour readings were recorded below 5.0 ppm for all soil samples. Soil samples were therefore selected for analysis based on a combination of visual appearance and location.

Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

4.4 Groundwater Monitoring Well Installation

Three groundwater monitoring wells were installed on the Phase II Property as part of the subsurface 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.

A summary of the monitoring well construction details is provided below in Table 2.

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	63.48	7.37	5.87-7.37	5.67-.7.37	0.0-2.9	Flushmount
BH2	64.15	7.04	5.54-7.04	5.34-7.04	0.0-2.8	Flushmount
BH3	63.53	6.86	3.86.-6.86	3.66-6.86	0.0-3.3	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 in Appendix 1, the soil and groundwater samples submitted for analytical testing are presented in Tables 3 and 4.

Table 3: Soil Samples Submitted and Analyzed Parameters

Sample ID	Sample Depth (m) and Stratigraphic Unit	Parameters Analyzed						Rationale
		BTEX	PHCs (F1-F4)	VIOCs	PAHs	Metals	Hg & CrVI	
March 8, 2021								
BH1-SS6	3.8-4.27 Glacial Till	X	X	X				Assess the potential soil impacts from historical up-gradient PCA.
BH2-SS2	0.76-1.37 Fill				X	X	X	Assess the quality of the fill material.
BH2-SS5	3.04-3.65 Glacial Till	X	X	X				Assess the potential soil impacts from historical up-gradient PCA.
BH3-SS2	0.76-1.37 Fill				X	X	X	Assess the potential impact due to the current use of the neighbouring sites.
DUP (BH2-SS2)	0.76-1.37 Fill					X		Duplicate for quality control

Table 4: Groundwater Samples Submitted and Analyzed Parameters					
Sample ID	Screened Interval (m)	Parameters Analyzed			Rationale
		BTEX	PHCs (F1-F4)	VOCs	
March 22, 2021					
BH1-GW1	5.87-7.37	X	X	X	Assess the potential groundwatwer impacts from historical upgradient PCA.
BH2-GW1	5.54-7.04	X	X	X	Assess the potential groundwatwer impacts from historical upgradient PCA.
BH3-GW1	3.86.-6.86	X	X	X	Assess the potential groundwatwer impacts from historical upgradient PCA.
DUP (BH1-GW4)	5.87-7.37	X	X	X	Assess the potential groundwatwer impacts from historical upgradient PCA.

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 located and surveyed in the field by Paterson. The locations and elevations of the boreholes are presented on Drawing PE5171-3 – Test Hole Location Plan, appended to this report.

4.9 Quality Assurance and Quality Control Measures

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

5.0 REVIEW AND EVALUATION

5.1 Geology

The site stratigraphy generally consists of a pavement structure consisting of 0.05m of asphalt over 0.61m of sand and gravel) or granular fill (mixed with silty sand) over a layer of fill material at (BH2-21 and BH3-21), followed by silty clay, silty sand glacial till and limestone bedrock. Bedrock was confirmed during the drilling program and was encountered in the boreholes at depths ranging from 3.28 to 4.27mbgs.

Groundwater was encountered within bedrock at depths ranging from approximately 2.73 to 4.83 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 event which occurred on March 17, 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	63.48	4.44	59.04	March 17, 2021
BH2	64.15	4.83	59.32	March 17, 2021
BH3	63.53	2.73	60.80	March 17, 2021

Based on the groundwater elevations measured during the sampling event, a groundwater contour plan was completed. The groundwater contour mapping is shown on Drawing PE5171-3 – Test Hole Location Plan. Based on the contour mapping, groundwater flow beneath the Phase II Property is in westerly direction. A horizontal hydraulic gradient of approximately 0.18m/m was calculated.

5.3 Fine-Course Soil Texture

No grain size analysis was completed for the Phase II Property. Coarse grained standards were chosen based on the observed soil texture.

5.4 Soil: Field Screening

No olfactory indications of contamination were identified in the recovered soil samples. Traces of building mortar fragments and fragments of coal were identified in the fill material at BH2-21.

Field screening of the soil samples collected during drilling resulted in organic vapour readings of less than 5.0 ppm. Field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

Soil samples were selected based on visual screening, sample depth and/or sample location.

5.5 Soil Quality

Five soil samples, including a duplicate, were submitted for BTEX, PHC (F_1-F_4), VOCs, PAHs, and/or metals, Hg and CrVI analyses. A duplicate sample (DUP) of Sample BH2-SS2 was selected to be submitted as the duplicate sample for quality assurance and quality control (QA/QC) purposes. The results of the analytical testing are presented in Tables 6, 7, 8 and 9. The laboratory Certificates of Analysis are provided in Appendix 1.

Table 6: Analytical Test Results – Soil
BTEX and PHC (F_1-F_4)

Parameter	MDL (µg/g)	Soil Samples (µg/g)		MECP Table 3 Residential Standards (µg/g)
		March 8, 2021		
		BH1-SS6 3.8-4.27	BH2-SS5 3.04-3.65	
Benzene	0.2	nd	nd	0.21
Ethylbenzene	0.5	nd	nd	2.0
Toluene	0.5	nd	nd	2.3
Xylenes	0.5	nd	nd	3.1
PHC F_1	7	nd	nd	55
PHC F_2	4	nd	nd	98
PHC F_3	8	nd	nd	300
PHC F_4	6	nd	nd	2800

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

No detectable BTEX or PHC concentrations were identified in the soil samples analyzed. All parameter concentrations comply with the selected MECP Table 3 Residential Standards.

The analytical results in soil with respect to borehole locations are shown on Drawing PE5171-4 - Analytical Testing Plan – Soil.

Table 7: Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g) March 8, 2021		MECP Table 3 Residential Standards (µg/g)
		BH1-SS6 3.8-4.27	BH2-SS5 3.04-3.65	
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	0.05	nd	nd	0.05
Hexane	0.05	nd	nd	2.8
Methyl Ethyl Ketone	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	**0.74**	**0.43**	0.28
Toluene	0.05	nd	nd	2.3

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds the selected MECP Table 3 Standards

Table 7 (Continued): Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g) March 8, 2021		MECP Table 3 Residential Standards (µg/g)
		BH1-SS6 3.8-4.27	BH2-SS5 3.04-3.65	
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	0.5	nd	nd	3.1

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds the selected MECP Table 3 Standards

All VOC concentrations were found to comply with the selected MECP Table 3 Residential Standards with the exception of two parameters. Tetrachloroethylene concentrations in both samples from BH1 and BH2 exceeded the MECP Table 3 Residential Standards.

The analytical results in soil with respect to borehole locations are shown on Drawing PE5171-5 - Analytical Testing Plan – Soil.

Table 8: Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g)		MECP Table 3 Residential Standards (µg/g)
		March 8, 2021		
		BH2-SS2	BH3-SS2	
Acenaphthene	0.02	nd	0.03	7.9
Acenaphthylene	0.02	**0.80***	0.07	0.15
Anthracene	0.02	**0.80***	0.12	0.67
Benzo[a]anthracene	0.02	**0.80***	0.25	0.5
Benzo[a]pyrene	0.02	**0.80***	0.29	0.3
Benzo[b]fluoranthene	0.02	**0.80***	0.26	0.78
Benzo[g,h,i]perylene	0.02	nd	0.19	6.6
Benzo[k]fluoranthene	0.02	**0.80***	0.14	0.78
Chrysene	0.02	nd	0.24	7
Dibenzo[a,h]anthracene	0.02	**0.80***	0.04	0.1
Fluoranthene	0.02	**0.80***	0.53	0.69
Fluorene	0.02	nd	0.03	62
Indeno[1,2,3-cd]pyrene	0.02	**0.80***	0.15	0.38
Methylnaphthalene (1&2)	0.04	**1.60***	0.10	0.99
Naphthalene	0.01	nd	0.06	0.6
Phenanthrene	0.02	nd	0.42	6.2
Pyrene	0.02	nd	0.58	78

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds the selected MECP Table 3 Standards
- * - Values deemed to exceed due to elevated laboratory detection limits

All PAH concentrations were found to comply with the selected MECP Table 3 Residential Standards for Sample BH3-SS2. Due to the sample matrix received by the laboratory for BH2-SS2, the Method Detection Limit (MDL) was elevated for most PAH parameters. Due to the elevated MDL, several PAH parameters were deemed to be in exceedance of the selected MECP Table 3 Residential Standards. All parameter concentrations comply with the selected MECP Table 3 Residential Standards.

The analytical results in soil with respect to borehole locations are shown on Drawing PE5171-5 - Analytical Testing Plan – Soil.

Table 9: Analytical Test Results – Soil
Metals, Hg and CrVI

Parameter	MDL (µg/g)	Soil Samples (µg/g) March 8, 2021			MECP Table 3 Residential Standards (µg/g)
		BH2-SS2	BH3-SS2	DUP (BH2-SS2)	
Antimony	1.0	nd	2.4	nd	7.5
Arsenic	1.0	4.00	7.80	3.60	18
Barium	1.0	213	1.75	194	390
Beryllium	0.5	0.60	0.70	0.60	4
Boron	5.0	18.5	13.8	25.7	120
Cadmium	0.5	nd	0.50	nd	1.2
Chromium	5.0	75.1	31.3	79.2	160
Chromium (VI)	0.2	nd	nd	N/A	8
Cobalt	1.0	10.4	11.3	10.3	22
Copper	5.0	18.4	39.8	16.7	140
Lead	1.0	35.2	69.8	30.3	120
Mercury	0.1	nd	0.10	N/A	0.27
Molybdenum	1.0	1.20	1.60	1.1	6.9
Nickel	5.0	31.7	22.4	30.7	100
Selenium	1.0	nd	nd	nd	2.4
Silver	0.3	nd	nd	nd	20
Thallium	1.0	nd	nd	nd	1
Uranium	1.0	nd	nd	nd	23
Vanadium	10.0	36.6	49.0	33.6	86
Zinc	20.0	54.8	158	50.3	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- N/A - not analyzed
- **Bold and Underlined** – Value exceeds the selected MECP Table 3 Standards

All metal concentrations identified in the soil samples analyzed comply with the selected MECP Table 3 Residential Standards.

The analytical results in soil with respect to borehole locations are shown on Drawings PE5171-4- Analytical Testing Plan.

The maximum concentrations of analyzed parameters in the soil at the site are summarized in Table 10.

Table 10: Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Soil Sample	Depth Interval (m BGS)
Tetrachloroethylene	**0.74**	BH3-SS2	0.76-1.37 Fill
Acenaphthene	0.03		
Acenaphthylene	0.07		

Notes:
- **Bold and Underlined** – Value exceeds the selected MECP Table 3 Standards

Table 10 (Continued): Maximum Concentrations – Soil			
Parameter	**Maximum Concentration (µg/g)**	**Soil Sample**	**Depth Interval (m BGS)**
Anthracene	0.12		
Benzo[a]anthracene	0.25		
Benzo[a]pyrene	0.29		
Benzo[b]fluoranthene	0.26		
Benzo[g,h,i]perylene	0.19		
Benzo[k]fluoranthene	0.14		
Chrysene	0.24		
Dibenzo[a,h]anthracene	0.04		
Fluoranthene	0.53		
Fluorene	0.03		
Indeno[1,2,3-cd]pyrene	0.15		
Methylnaphthalene (1&2)	0.10		
Naphthalene	0.06		
Phenanthrene	0.42		
Pyrene	0.58		
Antimony	2.40	BH3-SS2	0.76-1.37 Fill
Arsenic	7.80		
Barium	213	BH2-SS2	0.76-1.37 Fill
Beryllium	0.70	BH3-SS2	0.76-1.37 Fill
Boron	25.7	DUP (BH2-SS2)	0.76-1.37 Fill
Cadmium	0.50	BH3-SS2	0.76-1.37 Fill
Chromium	79.2	DUP (BH2-SS2)	0.76-1.37 Fill
Cobalt	11.3	BH3-SS2	0.76-1.37 Fill
Copper	39.8		
Lead	69.8		
Molybdenum	1.60		
Nickel	31.7	BH2-SS2	0.76-1.37 Fill
Vanadium	49.0	BH3-SS2	0.76-1.37 Fill
Zinc	158		
Mercury	0.1		
Acenaphthylene	**0.80**	BH2-SS2	0.76-1.37 Fill
Anthracene	**0.80**		
Benzo[a]anthracene	**0.80**		
Benzo[a]pyrene	**0.80**		
Benzo[b]fluoranthene	**0.80**		
Benzo[k]fluoranthene	**0.80**		
Dibenzo[a,h]anthracene	**0.80**		
Fluoranthene	**0.80**		
Ideno[1,2,3-cd]pyrene	**0.80**		
Methylnaphthalene (1&2)	**1.60**		

Notes:
- **Bold and Underlined** – Value exceeds the selected MECP Table 3 Standards

Remaining parameters were not detected above the laboratory method detection limits.

5.6 Groundwater Quality

Groundwater samples from each of the boreholes were submitted for laboratory analysis of BTEX, PHC (F_1-F_4), and VOCs. The groundwater samples were obtained from the screened intervals noted in Table 2.

The results of the analytical testing are presented in Tables 11 and 12. The laboratory Certificates of Analysis are provided in Appendix 1.

Table 11: Analytical Test Results – Groundwater
BTEX and PHC (F_1-F_4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)				MECP Table 3 Standards (µg/L)
		March 17, 2021				
		BH1-GW1 5.87-7.37 mbgs	BH2-GW1 5.54-7.04 mbgs	BH3-GW1 3.86-6.86 mbgs	DUP 5.87-7.37 mbgs	
Benzene	0.5	nd	nd	nd	nd	44
Toluene	0.5	nd	nd	nd	nd	18000
Ethylbenzene	0.5	nd	nd	nd	nd	2300
Xylenes	0.5	nd	nd	nd	nd	4200
PHC F_1	25	nd	nd	nd	nd	750
PHC F_2	100	nd	nd	nd	nd	150
PHC F_3	100	nd	nd	nd	nd	500
PHC F_4	100	nd	nd	nd	nd	500

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

No BTEX or PHC parameters were identified in any of the groundwater samples analysed. 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)				MECP Table 3 Standards (µg/L)
		March 17, 2021				
		BH1-GW1 5.87-7.37 mbgs	BH2-GW1 5.54-7.04 mbgs	BH3-GW1 3.86-6.86 mbgs	DUP 5.87-7.37 mbgs	
Acetone	5.0	nd	nd	nd	nd	130000
Benzene	0.5	nd	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	nd	85000
Bromoform	0.5	nd	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	nd	630
Chloroform	0.5	nd	nd	nd	nd	2.4
Dibromochloromethane	0.5	nd	nd	nd	nd	82000
Dichlorodifluoromethane	1.0	nd	nd	nd	nd	4400
1,2-Dichlorobenzene	0.5	nd	nd	nd	nd	4600
1,3-Dichlorobenzene	0.5	nd	nd	nd	nd	9600
1,4-Dichlorobenzene	0.5	nd	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	nd	16
1,3-Dichloropropene, total	0.5	nd	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	nd	2300
Ethylene dibromide (dibromoethane, 1,2-)	0.2	nd	nd	nd	nd	0.25
Hexane	1.0	nd	nd	nd	nd	51
Methyl Ethyl Ketone (2-Butanone)	5.0	nd	nd	nd	nd	470000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	nd	140000
Methyl tert-butyl ether	2.0	nd	nd	nd	nd	190
Methylene Chloride	5.0	nd	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	nd	1300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	0.7	nd	1.6
Toluene	0.5	nd	nd	nd	nd	18000

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

Table 12: Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)				MECP Table 3 Standards (µg/L)
		March 17, 2021				
		BH1-GW1 5.87-7.37 mbgs	BH2-GW1 5.54-7.04 mbgs	BH3-GW1 3.86-6.86 mbgs	DUP 5.87-7.37 mbgs	
1,1,1-Trichloroethane	0.5	nd	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	nd	2500
Vinyl Chloride	0.5	nd	nd	nd	nd	0.5
Xylenes, total	0.5	nd	nd	nd	nd	4200

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

No VOC parameters were identified in any of the samples analysed, with the exception of a concentration of tetrachloroethylene in groundwater Sample BH3-GW1 (0.7 µg/L) which is below the MECP Table 3 standards of 1.6 µg/L. The groundwater results comply with the MECP Table 3 standards.

Groundwater results are presented on Drawing PE5171-7- Analytical Testing Plan.

The maximum concentrations of analyzed parameters in the groundwater at the site are summarized in Table 11.

Table 13: Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Groundwater Sample	Screened Interval (m BGS)
Tetrachloroethylene	0.7	BH3-GW1	3.86-6.86

The remaining parameters analyzed were not detected above the laboratory method detection limits.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of this Phase II ESA were handled in accordance with the Analytical Protocol with respect to preservation method, storage requirement, and container type.

As per the sampling and analysis plan, a duplicate soil sample (DUP) from BH2-SS2 was obtained and analyzed for metal parameters.

The RPD calculations for the original and duplicate sample of the groundwater are provided below in Table 12.

Table 12: QA/QC Results – Soil Metals

Parameters	BH2-SS2	DUP (BH2-SS2)	RPD (%)	QA/QC Result
Arsenic	4.00	3.60	10.5	Within acceptable range
Barium	213	194	9.3	Within acceptable range
Beryllium	0.60	0.60	0.0	Within acceptable range
Boron	18.5	25.7	32.6	Outside the acceptable range
Chromium	75.1	79.2	5.3	Within acceptable range
Cobalt	10.4	10.3	1.0	Within acceptable range
Copper	18.4	16.7	9.7	Within acceptable range
Lead	35.2	30.3	15.0	Within acceptable range
Molybdenum	1.20	1.1	8.7	Within acceptable range
Nickel	31.7	30.7	3.2	Within acceptable range
Vanadium	36.6	33.6	8.5	Within acceptable range
Zinc	54.8	50.3	8.6	Within acceptable range

The RPD results are within the acceptable range with the exception of the boron parameter. Given the heterogenous nature of the fill material and that the concentrations are beneath the MECP Table 3 standards, this RPD result is not considered to affect the validity of the findings.

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

As presented in Table 1 in Section 3.3 of this report on- and off-site PCAs are considered to results in the following three APECs on the Phase II Property:

- APEC 1 - Fill material of unknown quality (PCA 30);
- APEC 2 - Use of salt for deicing purposes (as noted in Section 3.3, the exemption outlined in Section 49.1 is being relied up for APEC 2); and

- APEC 3 - Former off-site gasoline service station and dry cleaner (PCA 28 and PCA 37).

Contaminants of Potential Concern

Based on the APECs identified on the Phase II Property, the contaminants of potential concern (CPCs) present in soil and/or groundwater include:

- Benzene, toluene, ethylbenzene, and xylenes (BTEX);
- Petroleum hydrocarbons (PHCs, Fractions F_1-F_4);
- Polycyclic aromatic compounds (PAHs);
- Metals (including As, Sb, Se), Hg and CrVI; and
- Volatile organic compounds (VOCs).

Subsurface Structures and Utilities

The Phase II Property is situated in a municipally serviced area. Underground utility services on the Phase II Property include natural gas, electricity, municipal water and sewer services. These services enter the Phase II Property from Holland Avenue.

Physical Setting

Site Stratigraphy

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is illustrated on Drawings PE5171-6A and PE5171-6B for soil and groundwater cross-sections. The site stratigraphy consists of:

- Brown silty sand with gravel and some topsoil or asphaltic concrete pavement structure.
- Fill material consisting of brown silty sand, trace topsoil, and traces of building mortar and coal fragments (BH2-21). The fill material was encountered at depths ranging from 0 to 1.68 mbgs at BH2-21 and BH3-21 only.
- Very stiff to stiff brown silty clay, encountered at depths ranging from 0.69 to 1.68 mbgs.
- Glacial till was encountered beneath the silty clay layer and encountered at depths ranging from 2.29 to 2.34 mbgs.

- Limestone bedrock was encountered in all boreholes at depths ranging from approximately 3.28 to 4.27 mbgs. Groundwater was encountered stratigraphic unit.

Hydrogeological Characteristics

Groundwater at the Phase II Property was encountered in glacial till and sandstone bedrock, ranging from depths of approximately 2.73 to 4.83 mbgs. Groundwater flow was measured in an southerly direction with a hydraulic gradient of 0.18m/m. Groundwater contours are shown on Drawing PE5171-3–Test Hole Location Plan.

Approximate Depth to Water Table

Depth to the water table at the Phase II Property varies between approximately 2.73 to 4.83 mbgs.

Approximate Depth to Bedrock

Bedrock was confirmed during the drilling program at depths ranging from 3.28 to 4.27 mbgs.

Sections 35, 41 and 43.1 of the Regulation

Non-potable groundwater conditions, as defined in Section 35 of O.Reg. 153/04, were selected as the Phase II property is situated in a municipally serviced area and residential land use standards were selected based on the proposed development.

Section 41 of the O.Reg. 153/04 does not apply to the Phase II Property, as there are no areas of natural significance or bodies of water located on or within 30 m of the Phase II Property. The Phase II Property is not considered to be environmentally sensitive.

Section 43.1 of O.Reg. 153/04 does not apply to the Phase II Property as bedrock is located more than 2 m below ground surface and thus, exceeds the defined shallow soil property.

Fill Placement

Based on the findings of the subsurface investigation, the fill material generally consists of brown silty sand with gravel. Possible coal fragments and traces of building mortar were identified in the fill material at BH2-21.

No olfactory evidence of deleterious materials or contamination were identified in the fill material.

Existing Buildings and Structures

The Phase II Property is occupied by two former residential dwellings which were constructed in the early 1900s and were later converted to commercial restaurants in the 1960s. The original portions of each building were constructed with stone and mortar foundations. The buildings both have two stories with a full basement level and are finished on the exterior with stucco and sloped, shingled roofs. The buildings are heated with natural gas-fired equipment.

No other buildings or above-grade structures are present on the Phase II Property.

Proposed Buildings and Other Structures

It is our understanding the proposed development consists of a nine-storey residential apartment building with one (1) underground parking level will be constructed on the Phase II Property.

Water Bodies and Areas of Natural Significance

There are no water bodies on the Phase II Property or within the Phase II study area. The closest body of water is the Ottawa River, located approximately 1.28km north of the Phase I Property.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of the Phase II ESA, fill material considered to be impacted with PAH parameters was identified at BH2 on the southern portion of the site. Tetrachloroethylene is present in the soil at BH1 and BH2, on the southern portion of the Phase II Property, at concentrations exceeding the MECP Table 3 Residential Standard.

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

Types of Contaminants

Based on the findings of the Phase II ESA, contaminants of concern in the soil include: VOCs (tetrachloroethylene) and PAHs. PAH contaminants of concern include Acenaphthylene, Anthracene, Benzo[a]anthracene, Benzo[a]pyrene, Benzo[b]fluoranthene, Benzo[k]fluoranthene, Dibenzo[a,h]anthracene, Fluoranthene, Ideno[1,2,3-cd]pyrene, and Methylnaphthalene (1&2).

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

Contaminated Media

Based on the findings of the Phase II ESA, the fill material at BH2 is impacted with PAH parameters while the glacial till material at BH1 and BH2 is impacted with tetrachloroethylene at concentrations above the MECP Table 3 standard.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of the subsurface investigation, PAH impacted fill material at BH2 expected to be associated with the historical importation of fill material for grading purposes. Tetrachloroethylene concentrations exceeding the MECP Table 3 standards were identified in the soil at BH1 and BH2 at depths ranging from approximately 3.0 to 4.3m below grade. It is expected that the soil impacts are associated with a former up-gradient drycleaners and retail fuel outlet.

Distribution and Migration of Contaminants

Based on the findings of the Phase II ESA, PAH impacts are considered to be confined to the fill material, well above the water table.

Given that groundwater beneath the Phase II Property complies with the MECP Table 3 standards, tetrachloroethylene impacts on the Phase II Property are considered to be confined to the soil. No significant migration of contaminants is expected to have occurred given the clean groundwater results.

Discharge of Contaminants

The PAH impacts are considered to be associated with historical fill material imported to the Phase II Property.

Given that no potential on-site source of tetrachloroethylene was identified, the tetrachloroethylene concentrations identified in the soil on the Phase II Property are expected to have been carried to and deposited on the site through groundwater flow from an up-gradient historical source (former retail fuel outlet and drycleaners at northeast corner of Holland Avenue and Wellington Street West). It is expected that impacted soil just above the bedrock is attributed to seasonal fluctuations in the groundwater table, which is in the upper levels of the bedrock, near the bedrock/soil interface.

Climatic and Meteorological Conditions

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

Based on the findings of the Phase II ESA, groundwater beneath the Phase II Property complies with the MECP Table 3 standards. Downward leaching of contaminants by means of infiltration of precipitation is not considered to have affected contaminant distribution on the Phase II Property.

As discussed above, contaminants are considered to have migrated to the Phase II Property from a historical upgradient source, via historical groundwater flow and seasonal fluctuation in groundwater levels. As noted above, groundwater beneath the Phase II Property currently complies with the MECP Table 3 standards.

Potential for Vapour Intrusion

While PAHs have low volatility, tetrachloroethylene is volatile in nature and as such, there is potential for vapour intrusion at the Phase II Property. Based on the depth of the impacts in combination with the identified locations outside of the building footprints and relatively low concentrations identified, the potential is considered to be low.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the property addressed 91 and 93 Holland Avenue in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the areas of potential environmental concern (APECs) that were identified on the Phase II Property during the Phase I ESA.

The Phase II ESA was carried out in conjunction with a Geotechnical Investigation and consisted of drilling three (3) boreholes on the Phase II Property, all of which were cored into the bedrock and completed with groundwater monitoring well installations at depths ranging from approximately 6.9 to 7.4 m below grade.

The site stratigraphy generally consists of a pavement structure consisting of 0.05m of asphalt over 0.61m of sand and gravel) or granular fill (mixed with silty sand) over a layer of fill material at (BH2-21 and BH3-21), followed by silty clay, silty sand glacial till and limestone bedrock. The fill material generally consists of brown silty sand with gravel. Possible coal fragments and traces of building mortar were identified in the fill material at BH2-21.

Soil samples were obtained from the boreholes and screened based on visual observations. No olfactory evidence or contamination were identified during the subsurface investigation. Additionally, field screening of the soil samples collected during drilling resulted in organic vapour readings of less than 5.0 ppm.

Based on the screening results in combination with sample depth and location, five (5) soil samples, including a duplicate were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), petroleum hydrocarbons (PHCs, F_1-F_4), PAHs, and/or metals, Hg and CrVI. Tetrachloroethylene was identified in soil Samples BH1-21 and BH2-21 at concentrations exceeding the MECP Table 3 standards for a residential land use. No other VOC parameters were identified in the soil samples analysed. Various PAH parameters identified in soil Sample BH2-SS2 were considered to exceed the MECP Table 3 standards due to elevated method detection limits above the site standards. According to the laboratory Certificate of Analysis, method detection limits were elevated due to the nature of the sample matrix. The PAH parameters identified in soil Sample BH3-SS2 comply with the MECP Table 3 standards. No BTEX or PHC parameters were identified in the samples analysed.

Groundwater samples were recovered and analyzed for BTEX, PHCs, and VOCs. No free-phase product was observed on the groundwater at any of the monitoring well locations during the groundwater sampling events. A tetrachloroethylene concentration below the MECP Table 3 standard was identified in BH3. No other VOC parameters and no BTEX or PHC parameters were identified in the samples analysed. The groundwater results comply 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 depth of tetrachloroethylene-impacted soil, 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.

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. Prior to construction activities, it is recommended that a test pit program be completed to fully delineate the extent of the PAH and VOC impacted soil and determine the quality of any excess soil for off-site disposal purposes.

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 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 Phase II Property 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 Nicholson Gluckstein. Notification from Nicholson Gluckstein and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.

Mark St Pierre, B.Eng.

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

Report Distribution:

- Nicholson Gluckstein
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FIGURES

FIGURE 1 – KEY PLAN

Drawing PE5171-3 – Test Hole Location Plan

Drawing PE5171-4 - Analytical Testing plan – Soil (BTEX, PHC, Metals, Hg, CrVI)

Drawing PE5171-4A - Cross-section – A-A' – Soil (BTEX, PHC, Metals, Hg, CrVI)

Drawing PE5171-4B - Cross-section – B-B' – Soil (BTEX, PHC, Metals, Hg, CrVI)

Drawing PE5171-5 - Analytical Testing plan – Soil (VOC)

Drawing PE5171-5A - Cross-section – A-A' – Soil (VOC)

Drawing PE5171-5B - Cross-section – B-B' – Soil (VOC)

Drawing PE5171-6 - Analytical Testing plan – Soil (PAH)

Drawing PE5171-6A - Cross-section – A-A' – Soil (PAH)

Drawing PE5171-6B - Cross-section – B-B' – Soil (PAH)

Drawing PE5171-7 - Analytical Testing plan – Groundwater (BTEX, PHC, VOC)

Drawing PE5171-7A - Cross-section – A-A' – Groundwater (BTEX, PHC, VOC)

Drawing PE5171-7B - Cross-section – B-B' – Groundwater (BTEX, PHC, VOC)

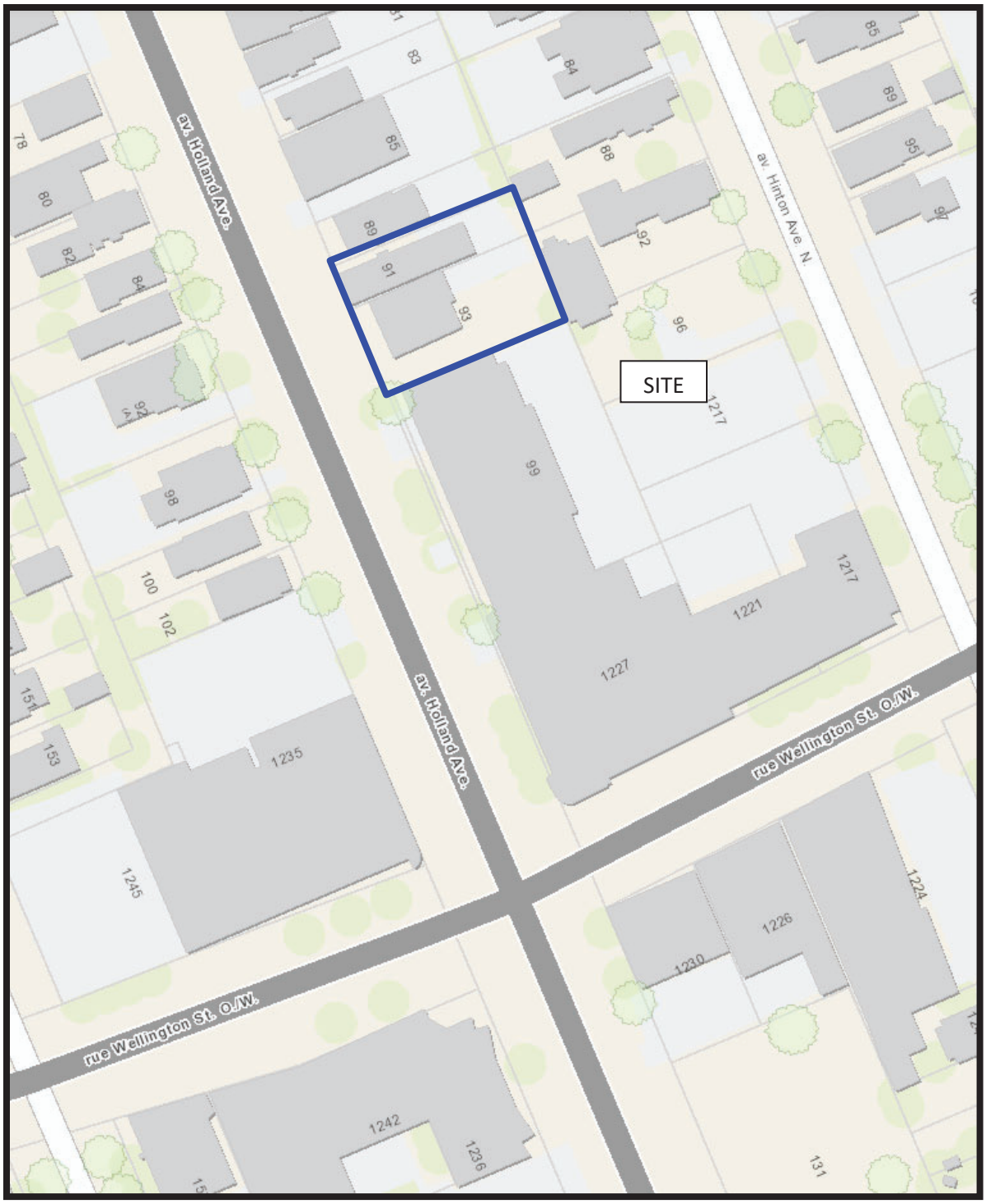
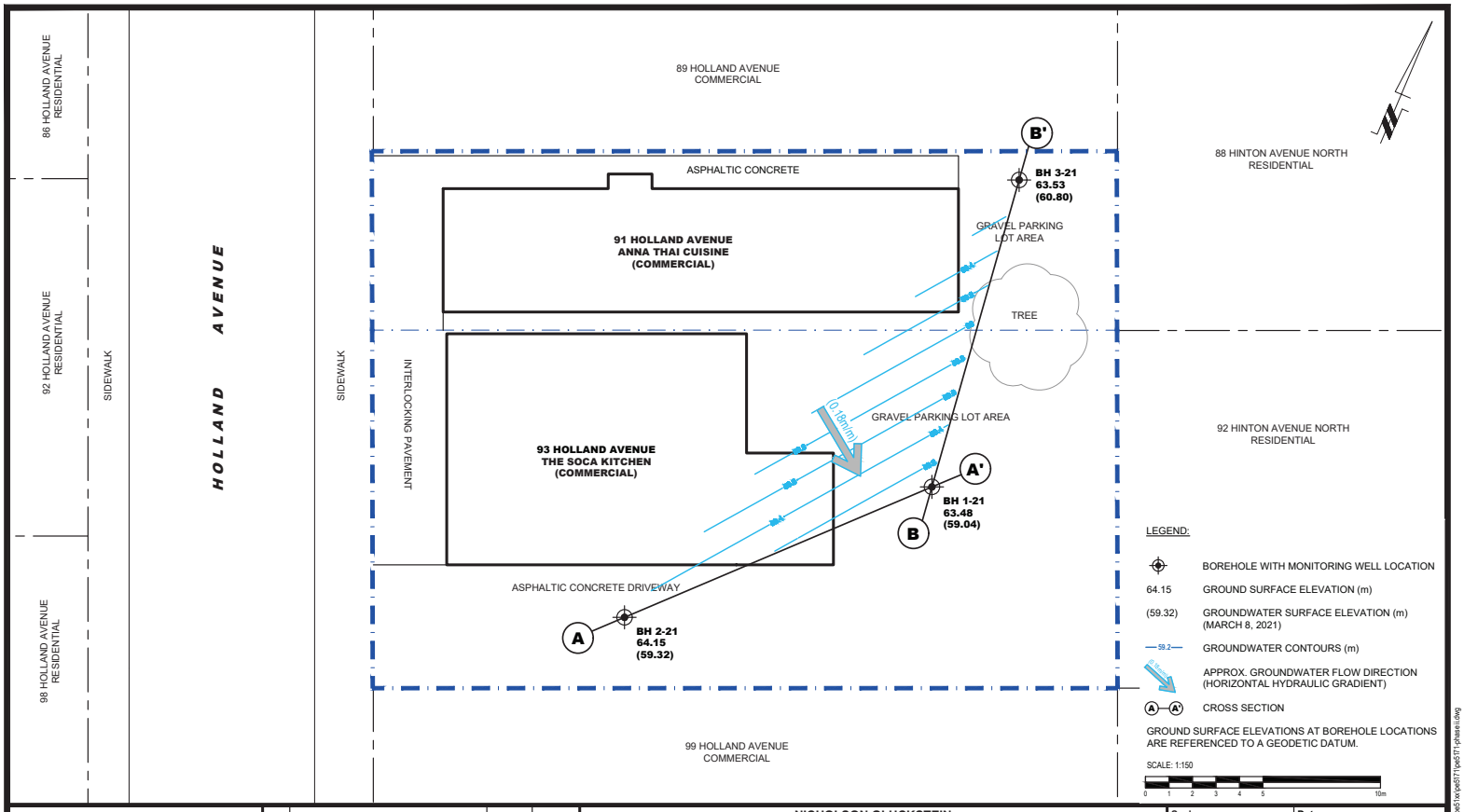


FIGURE 1

KEY PLAN



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NO.	REVISIONS	DATE	INITIAL

NICHOLSON GLUCKSTEIN

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
91 & 93 HOLLAND AVENUE
OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION

Scale: 1:150	Date: 04/2021
Drawn by: JM	Report No.: PE5171-2
Checked by: MSP	Dwg No.: PE5171-3
Approved by: KM	Revision No.:

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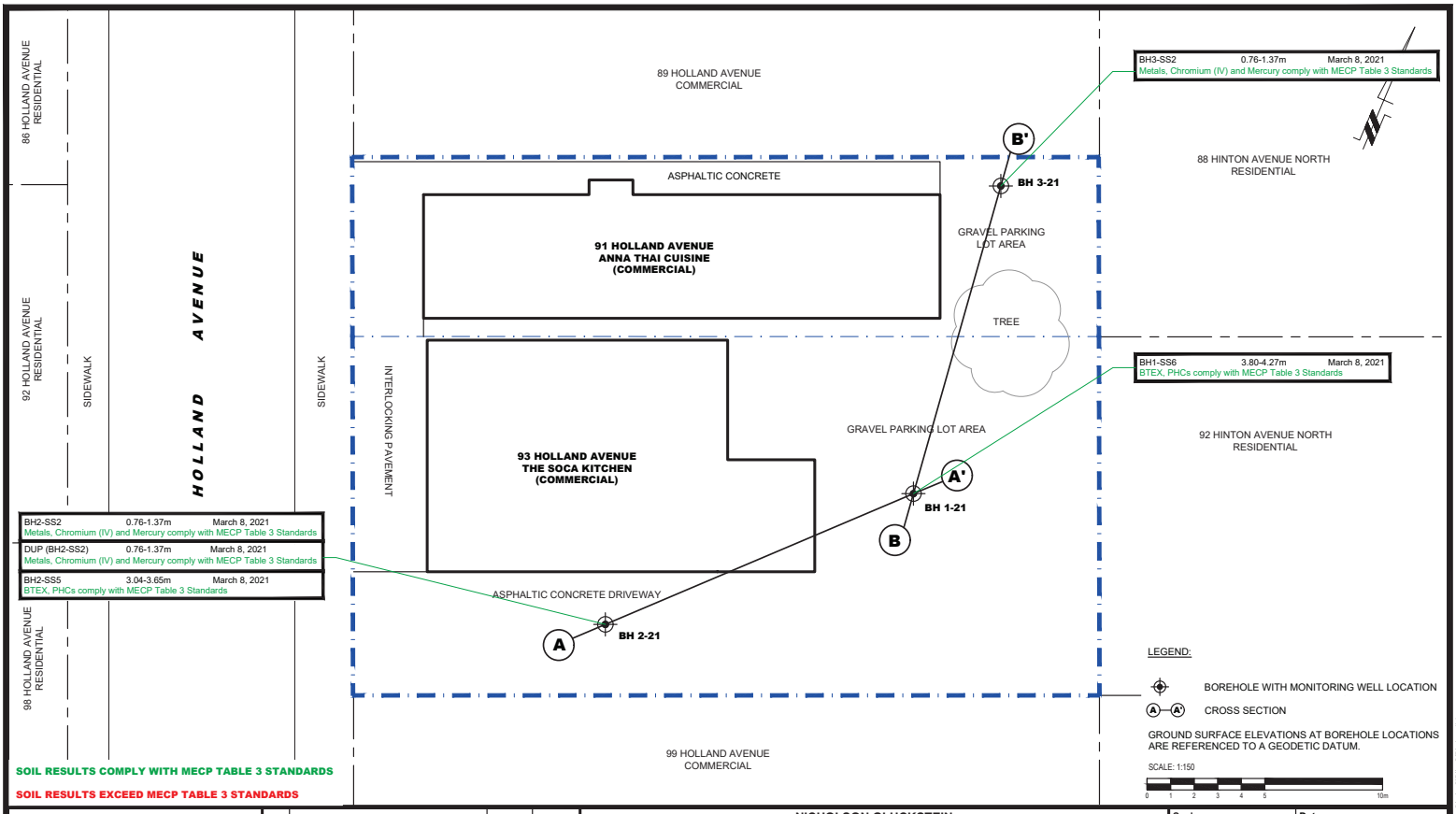

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - SOIL (BTEX, PHCs, METALS, CHROMIUM (IV) AND MERCURY)

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Drawn by: JM	Report No.: PE5171-2
Checked by: MSP	Dwg No.: PE5171-4
Approved by: KM	Revision No.:

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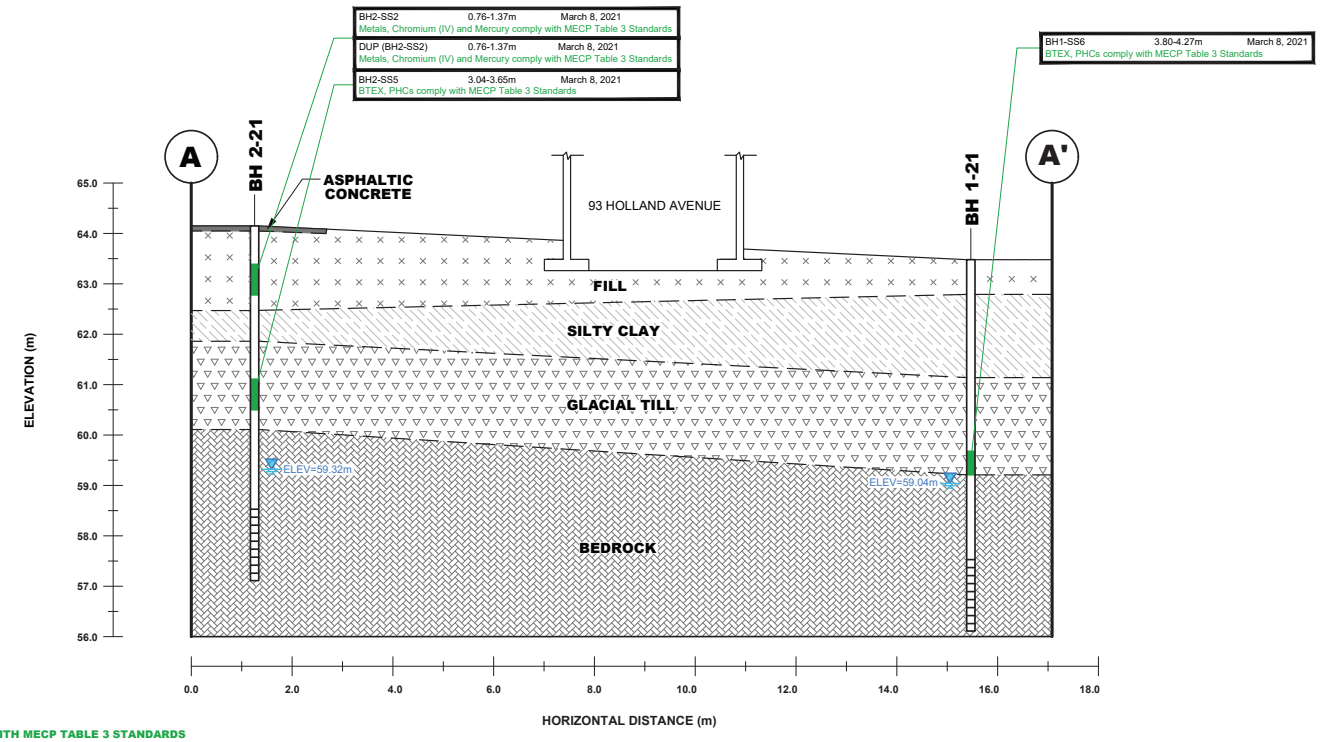

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91 & 93 HOLLAND AVENUE
OTTAWA, ONTARIO

Title:
CROSS SECTION A-A' - SOIL (BTEX, PHCs, METALS, CHROMIUM (IV) AND MERCURY)

Scale: AS SHOWN	Date: 04/2021
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Checked by: MSP	Dwg No.: PE5171-4A
Approved by: KM	Revision No.:

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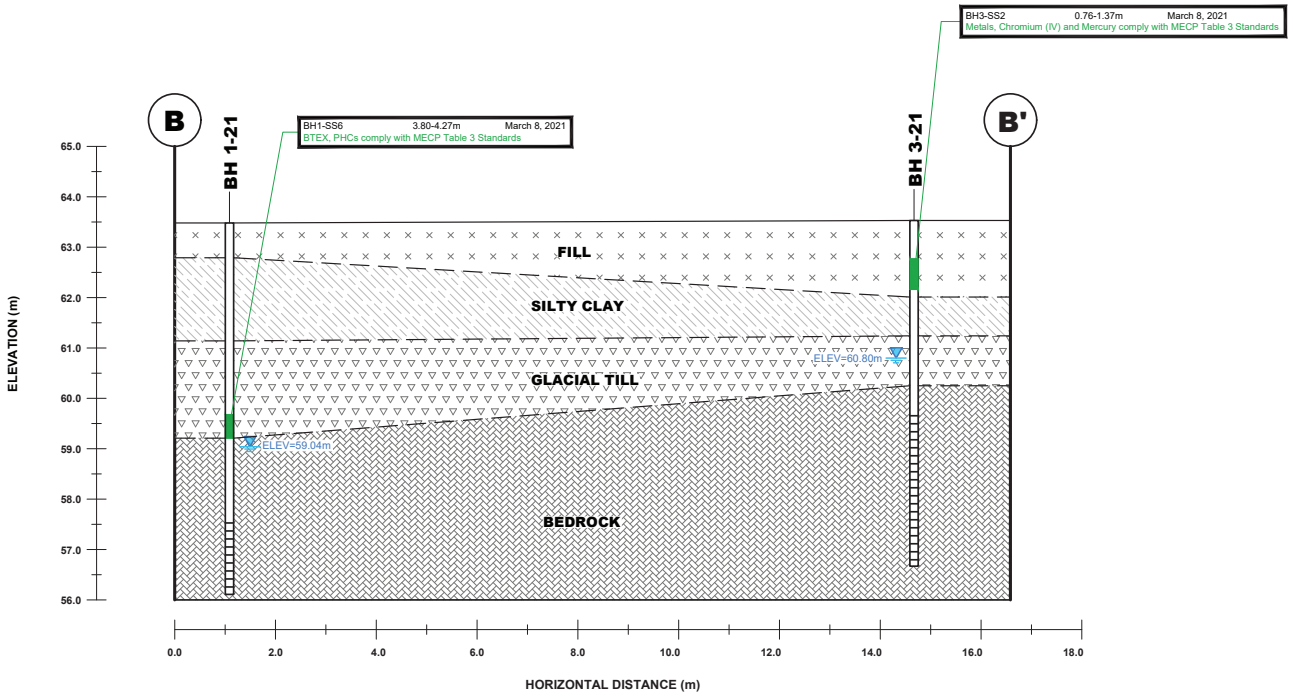

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
91 & 93 HOLLAND AVENUE

OTTAWA, ONTARIO

Title:
CROSS SECTION B-B' - SOIL (BTEX, PHCs, METALS, CHROMIUM (IV) AND MERCURY)

Scale: AS SHOWN	Date: 04/2021
Drawn by: YA	Report No.: PE5171-2
Checked by: MSP	Dwg No.: PE5171-4B
Approved by: KM	Revision No.:

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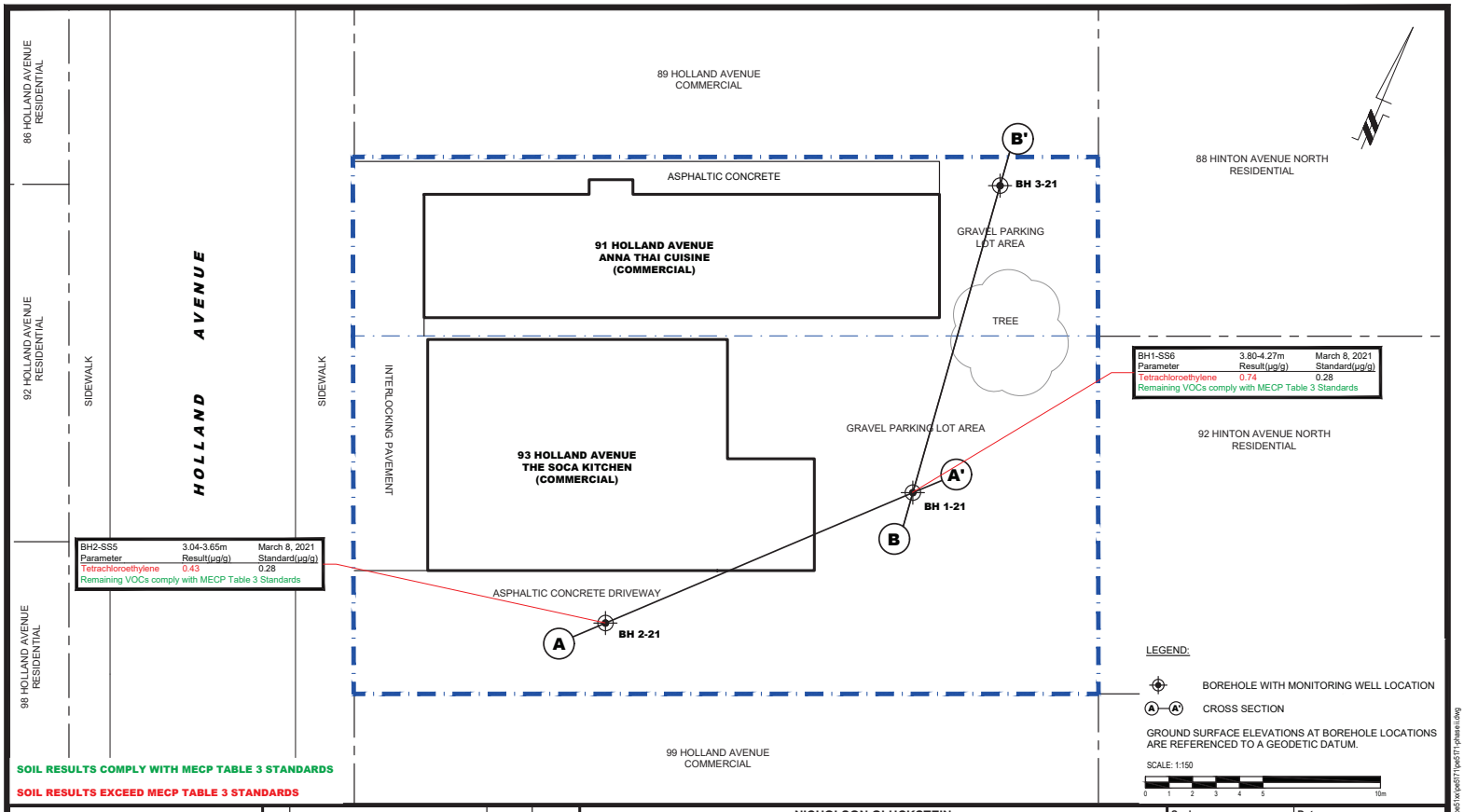

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
91 & 93 HOLLAND AVENUE
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - SOIL (VOCs)

Scale: 1:150	Date: 04/2021
Drawn by: JM	Report No.: PE5171-2
Checked by: MSP	Dwg No.: PE5171-5
Approved by: KM	Revision No.:

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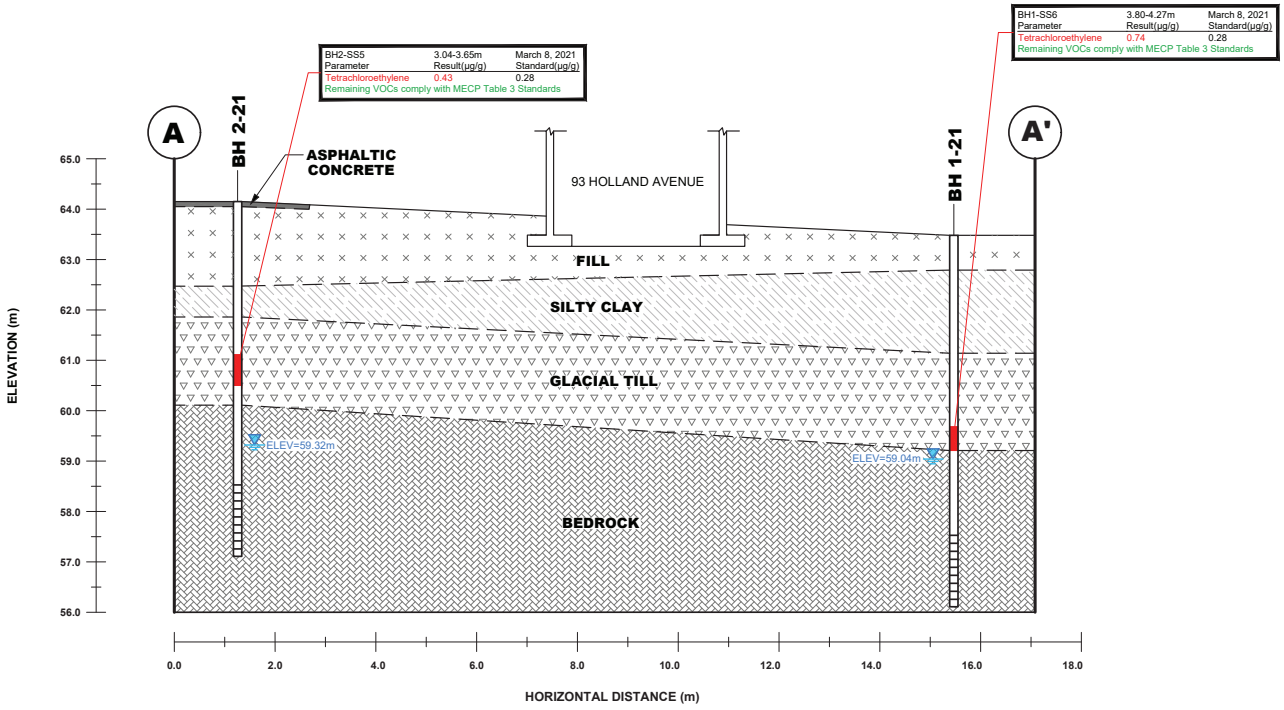

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
91 & 93 HOLLAND AVENUE

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (VOCs)

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Checked by: MSP	Dwg No.: PE5171-5A
Approved by: KM	Revision No.:

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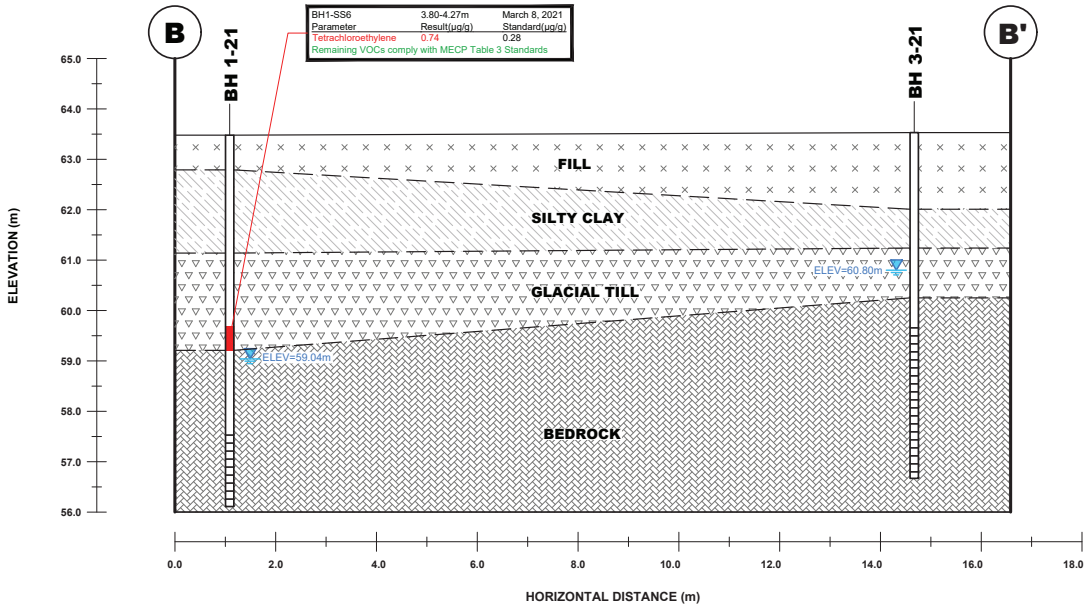

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OTTAWA, ONTARIO

Title:
CROSS SECTION B-B' - SOIL (VOCs)

Scale: AS SHOWN	Date: 04/2021
Drawn by: YA	Report No.: PE5171-2
Checked by: MSP	Dwg No.: PE5171-5B
Approved by: KM	Revision No.:

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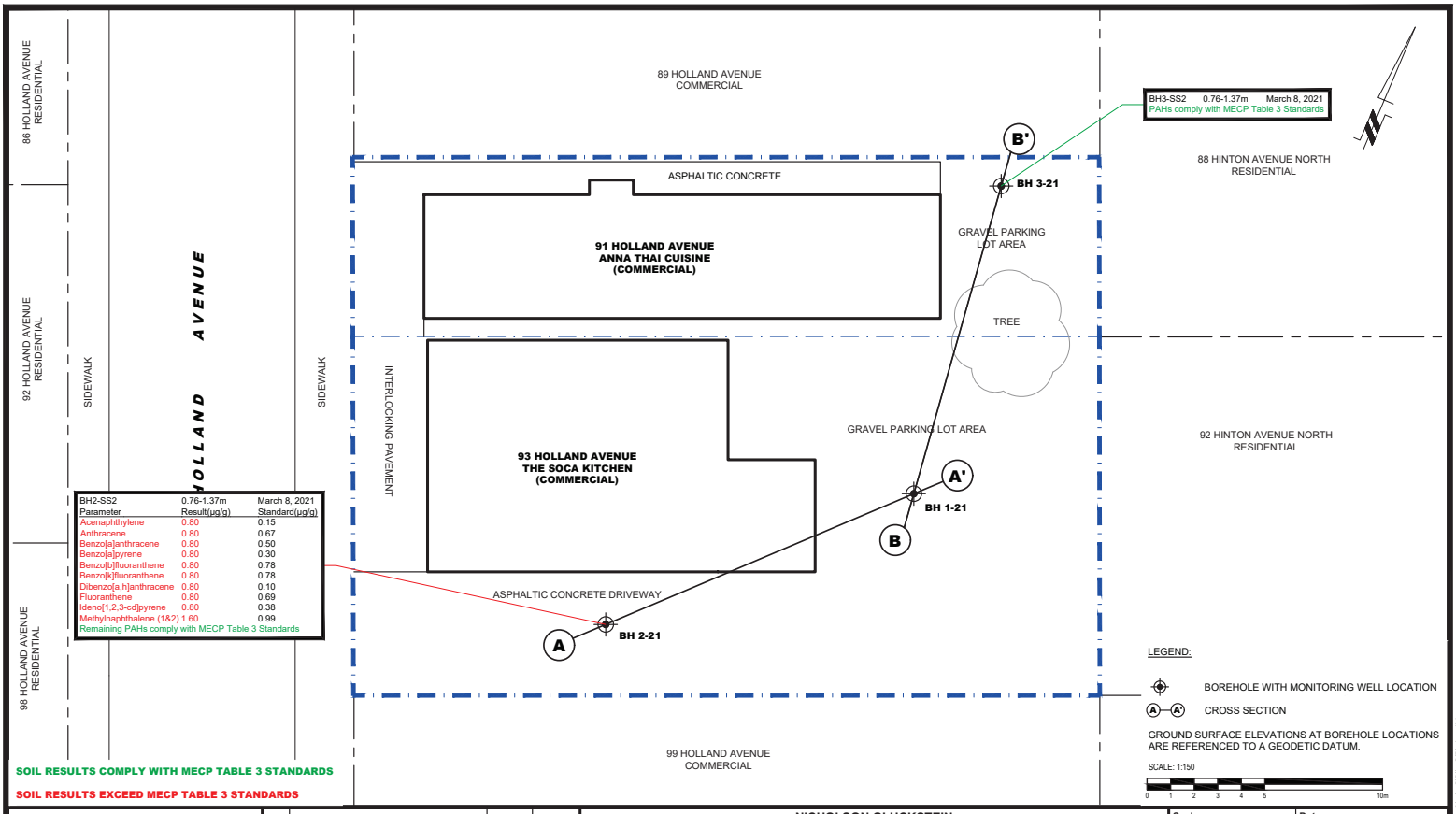

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
91 & 93 HOLLAND AVENUE
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - SOIL (PAHs)

Scale: 1:150	Date: 04/2021
Drawn by: JM	Report No.: PE5171-2
Checked by: MSP	Dwg No.: PE5171-6
Approved by: KM	Revision No.:

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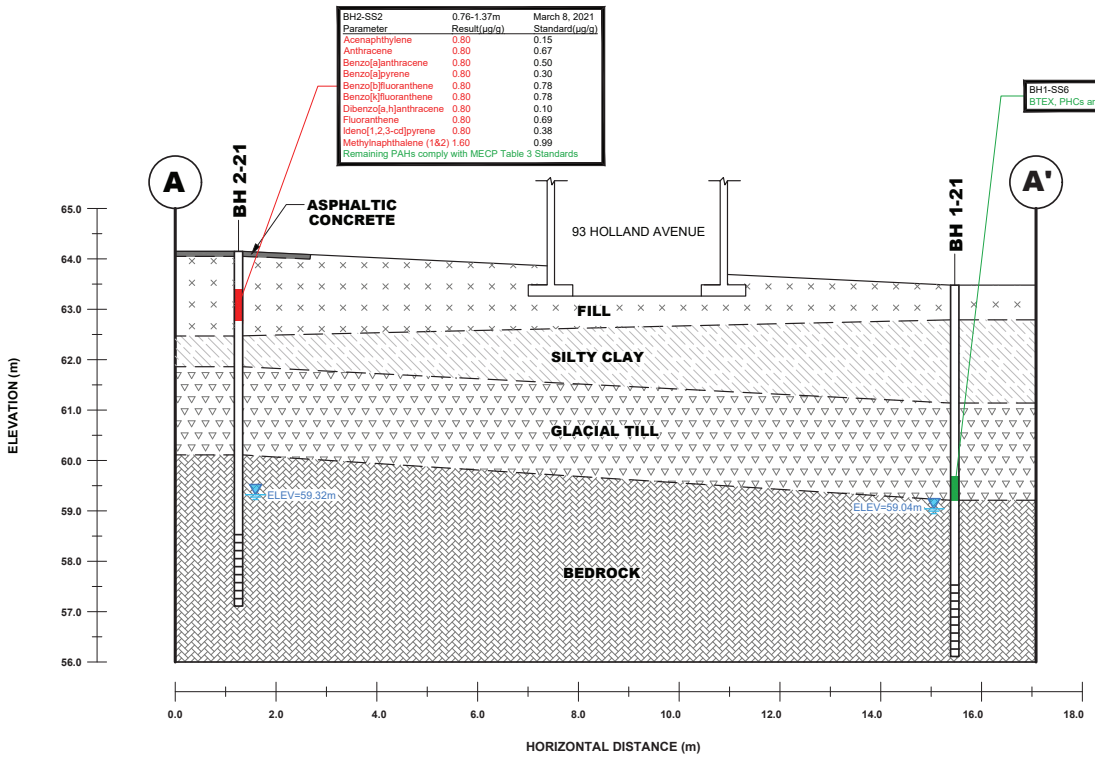

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91 & 93 HOLLAND AVENUE
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Title:
CROSS SECTION A-A' - SOIL (PAHs)

Scale: AS SHOWN	Date: 04/2021
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Approved by: KM	Revision No.:

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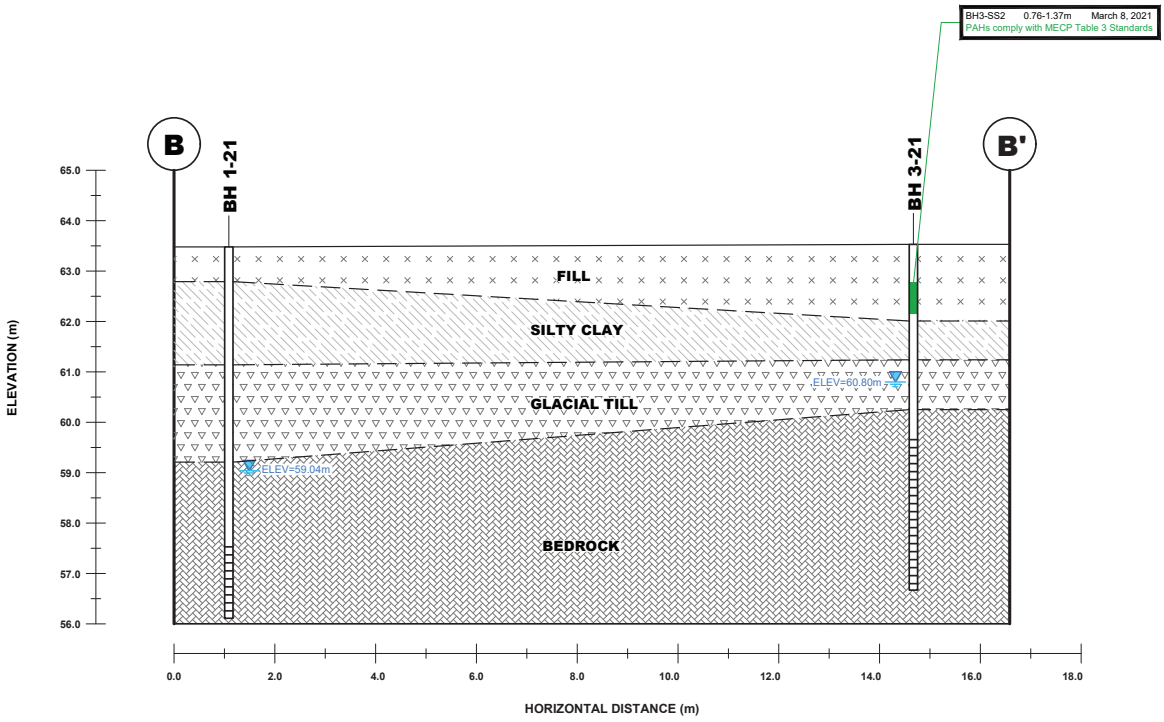

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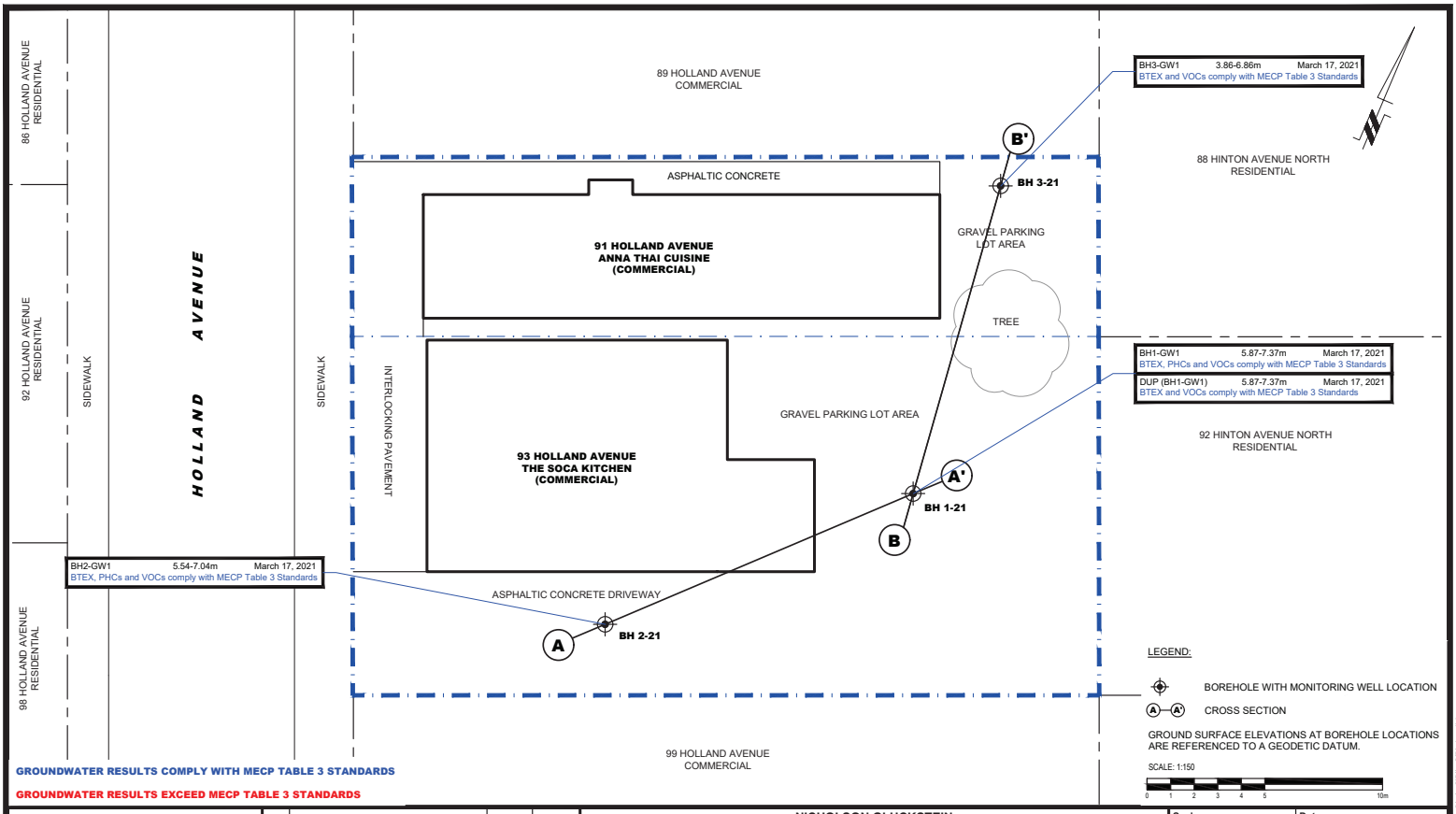

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
91 & 93 HOLLAND AVENUE

OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - GROUNDWATER (BTEX, PHCs, VOCs)

Scale: 1:150	Date: 04/2021
Drawn by: JM	Report No.: PE5171-2
Checked by: MSP	Dwg No.: PE5171-7
Approved by: KM	Revision No.:

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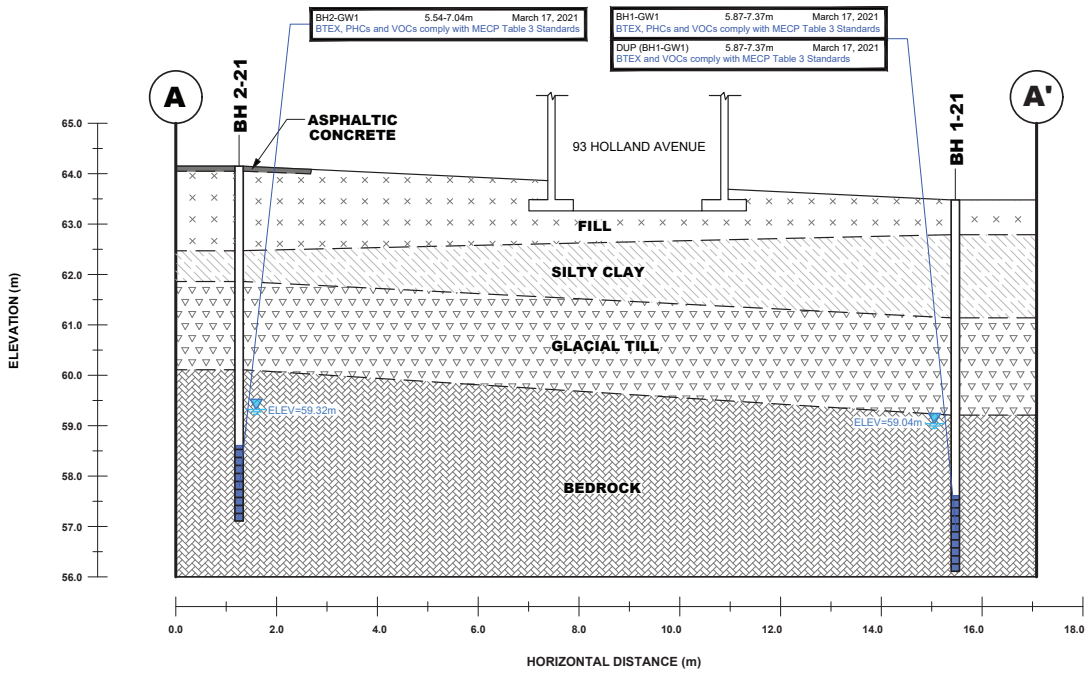

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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91 & 93 HOLLAND AVENUE

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Title:
CROSS SECTION A-A' - GROUNDWATER (BTEX, PHCs, VOCs)

Scale: AS SHOWN	Date: 04/2021
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Checked by: MSP	Dwg No.: PE5171-7A
Approved by: KM	Revision No.:

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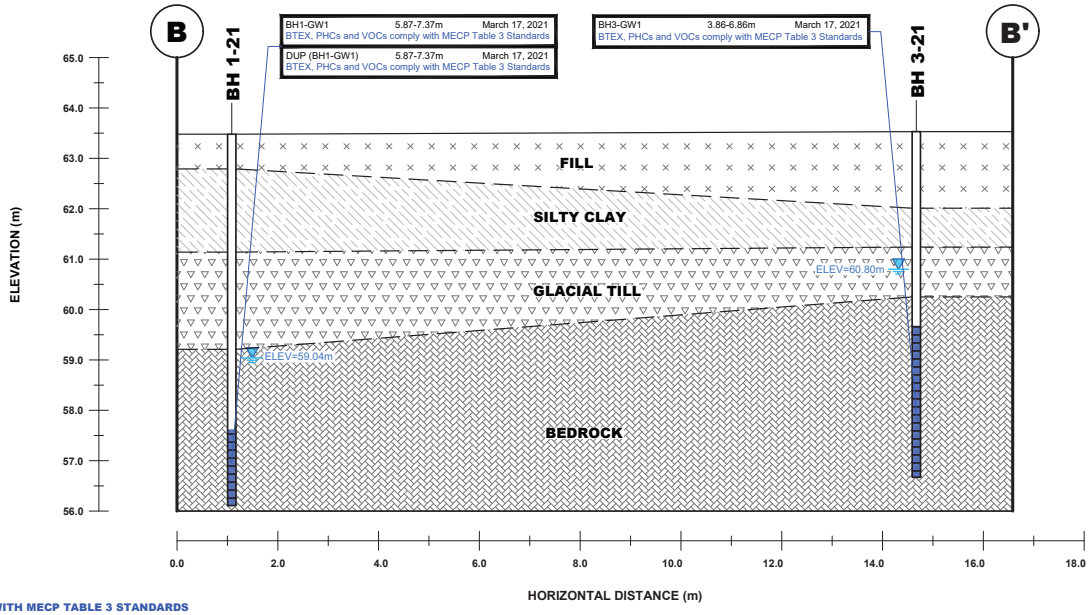

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CROSS SECTION B-B' - GROUNDWATER (BTEX, PHCs, VOCs)

Scale: AS SHOWN	Date: 04/2021
Drawn by: YA	Report No.: PE5171-2
Checked by: MSP	Dwg No.: PE5171-7B
Approved by: KM	Revision No.:

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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

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Sampling & Analysis Plan

Phase II Environmental Site Assessment
91 and 93 Holland Avenue
Ottawa, Ontario

Prepared For

Nicholson Gluckstein

April 2021

Report: PE5171-SAP

Table of Contents

1.0 SAMPLING PROGRAM

Paterson was engaged by Mr. Joe Tallis on behalf of Nicholson Gluckstein, to conduct a Phase II Environmental Site Assessment (ESA) for the property addressed 91 and 93 Holland Avenue, in the City of Ottawa, Ontario.

The Phase II ESA was carried out to address the areas of potential environmental concern on the Phase II Property. The following subsurface investigation program was developed. A Geotechnical Investigation was conducted concurrently with the environmental subsurface investigation.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1	Place on southeast portion of property to assess the quality of imported fill material and off-site historical retail fuel outlet and drycleaners.	Borehole advanced into the groundwater table to facilitate installation of groundwater monitoring wells. Bedrock will be cored if required.
BH2	Place on southwest portion of property to assess the quality of imported fill material and off-site historical retail fuel outlet and drycleaners.	Borehole advanced into the groundwater table to facilitate installation of groundwater monitoring wells. Bedrock will be cored if required.
BH3	Place on northeast portion of property to assess the quality of imported fill material	Borehole advanced into the groundwater table to facilitate installation of groundwater monitoring wells. Bedrock will be cored if required.

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

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

2.0 ANALYTICAL TESTING PROGRAM

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

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

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

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

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

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. Boreholes were located and surveyed in the field by Paterson.

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 MECP 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 II Environmental Site Assessment
91 and 93 Holland Avenue
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5171

REMARKS

HOLE NO. BH 1-21

BORINGS BY CME 55 Power Auger **DATE** March 8, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	63.48
FILL: Brown silty sand with gravel, some topsoil		AU	1				
0.69						1	62.48
Very stiff to stiff, brown **SILTY CLAY**		SS	2	75	11		
		SS	3	67	9	2	61.48
2.34							
		SS	4	50	73	3	60.48
GLACIAL TILL: Very dense, brown silty sand with gravel, cobbles and boulders		SS	5	33	62		
		SS	6	33	+50	4	59.48
4.27							
BEDROCK: Excellent to fair quality, grey limestone		RC	1	100	92	5	58.48
- vertical seams from 6.1 to 6.4m and 6.7 to 7.4m depths		RC	2	100	57	6	57.48
						7	56.48
7.37							
End of Borehole							
(GWL @ 4.44m - March 17, 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
91 and 93 Holland Avenue
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5171

REMARKS

HOLE NO. BH 2-21

BORINGS BY CME 55 Power Auger **DATE** March 8, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic Concrete 0.05						0	64.15
FILL: Brown silty sand with crushed stone trace clay 0.69		AU	1				
FILL: Brown silty sand with gravel, coal fragments and traces of mortar 1.68		SS	2	33	45	1	63.15
Very stiff, brown **SILTY CLAY** 2.29		SS	3	50	17	2	62.15
GLACIAL TILL: Compact brown silty sand with gravel, cobbles and boulders		SS	4	17	20	3	61.15
		SS	5	13	+50		
- cored boulder from 3.68 to 4.04m 4.04						4	60.15
		RC	1	100	88		
BEDROCK: Good to excellent quality, grey limestone						5	59.15
		RC	2	100	100	6	58.15
7.04						7	57.15
End of Borehole							
(GWL @ 4.83m - March 17, 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
91 and 93 Holland Avenue
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME 55 Power Auger **DATE** March 8, 2021

FILE NO. PE5171

HOLE NO. BH 3-21

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	63.53
FILL: Brown silty sand with crushed stone, topsoil and organics (0.05)		AU	1				
FILL: Brown silty sand trace topsoil and organics		SS	2	33	10	1	62.53
(1.52) Very stiff, brown **SILTY CLAY**		SS	3	50	13	2	61.53
(2.29) **GLACIAL TILL:** Very dense, brown silty sand with gravel, cobbles and boulders		SS	4	33	76		
(3.28)		SS	5	87	+50	3	60.53
		RC	1	100	70	4	59.53
BEDROCK: Good to excellent quality, grey limestone						5	58.53
		RC	2	100	98	6	57.53
(6.86) End of Borehole							
(GWL @ 2.73m - March 17, 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

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

WC%	-	Natural water content or water content of sample, %
LL	-	Liquid Limit, % (water content above which soil behaves as a liquid)
PL	-	Plastic Limit, % (water content above which soil behaves plastically)
PI	-	Plasticity Index, % (difference between LL and PL)
Dxx	-	Grain size at which xx% of the soil, by weight, is of finer grain sizes These grain size descriptions are not used below 0.075 mm grain size
D10	-	Grain size at which 10% of the soil is finer (effective grain size)
D60	-	Grain size at which 60% of the soil is finer
Cc	-	Concavity coefficient = $(D30)^2 / (D10 \times D60)$
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

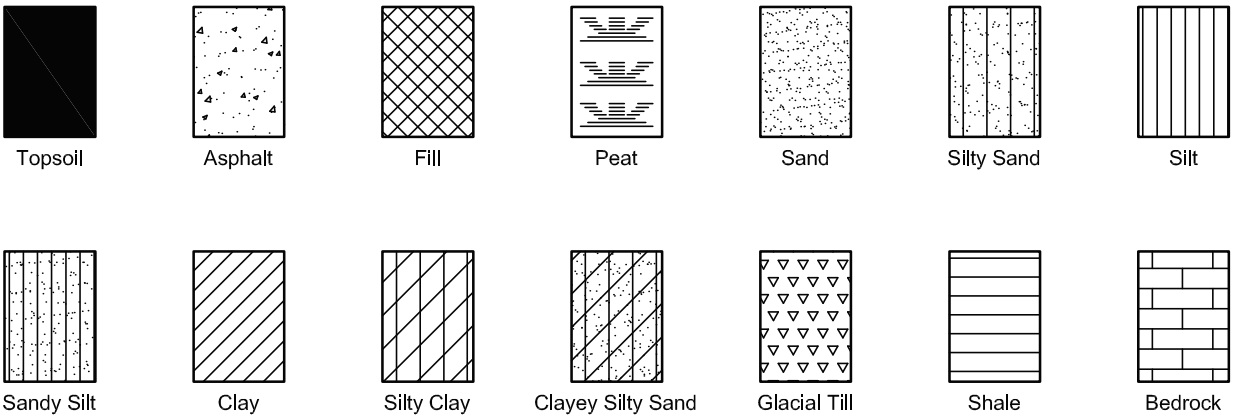
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

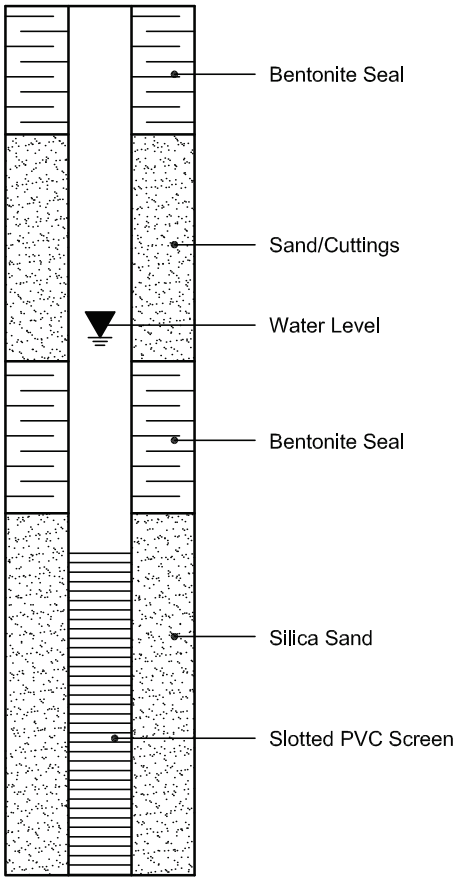
SYMBOLS AND TERMS (continued)

STRATA PLOT

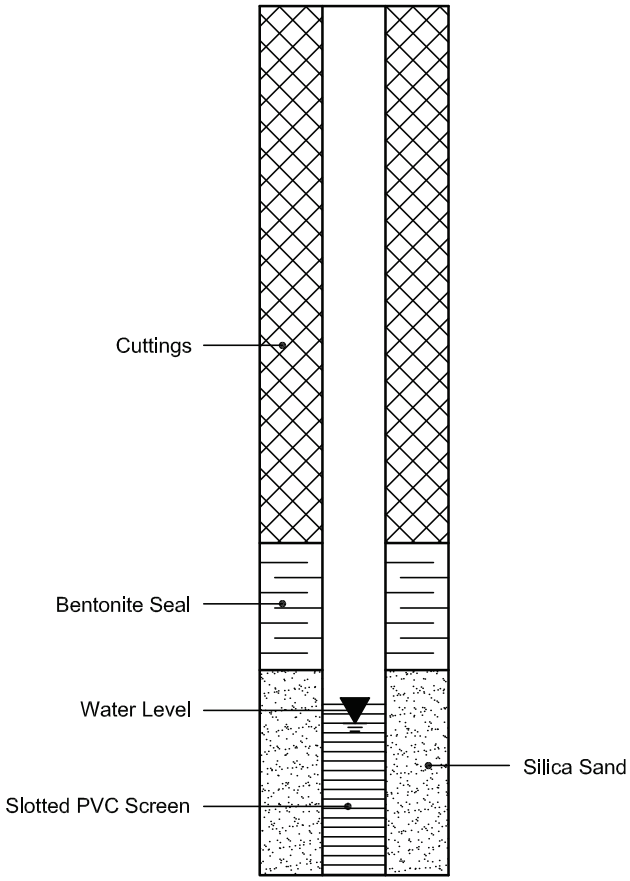


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Karyn Munch

Client PO: 31975
Project: PE5171
Custody: 59315

Report Date: 15-Mar-2021
Order Date: 10-Mar-2021

Order #: 2111395

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

Paracel ID	Client ID
2111395-01	BH1-SS6
2111395-02	BH2-SS2
2111395-03	BH2-SS5
2111395-04	BH3-SS2
2111395-05	DUP

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 15-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 10-Mar-2021

Client PO: 31975

Project Description: PE5171

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	11-Mar-21	12-Mar-21
Mercury by CVAA	EPA 7471B - CVAA, digestion	12-Mar-21	12-Mar-21
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	10-Mar-21	11-Mar-21
PHC F1	CWS Tier 1 - P&T GC-FID	11-Mar-21	11-Mar-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	11-Mar-21	11-Mar-21
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	12-Mar-21	12-Mar-21
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	11-Mar-21	12-Mar-21
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	11-Mar-21	11-Mar-21
Solids, %	Gravimetric, calculation	11-Mar-21	11-Mar-21

Certificate of Analysis

Report Date: 15-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 10-Mar-2021

Client PO: 31975

Project Description: PE5171

	Client ID:	BH1-SS6	BH2-SS2	BH2-SS5	BH3-SS2
	Sample Date:	08-Mar-21 09:00	08-Mar-21 09:00	08-Mar-21 09:00	08-Mar-21 09:00
	Sample ID:	2111395-01	2111395-02	2111395-03	2111395-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	94.4	86.3	93.6	88.2
Metals					
Antimony	1.0 ug/g dry	-	<1.0	-	2.4
Arsenic	1.0 ug/g dry	-	4.0	-	7.8
Barium	1.0 ug/g dry	-	213	-	175
Beryllium	0.5 ug/g dry	-	0.6	-	0.7
Boron	5.0 ug/g dry	-	18.5	-	13.8
Cadmium	0.5 ug/g dry	-	<0.5	-	0.5
Chromium	5.0 ug/g dry	-	75.1	-	31.3
Chromium (VI)	0.2 ug/g dry	-	<0.2	-	<0.2
Cobalt	1.0 ug/g dry	-	10.4	-	11.3
Copper	5.0 ug/g dry	-	18.4	-	39.8
Lead	1.0 ug/g dry	-	35.2	-	69.8
Mercury	0.1 ug/g dry	-	<0.1	-	0.1
Molybdenum	1.0 ug/g dry	-	1.2	-	1.6
Nickel	5.0 ug/g dry	-	31.7	-	22.4
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	-	36.6	-	49.0
Zinc	20.0 ug/g dry	-	54.8	-	158
Volatiles					
Acetone	0.50 ug/g dry	<0.50	-	<0.50	-
Benzene	0.02 ug/g dry	<0.02	-	<0.02	-
Bromodichloromethane	0.05 ug/g dry	<0.05	-	<0.05	-
Bromoform	0.05 ug/g dry	<0.05	-	<0.05	-
Bromomethane	0.05 ug/g dry	<0.05	-	<0.05	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	-	<0.05	-
Chlorobenzene	0.05 ug/g dry	<0.05	-	<0.05	-
Chloroform	0.05 ug/g dry	<0.05	-	<0.05	-
Dibromochloromethane	0.05 ug/g dry	<0.05	-	<0.05	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	-	<0.05	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	-	<0.05	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	-	<0.05	-

Certificate of Analysis

Report Date: 15-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 10-Mar-2021

Client PO: 31975

Project Description: PE5171

	Client ID:	BH1-SS6	BH2-SS2	BH2-SS5	BH3-SS2
	Sample Date:	08-Mar-21 09:00	08-Mar-21 09:00	08-Mar-21 09:00	08-Mar-21 09:00
	Sample ID:	2111395-01	2111395-02	2111395-03	2111395-04
	MDL/Units	Soil	Soil	Soil	Soil
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	-	<0.05	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	-	<0.05	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	-	<0.05	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	-	<0.05	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	<0.05	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	<0.05	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	-	<0.05	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	<0.05	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	<0.05	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	-	<0.05	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	<0.05	-
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	<0.05	-	<0.05	-
Hexane	0.05 ug/g dry	<0.05	-	<0.05	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	-	<0.50	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	-	<0.50	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	-	<0.05	-
Methylene Chloride	0.05 ug/g dry	<0.05	-	<0.05	-
Styrene	0.05 ug/g dry	<0.05	-	<0.05	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	<0.05	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	<0.05	-
Tetrachloroethylene	0.05 ug/g dry	0.74	-	0.43	-
Toluene	0.05 ug/g dry	<0.05	-	<0.05	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	-	<0.05	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	-	<0.05	-
Trichloroethylene	0.05 ug/g dry	<0.05	-	<0.05	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	-	<0.05	-
Vinyl chloride	0.02 ug/g dry	<0.02	-	<0.02	-
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	-
4-Bromofluorobenzene	Surrogate	102%	-	103%	-
Dibromofluoromethane	Surrogate	88.6%	-	89.9%	-
Toluene-d8	Surrogate	118%	-	118%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	<4	-

Certificate of Analysis

Report Date: 15-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 10-Mar-2021

Client PO: 31975

Project Description: PE5171

	Client ID:	BH1-SS6	BH2-SS2	BH2-SS5	BH3-SS2
	Sample Date:	08-Mar-21 09:00	08-Mar-21 09:00	08-Mar-21 09:00	08-Mar-21 09:00
	Sample ID:	2111395-01	2111395-02	2111395-03	2111395-04
	MDL/Units	Soil	Soil	Soil	Soil
F3 PHCs (C16-C34)	8 ug/g dry	<8	-	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	<6	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	<0.80 [1]	-	0.03
Acenaphthylene	0.02 ug/g dry	-	<0.80 [1]	-	0.07
Anthracene	0.02 ug/g dry	-	<0.80 [1]	-	0.12
Benzo [a] anthracene	0.02 ug/g dry	-	<0.80 [1]	-	0.25
Benzo [a] pyrene	0.02 ug/g dry	-	<0.80 [1]	-	0.29
Benzo [b] fluoranthene	0.02 ug/g dry	-	<0.80 [1]	-	0.26
Benzo [g,h,i] perylene	0.02 ug/g dry	-	<0.80 [1]	-	0.19
Benzo [k] fluoranthene	0.02 ug/g dry	-	<0.80 [1]	-	0.14
Chrysene	0.02 ug/g dry	-	<0.80 [1]	-	0.24
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	<0.80 [1]	-	0.04
Fluoranthene	0.02 ug/g dry	-	<0.80 [1]	-	0.53
Fluorene	0.02 ug/g dry	-	<0.80 [1]	-	0.03
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	<0.80 [1]	-	0.15
1-Methylnaphthalene	0.02 ug/g dry	-	<0.80 [1]	-	0.04
2-Methylnaphthalene	0.02 ug/g dry	-	<0.80 [1]	-	0.05
Methylnaphthalene (1&2)	0.04 ug/g dry	-	<1.60 [1]	-	0.10
Naphthalene	0.01 ug/g dry	-	<0.40 [1]	-	0.06
Phenanthrene	0.02 ug/g dry	-	<0.80 [1]	-	0.42
Pyrene	0.02 ug/g dry	-	<0.80 [1]	-	0.58
2-Fluorobiphenyl	Surrogate	-	72.3%	-	62.9%
Terphenyl-d14	Surrogate	-	89.0%	-	90.6%

Certificate of Analysis

Report Date: 15-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 10-Mar-2021

Client PO: 31975

Project Description: PE5171

	Client ID:	DUP	-	-	-
	Sample Date:	08-Mar-21 09:00	-	-	-
	Sample ID:	2111395-05	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	88.2	-	-	-
General Inorganics					
pH	0.05 pH Units	9.70	-	-	-
Metals					
Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	3.6	-	-	-
Barium	1.0 ug/g dry	194	-	-	-
Beryllium	0.5 ug/g dry	0.6	-	-	-
Boron	5.0 ug/g dry	25.7	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	5.0 ug/g dry	79.2	-	-	-
Cobalt	1.0 ug/g dry	10.3	-	-	-
Copper	5.0 ug/g dry	16.7	-	-	-
Lead	1.0 ug/g dry	30.3	-	-	-
Molybdenum	1.0 ug/g dry	1.1	-	-	-
Nickel	5.0 ug/g dry	30.7	-	-	-
Selenium	1.0 ug/g dry	<1.0	-	-	-
Silver	0.3 ug/g dry	<0.3	-	-	-
Thallium	1.0 ug/g dry	<1.0	-	-	-
Uranium	1.0 ug/g dry	<1.0	-	-	-
Vanadium	10.0 ug/g dry	36.4	-	-	-
Zinc	20.0 ug/g dry	50.3	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	*1.02*		*ug/g*		*76.7*	*50-140*			
Surrogate: Terphenyl-d14	*1.52*		*ug/g*		*114*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*9.07*		*ug/g*		*113*	*50-140*			
Surrogate: Dibromofluoromethane	*7.59*		*ug/g*		*94.9*	*50-140*			
Surrogate: Toluene-d8	*9.35*		*ug/g*		*117*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	7.00	0.05	pH Units	6.99			0.1	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	221	7	ug/g dry	289			26.4	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	2.9	1.0	ug/g dry	1.6			NC	30	
Arsenic	20.7	1.0	ug/g dry	16.1			24.9	30	
Barium	133	1.0	ug/g dry	102			26.3	30	
Beryllium	0.6	0.5	ug/g dry	0.5			9.5	30	
Boron	6.0	5.0	ug/g dry	5.1			17.2	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	23.4	5.0	ug/g dry	20.6			12.5	30	
Cobalt	7.8	1.0	ug/g dry	6.6			17.7	30	
Copper	32.8	5.0	ug/g dry	29.0			12.3	30	
Mercury	0.141	0.1	ug/g dry	0.129			9.0	30	
Molybdenum	2.3	1.0	ug/g dry	1.6			NC	30	
Nickel	18.5	5.0	ug/g dry	16.1			13.7	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	1.1	1.0	ug/g dry	ND			NC	30	
Vanadium	37.7	10.0	ug/g dry	33.4			12.1	30	
Zinc	109	20.0	ug/g dry	94.1			14.4	30	
Physical Characteristics									
% Solids	88.4	0.1	% by Wt.	91.1			3.1	25	
Semi-Volatiles									
Acenaphthene	0.104	0.02	ug/g dry	0.051			68.8	40	QR-04
Acenaphthylene	0.136	0.02	ug/g dry	0.140			2.7	40	
Anthracene	0.272	0.02	ug/g dry	0.197			32.0	40	
Benzo [a] anthracene	0.743	0.02	ug/g dry	0.761			2.5	40	
Benzo [a] pyrene	0.693	0.02	ug/g dry	0.708			2.1	40	
Benzo [b] fluoranthene	0.355	0.02	ug/g dry	0.440			21.4	40	
Benzo [g,h,i] perylene	0.373	0.02	ug/g dry	0.389			4.3	40	
Benzo [k] fluoranthene	0.194	0.02	ug/g dry	0.241			21.6	40	
Chrysene	0.836	0.02	ug/g dry	0.570			37.9	40	
Dibenzo [a,h] anthracene	0.110	0.02	ug/g dry	0.118			7.0	40	
Fluoranthene	1.65	0.02	ug/g dry	1.51			9.1	40	
Fluorene	0.136	0.02	ug/g dry	0.069			65.8	40	QR-04
Indeno [1,2,3-cd] pyrene	0.365	0.02	ug/g dry	0.390			6.6	40	
1-Methylnaphthalene	0.075	0.02	ug/g dry	0.029			88.5	40	QR-04
2-Methylnaphthalene	0.083	0.02	ug/g dry	0.037			77.7	40	QR-04
Naphthalene	0.243	0.01	ug/g dry	0.077			104.0	40	QR-04
Phenanthrene	1.52	0.02	ug/g dry	0.894			52.1	40	QR-04
Pyrene	1.28	0.02	ug/g dry	1.20			6.6	40	
Surrogate: 2-Fluorobiphenyl	*1.14*		*ug/g dry*		*78.1*	*50-140*			
Surrogate: Terphenyl-d14	*1.44*		*ug/g dry*		*98.3*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	0.156	0.02	ug/g dry	0.163			4.5	50	
Bromodichloromethane	ND	0.05	ug/g dry	ND			NC	50	
Bromoform	ND	0.05	ug/g dry	ND			NC	50	
Bromomethane	ND	0.05	ug/g dry	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Carbon Tetrachloride	ND	0.05	ug/g dry	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
Chloroform	ND	0.05	ug/g dry	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g dry	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
Ethylbenzene	2.89	0.05	ug/g dry	3.21			10.4	50	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g dry	ND			NC	50	
Hexane	ND	0.05	ug/g dry	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g dry	ND			NC	50	
Styrene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	4.13	0.05	ug/g dry	4.27			3.2	50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND			NC	50	
Vinyl chloride	ND	0.02	ug/g dry	ND			NC	50	
m,p-Xylenes	8.92	0.05	ug/g dry	10.0			11.6	50	
o-Xylene	4.49	0.05	ug/g dry	5.16			13.8	50	
Surrogate: 4-Bromofluorobenzene	*8.95*		*ug/g dry*		*104*	*50-140*			
Surrogate: Dibromofluoromethane	*7.53*		*ug/g dry*		*87.4*	*50-140*			
Surrogate: Toluene-d8	*10.3*		*ug/g dry*		*119*	*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)	205	7	ug/g	ND	103	80-120			
F2 PHCs (C10-C16)	72	4	ug/g	ND	80.6	60-140			
F3 PHCs (C16-C34)	233	8	ug/g	ND	107	60-140			
F4 PHCs (C34-C50)	147	6	ug/g	ND	106	60-140			
Metals									
Antimony	43.7	1.0	ug/g	ND	86.2	70-130			
Arsenic	55.0	1.0	ug/g	6.5	97.2	70-130			
Barium	96.4	1.0	ug/g	40.9	111	70-130			
Beryllium	51.7	0.5	ug/g	ND	103	70-130			
Boron	48.6	5.0	ug/g	ND	93.2	70-130			
Cadmium	47.6	0.5	ug/g	ND	95.0	70-130			
Chromium (VI)	5.0	0.2	ug/g	ND	100	70-130			
Chromium	60.8	5.0	ug/g	8.3	105	70-130			
Cobalt	53.3	1.0	ug/g	2.6	101	70-130			
Copper	60.2	5.0	ug/g	11.6	97.3	70-130			
Lead	46.2	1.0	ug/g	ND	92.4	70-130			
Mercury	1.64	0.1	ug/g	0.129	101	70-130			
Molybdenum	51.7	1.0	ug/g	ND	102	70-130			
Nickel	55.5	5.0	ug/g	6.5	98.1	70-130			
Selenium	46.3	1.0	ug/g	ND	92.0	70-130			
Silver	44.0	0.3	ug/g	ND	87.9	70-130			
Thallium	46.4	1.0	ug/g	ND	92.6	70-130			
Uranium	48.3	1.0	ug/g	ND	96.0	70-130			
Vanadium	66.7	10.0	ug/g	13.3	107	70-130			
Zinc	84.9	20.0	ug/g	37.6	94.6	70-130			
Semi-Volatiles									
Acenaphthene	0.223	0.02	ug/g	0.051	94.3	50-140			
Acenaphthylene	0.272	0.02	ug/g	0.140	72.5	50-140			
Anthracene	0.340	0.02	ug/g	0.197	78.3	50-140			
Benzo [a] anthracene	0.130	0.02	ug/g	ND	78.2	50-140			
Benzo [a] pyrene	0.133	0.02	ug/g	ND	79.8	50-140			
Benzo [b] fluoranthene	0.565	0.02	ug/g	0.440	68.3	50-140			
Benzo [g,h,i] perylene	0.485	0.02	ug/g	0.389	52.5	50-140			
Benzo [k] fluoranthene	0.373	0.02	ug/g	0.241	72.0	50-140			
Chrysene	0.160	0.02	ug/g	ND	95.9	50-140			
Dibenzo [a,h] anthracene	0.276	0.02	ug/g	0.118	86.3	50-140			
Fluoranthene	0.138	0.02	ug/g	ND	82.8	50-140			
Fluorene	0.231	0.02	ug/g	0.069	88.4	50-140			
Indeno [1,2,3-cd] pyrene	0.498	0.02	ug/g	0.390	59.2	50-140			
1-Methylnaphthalene	0.218	0.02	ug/g	0.029	103	50-140			
2-Methylnaphthalene	0.247	0.02	ug/g	0.037	115	50-140			
Naphthalene	0.331	0.01	ug/g	0.077	139	50-140			
Phenanthrene	1.05	0.02	ug/g	0.894	83.9	50-140			
Pyrene	0.138	0.02	ug/g	ND	83.0	50-140			
Surrogate: 2-Fluorobiphenyl	*1.07*		*ug/g*		*73.0*	*50-140*			
Surrogate: Terphenyl-d14	*1.34*		*ug/g*		*91.9*	*50-140*			
Volatiles									
Acetone	12.3	0.50	ug/g	ND	123	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzene	4.14	0.02	ug/g	ND	104	60-130			
Bromodichloromethane	3.79	0.05	ug/g	ND	94.9	60-130			
Bromoform	5.19	0.05	ug/g	ND	130	60-130			
Bromomethane	4.04	0.05	ug/g	ND	101	50-140			
Carbon Tetrachloride	4.16	0.05	ug/g	ND	104	60-130			
Chlorobenzene	4.11	0.05	ug/g	ND	103	60-130			
Chloroform	3.86	0.05	ug/g	ND	96.5	60-130			
Dibromochloromethane	4.35	0.05	ug/g	ND	109	60-130			
Dichlorodifluoromethane	4.85	0.05	ug/g	ND	121	50-140			
1,2-Dichlorobenzene	4.00	0.05	ug/g	ND	99.9	60-130			
1,3-Dichlorobenzene	3.86	0.05	ug/g	ND	96.4	60-130			
1,4-Dichlorobenzene	3.88	0.05	ug/g	ND	97.1	60-130			
1,1-Dichloroethane	4.03	0.05	ug/g	ND	101	60-130			
1,2-Dichloroethane	3.90	0.05	ug/g	ND	97.4	60-130			
1,1-Dichloroethylene	3.84	0.05	ug/g	ND	95.9	60-130			
cis-1,2-Dichloroethylene	3.81	0.05	ug/g	ND	95.3	60-130			
trans-1,2-Dichloroethylene	3.83	0.05	ug/g	ND	95.7	60-130			
1,2-Dichloropropane	3.97	0.05	ug/g	ND	99.2	60-130			
cis-1,3-Dichloropropylene	3.69	0.05	ug/g	ND	92.4	60-130			
trans-1,3-Dichloropropylene	3.38	0.05	ug/g	ND	84.4	60-130			
Ethylbenzene	4.06	0.05	ug/g	ND	102	60-130			
Ethylene dibromide (dibromoethane, 1,2-	4.33	0.05	ug/g	ND	108	60-130			
Hexane	3.78	0.05	ug/g	ND	94.4	60-130			
Methyl Ethyl Ketone (2-Butanone)	10.3	0.50	ug/g	ND	103	50-140			
Methyl Isobutyl Ketone	10.5	0.50	ug/g	ND	105	50-140			
Methyl tert-butyl ether	5.87	0.05	ug/g	ND	58.7	50-140			
Methylene Chloride	3.50	0.05	ug/g	ND	87.6	60-130			
Styrene	4.63	0.05	ug/g	ND	116	60-130			
1,1,1,2-Tetrachloroethane	4.38	0.05	ug/g	ND	109	60-130			
1,1,2,2-Tetrachloroethane	5.14	0.05	ug/g	ND	128	60-130			
Tetrachloroethylene	4.46	0.05	ug/g	ND	112	60-130			
Toluene	4.59	0.05	ug/g	ND	115	60-130			
1,1,1-Trichloroethane	3.99	0.05	ug/g	ND	99.6	60-130			
1,1,2-Trichloroethane	4.67	0.05	ug/g	ND	117	60-130			
Trichloroethylene	4.10	0.05	ug/g	ND	103	60-130			
Trichlorofluoromethane	3.84	0.05	ug/g	ND	96.0	50-140			
Vinyl chloride	4.49	0.02	ug/g	ND	112	50-140			
m,p-Xylenes	8.54	0.05	ug/g	ND	107	60-130			
o-Xylene	4.12	0.05	ug/g	ND	103	60-130			
Surrogate: 4-Bromofluorobenzene	*8.04*		*ug/g*		*100*	*50-140*			
Surrogate: Dibromofluoromethane	*7.55*		*ug/g*		*94.4*	*50-140*			
Surrogate: Toluene-d8	*8.07*		*ug/g*		*101*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

1 : Elevated detection limits due to the nature of the sample matrix.

QC Qualifiers :

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

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.

PARACE LABORATORIES LT

Paracel ID: 2111395

lvd.
J8
.com

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2111395	№ 59315

Client Name: Paterson Group Inc.
Contact Name: Kanyn Munch
Address: 154 Colonnade Rd S.
Telephone: 613-226-7381

Project Ref: PE5171
Quote #:
PO #: 31975
E-mail: kmunch@patersongroup.ca

Page __ of __

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)

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	Required Analysis: VOC/PHC	PAH	Metals ICP	Hg, CrVI	pH
1	BH1-SS6	S		2	March 8/21		✓				
2	BH2-SS2	S		1	"			✓	✓	✓	
3	BH3-SS2	S		1	"			✓	✓	✓	
4	BH2-SS4/SS5	S		2	"		✓				
5	BH3-SS2	S		1	"			✓	✓	✓	
6	DUP	S		1	"				✓		✓
7											
8											
9											
10											

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign):	Received By Driver/Depot: T. Flouie	Received at Lab:	Verified By:
Relinquished By (Print): Richmond Zamilton	Date/Time: 10/03/21 4:05	Date/Time: Mar 10, 2021 17:10	Date/Time: March 10 2021 17:41
Date/Time: March 10/21	Temperature: °C PH.	Temperature: 11.4 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Karyn Munch

Client PO: 30519
Project: PE5171
Custody: 131415

Report Date: 30-Mar-2021
Order Date: 19-Mar-2021

Revised Report

Order #: 2112651

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

Paracel ID	Client ID
2112651-01	BH1-GW1
2112651-02	BH2-GW1
2112651-03	BH3-GW1
2112651-04	DUP

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 30-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 19-Mar-2021

Client PO: 30519

Project Description: PE5171

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	22-Mar-21	22-Mar-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	23-Mar-21	24-Mar-21
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	22-Mar-21	22-Mar-21

Certificate of Analysis

Report Date: 30-Mar-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 19-Mar-2021

Client PO: **30519**

Project Description: PE5171

	Client ID:	BH1-GW1	BH2-GW1	BH3-GW1	DUP
	Sample Date:	17-Mar-21 12:00	17-Mar-21 12:00	19-Mar-21 00:00	19-Mar-21 00:00
	Sample ID:	2112651-01	2112651-02	2112651-03	2112651-04
	MDL/Units	Water	Water	Water	Water
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	0.7	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis

Report Date: 30-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 19-Mar-2021

Client PO: 30519

Project Description: PE5171

	Client ID:	BH1-GW1	BH2-GW1	BH3-GW1	DUP
	Sample Date:	17-Mar-21 12:00	17-Mar-21 12:00	19-Mar-21 00:00	19-Mar-21 00:00
	Sample ID:	2112651-01	2112651-02	2112651-03	2112651-04
	MDL/Units	Water	Water	Water	Water
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	100%	88.3%	82.9%	91.5%
Dibromofluoromethane	Surrogate	79.7%	89.5%	76.0%	87.5%
Toluene-d8	Surrogate	107%	106%	105%	107%
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	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-

Certificate of Analysis

Report Date: 30-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 19-Mar-2021

Client PO: 30519

Project Description: PE5171

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						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*75.5*		*ug/L*		*94.4*	*50-140*			
Surrogate: Dibromofluoromethane	*67.1*		*ug/L*		*83.9*	*50-140*			
Surrogate: Toluene-d8	*86.9*		*ug/L*		*109*	*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	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	0.58	0.5	ug/L	0.53			9.0	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	0.99	0.5	ug/L	0.98			1.0	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*71.4*		*ug/L*		*89.3*	*50-140*			
Surrogate: Dibromofluoromethane	*77.0*		*ug/L*		*96.3*	*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)	1960	25	ug/L	ND	97.9	68-117			
F2 PHCs (C10-C16)	1380	100	ug/L	ND	86.2	60-140			
F3 PHCs (C16-C34)	3740	100	ug/L	ND	95.3	60-140			
F4 PHCs (C34-C50)	2220	100	ug/L	ND	89.5	60-140			
Volatiles									
Acetone	109	5.0	ug/L	ND	109	50-140			
Benzene	33.5	0.5	ug/L	ND	83.7	60-130			
Bromodichloromethane	29.8	0.5	ug/L	ND	74.6	60-130			
Bromoform	38.1	0.5	ug/L	ND	95.2	60-130			
Bromomethane	33.4	0.5	ug/L	ND	83.6	50-140			
Carbon Tetrachloride	28.2	0.2	ug/L	ND	70.5	60-130			
Chlorobenzene	39.5	0.5	ug/L	ND	98.8	60-130			
Chloroform	33.1	0.5	ug/L	ND	82.6	60-130			
Dibromochloromethane	31.6	0.5	ug/L	ND	79.1	60-130			
Dichlorodifluoromethane	35.8	1.0	ug/L	ND	89.4	50-140			
1,2-Dichlorobenzene	36.8	0.5	ug/L	ND	92.0	60-130			
1,3-Dichlorobenzene	36.7	0.5	ug/L	ND	91.7	60-130			
1,4-Dichlorobenzene	36.6	0.5	ug/L	ND	91.5	60-130			
1,1-Dichloroethane	34.4	0.5	ug/L	ND	86.0	60-130			
1,2-Dichloroethane	41.2	0.5	ug/L	ND	103	60-130			
1,1-Dichloroethylene	30.0	0.5	ug/L	ND	75.0	60-130			
cis-1,2-Dichloroethylene	31.0	0.5	ug/L	ND	77.6	60-130			
trans-1,2-Dichloroethylene	30.2	0.5	ug/L	ND	75.5	60-130			
1,2-Dichloropropane	33.6	0.5	ug/L	ND	84.0	60-130			
cis-1,3-Dichloropropylene	39.1	0.5	ug/L	ND	97.7	60-130			
trans-1,3-Dichloropropylene	29.3	0.5	ug/L	ND	73.2	60-130			
Ethylbenzene	38.8	0.5	ug/L	ND	97.1	60-130			
Ethylene dibromide (dibromoethane, 1,2-	37.1	0.2	ug/L	ND	92.6	60-130			
Hexane	32.3	1.0	ug/L	ND	80.8	60-130			
Methyl Ethyl Ketone (2-Butanone)	88.1	5.0	ug/L	ND	88.1	50-140			
Methyl Isobutyl Ketone	76.9	5.0	ug/L	ND	76.9	50-140			
Methyl tert-butyl ether	84.4	2.0	ug/L	ND	84.4	50-140			
Methylene Chloride	31.8	5.0	ug/L	ND	79.5	60-130			
Styrene	41.4	0.5	ug/L	ND	103	60-130			
1,1,1,2-Tetrachloroethane	37.6	0.5	ug/L	ND	94.0	60-130			
1,1,2,2-Tetrachloroethane	40.0	0.5	ug/L	ND	100	60-130			
Tetrachloroethylene	39.6	0.5	ug/L	ND	99.1	60-130			
Toluene	40.8	0.5	ug/L	ND	102	60-130			
1,1,1-Trichloroethane	28.9	0.5	ug/L	ND	72.4	60-130			
1,1,2-Trichloroethane	32.3	0.5	ug/L	ND	80.7	60-130			
Trichloroethylene	31.7	0.5	ug/L	ND	79.2	60-130			
Trichlorofluoromethane	31.2	1.0	ug/L	ND	78.1	60-130			
Vinyl chloride	33.4	0.5	ug/L	ND	83.6	50-140			
m,p-Xylenes	87.6	0.5	ug/L	ND	110	60-130			
o-Xylene	43.6	0.5	ug/L	ND	109	60-130			
Surrogate: 4-Bromofluorobenzene	*78.1*		*ug/L*		*97.7*	*50-140*			
Surrogate: Dibromofluoromethane	*71.2*		*ug/L*		*89.0*	*50-140*			
Surrogate: Toluene-d8	*83.5*		*ug/L*		*104*	*50-140*			

Certificate of Analysis

Report Date: 30-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 19-Mar-2021

Client PO: 30519

Project Description: PE5171

Qualifier Notes:

Login Qualifiers :

Container and COC sample IDs don't match - ID ends in "21" and not "GW1"

Applies to samples: BH1-GW1, BH2-GW1, BH3-GW1, DUP

Sample Data Revisions

None

Work Order Revisions / Comments:

Revision-1 This report includes an updated sample list as per the client.

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

Paracel ID: 2112651

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2112651	№ 131415

Client Name: Paterson Group Inc.	Project Ref: PE5171	Page 1 of 1
Contact Name: Kanyn Munch / Mark St. Pierre	Quote #:	Turnaround Time
Address: 154 Colonnade Rd S.	PO #: 36519	☐ 1 day ☐ 3 day
	E-mail: kmunch@patersongroup.ca mstpierre@patersongroup.ca	☐ 2 day ☒ Regular
Telephone: 613-226-7381		Date Required:

Regulation 153/04	Other Regulation
☐ Table 1 ☐ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ CCME ☐ MISA
☒ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm
☐ Table ___	Mun: ___
For RSC: ☐ Yes ☐ No	☐ 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)
1	BH1-GW1	GW		2	Mar. 17/21	pm	✓	✓					
2	BH2-GW1	GW		2	Mar. 17/21	pm	✓	✓					
3	BH3-GW1	GW		2	HOLD								
4	DUP	GW		2				✓					
5													
6													
7													
8													
9													
10													

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): KMunch	Received By Driver/Depot: T. Sloss	Received at Lab: BSem	Verified By: BSem
Relinquished By (Print): KMunch	Date/Time: 19/03/21 3:20	Date/Time: March 19, 2021 17:35	Date/Time: March 19, 2021 17:58
Date/Time: March 19, 2021	Temperature: °C PH.	Temperature: 8.4 °C	pH Verified: ☐ By: