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Phase II Environmental Site Assessment

1518,1524,1526 Stittsville Main Street
Ottawa, Ontario

Prepared For

Inverness Homes

November 23, 2020

Report: PE4767-REP.02

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the properties addressed 1518, 1524 and 1526 Stittsville Main Street in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the areas of environmental concern (APECs) that were identified during the Phase I ESA.

The Phase II ESA was carried out in conjunction with a Geotechnical Investigation and consisted of drilling twelve boreholes on the Phase II Property, three of which were constructed with groundwater monitoring well installations.

The soil profile generally consisted of a topsoil and/or brown silty sand with crushed stone fill material, followed by some native silty sand, underlain by limestone interbedded shale bedrock. Bedrock was encountered at a depth ranging from 4.22 - 5.94 meters below the ground surface. Soil samples were obtained from the boreholes and screened based on visual observations and vapour measurements. Some brown silty sand with traces of cobbles, concrete, brick and/or wood were identified in the fill material, although no olfactory evidence or contamination were identified during the subsurface investigation.

Based on the screening results in combination with sample depth and location, six (6) soil sample were submitted for laboratory analysis of metals, PAHs and/or VOCs. The analytical results from the subsurface investigation identified metal concentrations (lead and mercury) in excess of the MECP Table 3 Residential Standards at BH4-20.

Previous subsurface investigations identified VOC concentrations (Tetrachloroethylene) in soil which exceeds MECP Table 3 Residential Standards.

Groundwater samples were recovered and analyzed for PHC's, VOCs and/or metals. No free-phase product was observed on the groundwater at any of the monitoring well locations during the groundwater sampling events. Tetrachloroethylene concentrations were identified in all sampled monitoring wells and exceeded the MECP Table 3 Residential Standards. Chloroform concentration identified in sample obtained from borehole BH2-11 was identified in excess of the MECP Table 3 Residential Standards. The presence of chloroform is considered to be related to the use of municipal water during the drilling program.

Previous groundwater sampling also identified chloroform, tetrachloroethylene and cis-1,2-dichloroethylene within the groundwater that exceeded MECP Table 3 Standards.

Recommendations

As noted in the report, a portion of the Phase II Property will be redeveloped for residential land use and as such, the residential portion of the property will require a Record of Site Condition (RSC).

Soil

Impacted Fill Material and Soil was identified on the Phase II Property. The impacted soil is not considered to pose a risk to the current use of the site and can be managed during the redevelopment of the property, if required. Any soil which exceeds the MECP Table 3 Standards will need to be disposed of at an approved waste disposal facility.

Testing of the fill material will be required in conjunction with the excavation program to segregate clean soil from impacted soil and for final confirmatory purposes.

Groundwater

Impacted groundwater was identified on the Phase II Property. The impacted groundwater is not considered to pose a risk to the current use of the site and can be managed during the redevelopment of the property, if required.

Monitoring Wells

The monitoring wells on the Phase II Property should be maintained for future groundwater monitoring purposes. If they are not going to be used in the future, they should be abandoned according to O.Reg. 903.

1.0 INTRODUCTION

At the request of Inverness Homes, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the property addressed 1518, 1524 and 1526 Stittsville Main Street 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 on the Phase II Property, during the Phase I ESA conducted by Paterson.

1.1 Site Description

Address:	1518, 1524 and 1526 Stittsville Main Street, Ottawa, Ontario.
Legal Description:	Part of Lot 23, Concession 10, in the Geographic Township of Goulbourn, in the City of Ottawa.
Property Identification Numbers:	PIN 04446-1658 (1518 Stittsville Main Street) PIN 04446-0238 (1524 Stittsville Main Street) and PIN 04446-0240 (1526 Stittsville Main Street).
Location:	The subject property is located on the west side of Stittsville Main Street, approximately 50 m south of Abbott Street West and Stittsville Main Street intersection, in the City of Ottawa, Ontario. Refer to Figure 1 - Key Plan for the site location.
Latitude and Longitude:	45° 15' 28" N, 75° 55' 15" W
Zoning:	TM – Traditional Mainstreet Zone
Area:	4760 m ² (approximate)

1.2 Property Ownership

The Phase II Property is owned by Krumac Holdings Inc. Paterson was retained by Mr. Joshua Laginski from Inverness Homes, an affiliate of the current property owner. The head office of Inverness Homes is Suite 200 located at 38 Auriga Drive, CenterPoint Drive, Ottawa, Ontario. can be reached by telephone at (613) 818-5140.

1.3 Current and Proposed Future Uses

The Phase II Property is occupied by a vacant residential building and associated outbuildings. The majority of the Phase II Property is landscaped or a gravel parking area.

The proposed development of the Phase II Property consists of a four-storey residential building and a two-storey commercial building connected by an archway, with one underground parking level.

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 Residential Standards are based on the following considerations:

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

These standards were selected based on the future land use of the subject site. Coarse-grained soil standards, were chosen to represent the current site conditions of the Phase II Property.

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 O.Reg. 153/04 does not apply to the Phase II Property, as the property is not within 30m of an environmentally sensitive area and the pH of the soil is between 5 and 9.

Section 43.1 of O.Reg. 153/04 does not apply to the Phase II Property as the soil exceeds the defined shallow soil property.

A comparison of the soil test data to the MECP Table 1 Standards was also conducted. The Table 1 standards are considered to be indicative of typical Ontario background concentrations and are commonly used to assess whether soil is clean for off-site disposal purposes.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is situated in a commercial area, with commercial land use to the east and south along Stittsville Main Street. Neighbouring lands to the west and north consist of residential, institutional and parkland use.

The majority of the Phase II Property is landscaped. The remainder of the site is gravel driveway/parking lot along the east portion adjacent to Stittsville Main Street. The site is relatively flat and at the grade of the adjacent streets and neighbouring lands. Site drainage occurs through both infiltration of the gravel and landscaped areas.

The regional topography slopes down in a south-eastern direction towards the Mahoney Creek. Groundwater in the area is anticipated to flow in a south-eastern direction.

2.2 Past Investigations

In conjunction with this Phase II ESA, a Phase I-ESA was completed by completed in general accordance with the Ontario Regulation (O.Reg.) 153/04, as amended. The Phase I ESA identified two PCAs that resulted in areas of potential environmental concern (APECs) on the Phase I Property. These APECS are identified in Table 1, Section 3.3.

A Phase II ESA was recommended to address the aforementioned APECS on the Phase I Property, as shown in Drawing PE4767-2 - Site Plan

Additionally, the following historical investigation were completed on the Phase II Property:

- ☐ "Phase I & II Environmental Site Assessment, 1524 and 1526 Stittsville Main Street, Ottawa, Ontario", prepared by Paterson, dated November 23, 2011.

The 2011 Phase I & II ESA conducted by Paterson assessed properties 1524 and 1526 Stittsville Main Street. Based on a historical review and onsite observations, a historical dry cleaner was identified at 1524 Stittsville Main Street, based on this a Phase II ESA was completed.

A subsurface investigation was conducted in November of 2011. Five (5) boreholes, two (2) of which were instrumented with groundwater monitoring wells, were advanced on the properties. The groundwater monitoring wells were located on the footprint of the former drycleaners (BH2) and the footprint of a former residential structure (BH4). One borehole was located adjacent to the southern commercial building addressed 1528 Stittsville Main Street (BH1), while the remaining boreholes were located throughout the properties for general coverage.

One (1) soil sample collected from BH1 was submitted for PAH analysis, while one (1) sample collected from BH2 and one (1) sample collected from BH4 were submitted for VOC analysis. Based on the analytical test results, no PAH concentrations above the applicable MECP standards were detected in the sample collected from BH1, however, it was noted that fill material was present and consisted of gravel and pieces of coal. A VOC parameter (tetrachloroethylene) was detected in samples collected from BH2 and BH4. The detected tetrachloroethylene concentration for BH2 exceed the current MECP standards while concentration for BH4 comply.

Two (2) groundwater samples were collected and submitted for VOC and PHC analysis. Based on the analytical test results, no PHC concentrations were detected in both samples. The sample collected from BH2 and BH identified 1,2-dichloroethylene and tetrachloroethylene in exceedance of the MECP standards at that time and detected trichloroethylene that complied with the current MECP Standards.

☐ "Phase I & II Environmental Site Assessment, 1520 Stittsville Main Street, Ottawa, Ontario", prepared by Paterson Group Inc., dated July 11, 2019.

The 2011 Phase I & II ESA conducted by Paterson assessed the property addressed 1520 Stittsville Main Street. The visual observations noted the presence of an above ground 900L furnace oil tank in the basement of the residential dwelling.

Based on the previously identified historical dry cleaners on the adjacent property, a subsurface investigation was conducted in June of 2019 on 1520 Stittsville Main Street. Three boreholes (BH1, BH2 and BH3), instrumented with groundwater monitoring wells, were advanced on the property. The groundwater monitoring wells were located on the western portion of the property while BH1 was located closest to the location of the former drycleaners on the adjacent property.

One (1) soil sample collected from BH2 was submitted for metals analysis. Three (3) samples collected from BH1, BH2, and BH3 were submitted for VOCs analysis. All metals parameters detected in the BH2 soil sample complied with MECP Table 3 Residential Standards however, it was noted that fill material was present and consisted of brown sand and brick. No detectable VOC parameter concentrations were identified in the BH3 soil sample. Tetrachloroethylene concentrations were found to exceed the MECP Table 3 Residential Standards in the BH1 soil sample.

Three (3) groundwater samples were collected and submitted for VOCs analysis. Based on the analytical test results, no VOC concentrations were detected in the groundwater samples analyzed. The groundwater complied with the MECP Table 3 Residential Standards.

Based on the findings of the Phase I & II ESA, it was recommended that a remediation be conducted to address the presence of VOC's in the soil.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted on July 22 and 23, 2020.. The field program consisted of drilling twelve boreholes, three of which were instrumented with groundwater monitoring wells. Boreholes were drilled to depths ranging from 4.22 to 9.04 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 Polycyclic Aromatic Hydrocarbons (PAHs), metals (including Hg and CrVI), and Volatile Organic Compounds (VOCs) in soil and/or groundwater.

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. Based on this information, the bedrock in the area of the site consists of limestone and interbed dolomite of the Gull River Formation. Based on the maps, the thickness of overburden ranges from 5 to 10 m

The regional groundwater flow is expected to be towards the southeast.

Buildings and Structures

The existing dwelling structure was formerly heated by an oil-fired furnace installed in 2009. An aboveground 900L furnace oil storage tank manufactured in 2009 served the oil-fired furnace in the basement of the dwelling. The tank was noted to be in good condition with no unusual staining or olfactory observations. The fuel tank was no longer in use as the dwelling was vacant. The presence of this tank does not pose a concern to the Phase II Property

No exterior aboveground storage tanks (ASTs) or signs of underground storage tanks (USTs) were observed on the Phase II Property at the time of the site visit. No areas of stained pavement, stressed vegetation or unidentified substances were observed on-site at this time.

Water Bodies and Areas of Natural Significance

No water bodies or areas of natural significance (ANSIs) are present on the Phase II Property. No areas of natural significance are known to exist within the Phase II Study Area.

Drinking Water Wells

A total of forty-two (42) well records were identified within the study area. All identified monitoring wells were recorded drinking water wells for domestic use. All identified wells were drilled between 1948 and 1973. Based on the available City of Ottawa's Water and Wastewater Infrastructure interactive maps all accessible roadways are municipally serviced by water and wastewater infrastructure. Therefore, these monitoring well are considered to no longer be in use.

Monitoring Well Records

No monitoring well records were identified within the Phase I Study Area. Based on the previous Phase I-II ESA reports, five (5) monitoring wells and three (3) geotechnical boreholes are located on the Phase I Property. These existing wells are presumed to still be viable on site.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area consists of institutional, residential and commercial/retail properties. Land use is shown on Drawing PE4767-2 Surrounding Land Use Plan.

Fill Placement

Based on the historical review of the previous Phase I-II ESA reports, fill material of unknown quality was identified at the former building structure locations. It is expected that fill material is associated with the demolition and/or backfilling of the former on-site buildings.

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

As per Section 7.1 of this report, Potentially Contaminating Activities and Areas of Potential Environmental Concern were identified within the Phase I ESA study area. Two (2) PCAs were identified on the subject site during the historical review or Phase I ESA site visit;

- ☐ Former on-site dry cleaners located in the southeastern corner of the Phase I Property; and
- ☐ Fill material of unknown quality located throughout on the eastern section of the Phase I Property where former structures were located.

Based on the findings of this assessment, it is understood a substance has been applied to surfaces of the Phase I Property for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both. As a result, the applicable site condition standard is deemed not to be exceeded of MECP standards.

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 subject site which have the potential to have impacted the subject site. 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. Due to historical subsurface investigation, borehole locations have been relabeled to include their respective year of installation. 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

During the Phase II ESA program physical impediments were encountered while positioning boreholes throughout the Phase II Property. Mature tree cover prohibited drilling equipment to position boreholes within proximity to the existing structures. Brush and gravel were also noted to bury a former monitoring well that was unable to be located (BH4-2011). No other impediments were encountered during the investigation.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was conducted on July 22 and July 23, 2020. The investigation consisted of drilling twelve boreholes on the Phase II Property, three of which included monitoring well installation.

The boreholes were drilled using a low-clearance track mounted 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 PE4767-3 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

A total of 84 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 and split spoon 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 soil stratigraphy at the borehole locations consisted of brown silty sand with crushed stone or topsoil followed by a fill material or silty sand, followed by some glacial till, underlain by limestone with interbedded shale bedrock. Practical refusal to auguring was completed in all boreholes and range from 4.22 to 5.94 m below the existing grade. Bedrock was encountered and cored at a depth of 5.49 mbgs at BH3-20.

4.3 Field Screening Measurements

All soil samples collected were subjected to a preliminary screening procedure, which included visual screening for colour and evidence of metals, as well as screening with a MiniRae photoionization detector (PID). The detection limit of the PID is 0.1ppm, with a precision of +/- 5ppm.

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 PID vapour readings were found to range from 0.2 - 4.5 ppm.

No visual or olfactory odours were identified in the soil samples. Soil samples were selected based on a combination of the results of visual and olfactory screening, vapour readings, sample depth and/or sample location.

4.4 Groundwater Monitoring Well Installation

Three (3) groundwater monitoring wells were installed on the Phase II Property as part of the subsurface investigation. The monitoring wells consisted of 32 mm or 51 mm diameter, Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed below in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

A summary of the monitoring well construction is detailed in Table 1 below.

Table 1: 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
BH1-20	121.77	5.94	4.42-5.94	4.34-5.94	0.18-4.34	Flushmount
BH2-20	121.23	5.94	2.94-5.94	2.62-9.17	0.20-2.62	Flushmount
BH3-20	121.78	9.04	6.04-9.04	5.64-9.04	0.18-5.64	Flushmount

4.5 Field Measurement of Water Quality Parameters

Groundwater samples were collected on July 22 and August 6, 2020. The water levels were the only parameter measured in the field during the August sampling events. Equipment was not available during the sampling event to measure water quality parameters.

4.6 Groundwater Sampling

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

Samples were stored in coolers to reduce analyte volatilization during transportation. Details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan in Appendix 1.

4.7 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan in Appendix 1, the soil and groundwater samples submitted for analytical testing are presented in Tables 2 and 3.

Table 2: Soil Samples Submitted and Analyzed Parameters					
Sample ID	Sample Interval (m) and Stratigraphic Unit	Parameters Analyzed			Rationale
		PAHs	VOCs	Metals*	
July 22, 2020					
BH1-20-SS8	5.36-5.83 mbgs Glacial till		X		Assess the potential impact due to the former dry-cleaning activity
BH2-20-SS7	4.59-5.19 mbgs Sandy silt		X		Assess the potential impact due to the former dry-cleaning activity.
BH2-20-SS7 (DUP1)	4.59-5.19 mbgs Sandy silt		X		Assess the potential impact due to the former dry-cleaning activity
BH3-20-SS2	0.79-1.39 mbgs Fill	X		X	Assess the quality of the fill material.
BH3-20-SS7	4.59-5.19 mbgs Silty sand		X		Assess the potential impact due to the former dry-cleaning activity
July 23, 2020					
BH4-20-SS2	0.79-1.38 mbgs Fill	X		X	Assess the quality of the fill material.
Note: <input type="checkbox"/> * Including Hg and CrVI					

Table 3: Groundwater Samples Submitted and Analyzed Parameters				
Sample ID	Screened Interval (m)	Parameters Analyzed		Rationale
		VOCs	Metals*	
July 22, 2020				
BH2-GW1	2.89-5.89	X		Assess the potential groundwater impact due to the former dry-cleaning activities.
August 6, 2020				
BH1-20-GW1	2.89-5.89	X		Assess the potential groundwater impact due to the former dry-cleaning activities.
BH2-20-GW1	6.17-9.17	X		Assess the potential groundwater impact due to the former dry-cleaning activities.
BH3-20-GW1	3.05-6.05	X		Assess the potential groundwater impact due to the former dry-cleaning activities.
BH2-19-GW2			X	Assess the potential groundwater impact due to fill material.
Note: ▪ * Including Hg and CrVI				

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

4.8 Residue Management

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

4.9 Elevation Surveying

Boreholes were located and surveyed in the field by Paterson. The 2019 investigation utilized a temporary benchmark and an assumed elevation of 100 meter to survey the three borehole/monitoring wells installed (BH1-19, BH2-19 and BH-19). The temporary benchmark was noted to be a manhole cover adjacent to 1519 Stittsville Main Street. During the current investigation all boreholes and existing monitoring wells, from previous investigations, were measured with reference to a geodetic datum. The locations and elevations of the boreholes are presented on Drawing PE4767-3 – Test Hole Location Plan, appended to this report.

4.10 Quality Assurance and Quality Control Measures

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

5.0 REVIEW AND EVALUATION

5.1 Geology

Site soils generally consists of topsoil and/or brown silty sand with crushed stone fill material, followed by some native silty sand, underlain by limestone interbedded shale bedrock. The boreholes were terminated at depths ranging from 4.22 to 9.04 mbgs.

Practical refusal to auguring was completed at all borehole locations to depths ranging from 4.22 to 5.94 m below the existing grade. Bedrock was encountered in borehole BH3-20 at depths from 5.49 and was cored to 9.04 mbgs to facilitate the installation of the monitoring well.

Groundwater was encountered within bedrock at depths ranging from approximately 5.10 to 5.42 mbgs. Site geology details are provided in the Soil Profile and Test Data Sheets provided in Appendix 1.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling events which occurred on July 22 and August 6, 2020, using an electronic water level meter. Groundwater levels are summarized below in Table 4.

Table 4: Groundwater Level Measurements				
Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
Existing Monitoring Well Measurements				
BH2-11	121.83	5.29	116.54	July 22, 2020
Current Investigation Monitoring Well Measurements				
BH1-20	121.77	3.32	63.24	August 6, 2020
BH2-20	121.23	3.66	62.95	August 6, 2020
BH3-20	121.78	2.67	63.83	August 6, 2020

Based on the groundwater elevations measured during the sampling event, a groundwater contour plan was completed. The groundwater contour mapping is shown on Drawing PE4767-3 – 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 0.038m/m was calculated.

5.3 Fine-Course Soil Texture

No grain size analysis was completed for the subject site. Coarse grained standards were chosen based on field observations.

5.4 Soil: Field Screening

No visual or olfactory signs of contamination were identified in the soil samples. Soil samples were selected based on visual screening, vapour readings, sample depth and/or sample location.

Field screening of the soil samples collected resulted in vapour readings ranging from 0.2 - 4.5 ppm. Field screening results of individual soil samples from BH1-20 through BH12-20 are provided on the Soil Profile and Test Data Sheets appended to this report.

5.5 Soil Quality

Six soil samples were submitted for Metals, VOCs and/or PAH analyses. The results of the analytical testing are presented in Tables 5, 6 and 7. The laboratory certificate of analysis are provided in Appendix 1.

Table 5: Analytical Test Results – Soil Metals				
Parameter	MDL (µg/g)	Soil Samples (µg/g)		MECP Table 3 Residential Standards (µg/g)
		July 22, 2020	July 23, 2020	
		BH3-20-SS2	BH4-20-SS2	
Antimony	1.0	nd	nd	7.5
Arsenic	1.0	3.2	5.8	18
Barium	1.0	198	185	390
Beryllium	0.5	nd	nd	4
Boron	5.0	10.3	10.1	120
Cadmium	0.5	nd	nd	1.2
Chromium	5.0	14.3	22.9	160
Chromium (VI)	0.2	nd	nd	8
Cobalt	1.0	5.8	5.6	22
Copper	5.0	12.4	43.3	140
Lead	1.0	13.1	<u>268</u>	120
Mercury	0.1	nd	<u>0.5</u>	0.27
Molybdenum	1.0	nd	nd	6.9
Nickel	5.0	13.1	11.6	100
Selenium	1.0	nd	nd	2.4
Silver	0.3	nd	0.3	20
Thallium	1.0	nd	nd	1
Uranium	1.0	nd	nd	23
Vanadium	10.0	21.4	23.9	86
Zinc	20.0	nd	236	340
Notes:				
<ul style="list-style-type: none"> MDL – Method Detection Limit nd – not detected above the MDL <u>Bold and Underlined</u> – Value exceeds the selected MECP Table 3 Residential Standards 				

All metals concentrations for sample BH3-20-SS2 comply with the selected MECP Table 3 Residential Standards. Lead and Mercury parameters exceed the selected MECP Table 3 Residential Standards for soil sample BH4-20-SS2.

Table 6: Analytical Test Results – Soil VOCs						
Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 3 Residential Standards (µg/g)
		July 22, 2020				
		BH1-20-SS8	BH2-20-SS7	DUP1 (BH2-20-SS7)	BH3-20-SS7	
Acetone	0.50	nd	nd	nd	nd	0.5
Benzene	0.02	nd	nd	nd	nd	0.02
Bromodichloromethane	0.05	nd	nd	nd	nd	0.05
Bromoform	0.05	nd	nd	nd	nd	0.05
Bromomethane	0.05	nd	nd	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	nd	nd	0.05
Chlorobenzene	0.05	nd	nd	nd	nd	0.05
Chloroform	0.05	nd	nd	nd	nd	0.05
Dibromochloromethane	0.05	nd	nd	nd	nd	0.05
Dichlorodifluoromethane	0.05	nd	nd	nd	nd	0.05
1,2-Dichlorobenzene	0.05	nd	nd	nd	nd	0.05
1,3-Dichlorobenzene	0.05	nd	nd	nd	nd	0.05
1,4-Dichlorobenzene	0.05	nd	nd	nd	nd	0.05
1,1-Dichloroethane	0.05	nd	nd	nd	nd	0.05
1,2-Dichloroethane	0.05	nd	nd	nd	nd	0.05
1,1-Dichloroethylene	0.05	nd	nd	nd	nd	0.05
cis-1,2-Dichloroethylene	0.05	nd	nd	nd	nd	0.05
trans-1,2-Dichloroethylene	0.05	nd	nd	nd	nd	0.05
1,2-Dichloropropane	0.05	nd	nd	nd	nd	0.05
1,3-Dichloropropene, total	0.05	nd	nd	nd	nd	0.05
Ethylbenzene	0.05	nd	nd	nd	nd	0.05
Ethylene dibromide	0.05	nd	nd	nd	nd	0.05
Hexane	0.05	nd	nd	nd	nd	0.05
Methyl Ethyl Ketone	0.50	nd	nd	nd	nd	0.5
Methyl Isobutyl Ketone	0.50	nd	nd	nd	nd	0.5
Methyl tert-butyl ether	0.05	nd	nd	nd	nd	0.05
Methylene Chloride	0.05	nd	nd	nd	nd	0.05
Styrene	0.05	nd	nd	nd	nd	0.05
1,1,1,2-Tetrachloroethane	0.05	nd	nd	nd	nd	0.05
1,1,2,2-Tetrachloroethane	0.05	nd	nd	nd	nd	0.05
Tetrachloroethylene	0.05	0.25	nd	nd	nd	0.05
Toluene	0.05	nd	nd	nd	nd	0.2
1,1,1-Trichloroethane	0.05	nd	nd	nd	nd	0.05
1,1,2-Trichloroethane	0.05	nd	nd	nd	nd	0.05
Trichloroethylene	0.05	nd	nd	nd	nd	0.05
Notes: <ul style="list-style-type: none">MDL – Method Detection Limitnd – not detected above the MDL<u>Bold and Underlined</u> – Value exceeds the selected MECP Table 7 Standards						

Table 6 (Continued): Analytical Test Results – Soil VOCs						
Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 3 Residential Standards (µg/g)
		July 22, 2020				
		BH1-20-SS8	BH2-20-SS7	DUP1 (BH2-20-SS7)	BH3-20-SS7	
Trichlorofluoromethane	0.05	nd	nd	nd	nd	0.25
Vinyl Chloride	0.02	nd	nd	nd	nd	0.02
Xylenes, total	0.05	nd	nd	nd	nd	0.05
Notes:						
<ul style="list-style-type: none">MDL – Method Detection Limitnd – not detected above the MDLnd – Value exceeds the selected MECP Table 3 Residential Standards						

All VOC concentrations were found to comply with the selected MECP Table 3 Residential Standards.

Table 7: Analytical Test Results – Soil PAHs				
Parameter	MDL (µg/g)	Soil Samples (µg/g)		MECP Table 3 Residential Standards (µg/g)
		July 22, 2020	July 23, 2020	
		BH3-20-SS2	BH4-20-SS2	
Acenaphthene	0.02	nd	nd	73.9
Acenaphthylene	0.02	nd	0.07	0.15
Anthracene	0.02	nd	0.04	0.67
Benzo[a]anthracene	0.02	nd	0.12	0.5
Benzo[a]pyrene	0.02	nd	0.17	0.3
Benzo[b]fluoranthene	0.02	nd	0.25	0.75
Benzo[g,h,i]perylene	0.02	nd	0.17	6.6
Benzo[k]fluoranthene	0.02	nd	0.12	0.78
Chrysene	0.02	nd	0.13	7
Dibenzo[a,h]anthracene	0.02	nd	0.05	0.1
Fluoranthene	0.02	nd	0.24	0.69
Fluorene	0.02	nd	nd	62
Indeno[1,2,3-cd]pyrene	0.02	nd	0.15	0.38
Methylnaphthalene (1&2)	0.04	nd	nd	0.99
Naphthalene	0.01	nd	nd	0.6
Phenanthrene	0.02	nd	0.09	6.2
Pyrene	0.02	nd	0.2	78
Notes:				
<ul style="list-style-type: none"> MDL – Method Detection Limit nd – not detected above the MDL nd – Value exceeds the selected MECP Table 3 Standards 				

All PAH concentrations were found to comply with the selected MECP Table 3 Residential Standards.

The analytical results in soil with respect to borehole locations are shown on Drawing PE4767-4 - Analytical Testing Plan – Soil.

The maximum concentrations of analyzed parameters in the soil at the site are summarized in Table 8.

Table 8: Maximum Concentrations – Soil			
Parameter	Maximum Concentration (µg/g)	Soil Sample	Depth Interval (m BGS)
Metals			
Arsenic	5.8	BH4-20-SS2	0.79-1.38, Fill
Barium	198		
Boron	10.3	BH3-20-SS2	0.79-1.39, Silty Sand
Chromium	22.9	BH4-20-SS2	0.79-1.38, Fill
Cobalt	5.8	BH3-20-SS2	0.79-1.39, Fill
Copper	43.3		
Lead	<u>268</u>	BH4-20-SS2	0.79-1.38, Fill
Mercury	<u>0.5</u>		
Nickel	13.1	BH3-20-SS2	0.79-1.39, Fill
Silver	0.3		
Vanadium	23.9	BH4-20-SS2	0.79-1.38, Fill
Zinc	236		
VOCs			
Tetrachloroethylene	0.25	BH1-20-SS8	5.36-5.83, Glacial Till
PAHs			
Acenaphthylene	0.07	BH4-20-SS2	0.79-1.38, Fill
Anthracene	0.04		
Benzo[a]anthracene	0.12		
Benzo[a]pyrene	0.17		
Benzo[b]fluoranthene	0.25		
Benzo[g,h,i]perylene	0.17		
Benzo[k]fluoranthene	0.12		
Chrysene	0.13		
Dibenzo[a,h]anthracene	0.05		
Fluoranthene	0.24		
Indeno[1,2,3-cd]pyrene	0.15		
Phenanthrene	0.09		
Pyrene	0.2		
Notes:			
▪ <u>Bold and Underlined</u> – Value exceeds the selected MECP Table 3 Residential Standards			

The maximum concentrations for lead and mercury in soil sample BH4-20-SS2 analyzed exceed the selected standards. The remaining maximum parameter concentrations are in compliance with the selected standards or were not detected above the laboratory method detection limits.

Metal, VOC and PAH concentrations were identified in the soil samples analyzed. All PAH parameter concentrations comply with the selected MECP Table 3 Residential Standards, while metals (lead and mercury) and a VOC (tetrachloroethylene) exceeded the selected MECP Table 3 Residential Standards.

5.6 Groundwater Quality

Groundwater samples were submitted for laboratory analysis of VOCs or metals. The groundwater samples were obtained from the screened intervals noted in Table 2.

The results of the analytical testing are presented in Tables 9 and 10. The laboratory certificates of analysis are provided in Appendix 1.

Table 9: Analytical Test Results – Groundwater VOCs						
Parameter	MDL (µg/L)	Groundwater Samples (µg/L)				MECP Table 3 Residential Standards (µg/L)
		June 16, 2020	August 6, 2020			
		BH2-G1 (BH2-11)	BH1-20-GW1	BH2-20-GW1	BH3-20-GW1	
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	<u>17.5</u>	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
Notes:						
<ul style="list-style-type: none">MDL – Method Detection LimitNA – Parameter not testednd – not detected above the MDL<u>Bold and Underlined</u> – Value exceeds the selected MECP Table 7 Standards						

Table 9 (Continued): Analytical Test Results – Groundwater VOCs						
Parameter	MDL (µg/L)	Groundwater Samples (µg/L)				MECP Table 3 Residential Standards (µg/L)
		June 16, 2020	August 6, 2020			
		BH2-G1 (BH2-11)	BH1-20-GW1	BH2-20-GW1	BH3-20-GW1	
1,3-Dichloropropene, total	0.5	nd	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	nd	2300
Ethylene dibromide	0.2	nd	nd	nd	nd	0.25
Hexane	1.0	nd	nd	nd	nd	51
Methyl Ethyl Ketone	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	<u>3.7</u>	<u>40.3</u>	<u>1.7</u>	<u>3.5</u>	1.6
Toluene	0.5	nd	nd	nd	nd	18000
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: <ul style="list-style-type: none">MDL – Method Detection LimitNA – Parameter not testednd – not detected above the MDL<u>Bold and Underlined</u> – Value exceeds the selected MECP Table 7 Standards						

Tetrachloroethylene exceeded the selected MECP Table 3 Residential Standards in all groundwater samples. Chloroform exceed the selected MECP Table 3 Residential Standards in only the BH2-G1 sample. All other parameter concentrations were not detected above the detection limit.

Table 10: Analytical Test Results – Groundwater Metals			
Parameter	MDL (µg/L)	Groundwater Samples (µg/L)	MECP Table 3 Standards (µg/L)
		August 6, 2020	
		BH2-19-GW2	
Antimony	0.1	nd	20000
Arsenic	0.5	nd	1900
Barium	1.0	114	29000
Beryllium	1.0	nd	67
Boron	0.5	101	45000
Cadmium	10	nd	2.7
Chromium	0.1	nd	810
Copper	0.5	nd	87
Lead	0.5	nd	25
Mercury	0.1	nd	0.29
Molybdenum	0.5	1.5	9200
Nickel	1.0	490	490
Selenium	1.0	nd	63
Chromium (VI)	1.0	nd	140
Cobalt	10	nd	66
Silver	0.1	nd	1.5
Sodium	200	94500	2300000
Thallium	0.1	nd	510
Uranium	0.1	3.4	420
Vanadium	0.5	nd	250
Zinc	5	6	1100
Notes:			
<ul style="list-style-type: none"> MDL – Method Detection Limit nd – not detected above the MDL 			

All metal concentrations in the groundwater samples comply with the selected MECP Table 3 Residential Standards.

The analytical results in the groundwater with respect to borehole locations are shown on Drawing PE4767-5 - Analytical Testing Plan – Groundwater.

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

Table 11: Maximum Concentrations – Groundwater			
Parameter	Maximum Concentration (µg/L)	Groundwater Sample	Screened Interval (m BGS)
VOCs			
Chloroform	<u>17.5</u>	BH2-GW1	6.17-9.17
Tetrachloroethylene	<u>40.3</u>	BH1-20-GW1	4.42-5.94
Metals			
Barium	114	BH2-19-GW2	6.02-9.07
Boron	101		
Molybdenum	1.5		
Sodium	94500		
Uranium	3.4		
Zinc	6		
Notes:			
▪ <u>Bold and Underlined</u> – Value exceeds the selected MECP Table 3 Residential Standards			

The maximum concentrations for chloroform and tetrachloroethylene in groundwater samples analyzed exceed the selected MECP Table 3 Residential Standards. The remaining maximum parameter concentrations analyzed are in compliance with the selected standards or were not detected above the laboratory method detection limits.

VOC and Metals concentrations were identified in the groundwater samples analyzed. All Metals parameter concentrations comply with the selected MECP Table 3 Residential Standards, while VOCs (chloroform and tetrachloroethylene) exceeded the selected MECP Table 3 Residential Standards.

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 (DUP1) from BH2-20 was obtained and analyzed for VOC parameters.

The RPD calculations were not completed as all VOC parameters analyzed for both soil sample BH2-20-SS7 and the duplicate (DUP1) were below the analytical detection limit. The RPD results are considered to be within the acceptable range. Therefore, 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 indicated in Section 2.2 of this report, PCAs 34 and 33, as per Table 2 of the O.Reg. 153/04 were identified and considered to represent APECs on the Phase II Property:

- ☐ APEC 1: Former on-site dry cleaners located in the southeastern corner of the Phase I Property;
- ☐ APEC 2: Fill material of unknown quality located throughout on the eastern section of the Phase I Property where former structures were located.

Contaminants of Potential Concern

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

- ☐ Polycyclic Aromatic Hydrocarbons (PAHs);
- ☐ Metals (including Mercury and Chrome VI); and
- ☐ Volatile organic compounds (VOCs).

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

- ☐ Metals (including Mercury and Chrome VI); and
- ☐ Volatile organic compounds (VOCs).

Subsurface Structures and Utilities

The Phase II Property is situated in a municipally serviced area. All underground services including electricity, municipal water and sewer services, have been disconnected from the existing residential structure. These services enter the Phase II Property from Stittsville Main Street. A natural gas line connects to the adjacent commercial property at the southeastern corner of the Phase II Property.

Physical Setting

Site Stratigraphy

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is described below and consists of:

- ☐ Topsoil at six boreholes located on landscaped areas of the Phase II Property. Topsoil was encountered at depths ranging from 0 - 0.20 mbgs.
- ☐ Fill material consisting of brown silty sand with traces of cobbles, concrete, brick and/or wood. The fill material was encountered at depths ranging from 0 to 2.29 mbgs.
- ☐ Silty sand was encountered beneath the fill layer and encountered at depths ranging from 0.18 to 2.29 mbgs and extended to depths ranging from 3.81 to 5.77 mbgs. Groundwater was encountered in this layer at BH2-20 and BH3-20.
- ☐ Glacial till was encountered beneath the silty sand layer and encountered at depths ranging from 3.81 to 5.77 mbgs and extended to depths ranging from 4.22 to 5.94. Groundwater was encountered in this layer at BH1-20.
- ☐ Limestone bedrock was encountered in all boreholes, extending to depths ranging from approximately 4.22 to 5.94 mbgs. Bedrock was cored to a maximum depth of 9.04 mbgs at BH3-20. Groundwater was encountered in the bedrock layer at BH3-20.

Hydrogeological Characteristics

Groundwater at the Phase II Property was encountered in the silty sand and glacial till layers, ranging from depths of approximately 5.07 to 5.42 mbgs. Groundwater flow was measured in a westerly direction with a hydraulic gradient of 0.038mm/m. Groundwater contours are shown on Drawing PE4767-3—Test Hole Location Plan.

Approximate Depth to Water Table

Depth to the water table at the subject site varies between approximately 5.07 to 5.42 mbgs.

Approximate Depth to Bedrock

Bedrock was confirmed during the drilling program at depths ranging from 4.22 to 5.94 mbgs in all boreholes.

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 O.Reg. 153/04 does not apply to the Phase II Property, as the property is not within 30m of an environmentally sensitive area and the pH of the soil is between 5 and 9.

Section 43.1 of O.Reg. 153/04 does not apply to the Phase II Property as the soil exceeds the defined shallow soil property.

Fill Placement

Based on the findings of the subsurface investigation, the fill material encountered consisted of a mixture of silty sand with crushed stone, gravel, concrete, brick and wood. The fill material was encountered in the west side of the Phase II Property in the area of the former building footprints.

No visual or olfactory evidence of deleterious materials or contamination were identified in the fill material with the exception of brick and concrete debris in bore hole BH4-20.

Existing Buildings and Structures

The Phase II Property is occupied by three (3) structures; a single storey residential dwelling with a full level basement, a detached wood framed shed located at the rear of the residential dwelling, and a steel framed slab on grade workshop/garage, all of which have been abandoned. No other structures are present on the Phase II Property.

Proposed Buildings and Other Structures

The proposed development for the Phase II Property includes a four-storey residential structure and a two-storey commercial structure connected by an archway. The proposed structure will consist of a single level of underground parking and ground level parking.

Water Bodies and Areas of Natural Significance

No areas of natural significance or water bodies were identified on the Phase II Property or within a 250 m search radius. The closest named waterbody is Poole Creek, located approximately 600 m northwest of the Phase II Property.

Environmental Condition

Areas Where Contaminants are Present

The 2011 and 2019 subsurface investigations identified tetrachloroethylene, in the soil samples that exceed the MECP Table 3 Residential Standards. The impacted soil samples were collected from the eastern portion of the Phase II Property on and adjacent to the footprint of the former dry cleaners.

The current subsurface investigation identified lead and mercury in the soil samples that exceed the MECP Table 3 Residential Standards. The impact soil samples were collected from the fill material from the northeastern portion of the Phase II Property on the footprint of the former restaurant.

The 2011 and 2019 subsurface investigations identified chloroform, cis-1,2-Dichloroethylene and tetrachloroethylene in the groundwater samples that exceeded the current MECP Table 3 Residential standards. The impacted groundwater samples were collected from monitoring wells installed on the eastern portion of the Phase II Property within proximity to the footprint of the former dry cleaners.

The current subsurface investigation identified chloroform and tetrachloroethylene in the groundwater samples that exceed the MECP Table 3 Residential Standards. The impacted groundwater samples were collected from monitoring wells installed on the eastern portion of the Phase II Property within proximity to footprint of the former dry cleaners.

Types of Contaminants

Based on the analytical results for soil and groundwater, the contaminants of concern include lead and mercury identified in the fill material from BH4-2 and Chloroform and Tetrachloroethylene which were identified in the groundwater. Chloroform was identified in only one sampled monitoring well (BH2-11) which was installed in 2011. The presence of chloroform is considered to be related to the use of municipal drinking water during the drilling process.

Contaminated Media

Based on the findings of the Phase II ESA, the fill material at BH4-20 is impacted with metals, specifically lead and mercury, while groundwater encountered on the eastern portion of the property is impacted with VOCs, specifically tetrachloroethylene.

What Is Known About Areas Where Contaminants Are Present

Based on the subsurface investigation, the fill material was impacted and contained demolition debris in the vicinity of the former structures along the eastern portion of the Phase II Property. The groundwater impact was also identified in the monitoring wells sampled along the eastern portion of the Phase II Property, in the area of the former dry cleaners.

Distribution and Migration of Contaminants

Metals contamination in soil was identified within the layer of fill material located at the footprint of the former restaurant located at the northeastern portion of the Phase II Property. VOC contamination in soil was identified within the silty sand layer on the eastern portion of the Phase II Property at BH1-19 and BH2-11. The VOC contamination in soils were noted to be within proximity (BH1-19) and on the footprint of the former dry cleaners (BH2-11).

Migration of contaminants in soils may be affected by downward leaching given the hydraulic conductivity of underlying layers (silty sand). Physical transport of contaminated soil on the Phase II Property was not observed to be occurring, as no soil disturbances were noted on the site at the time of the investigation.

Groundwater VOC contamination was identified in five monitoring wells installed on the eastern portion of the Phase II Property. Groundwater contamination is attributed to the former dry-cleaning activities.

Migration of contaminants within the groundwater at the Phase II Property is potentially affected by groundwater flow and hydraulic gradients. Analytical testing indicates that groundwater contamination has migrated beyond BH2-20 and BH1-20.

Discharge of Contaminants

The metals impact on the northeastern portion of the Phase II Property is considered to have resulted from the demolition debris from the former buildings on-site and importation of off-site fill material. The VOC contamination identified in soil and groundwater are attributed to the former dry cleaning activities.

Climatic and Meteorological Conditions

In general, climatic and meteorological conditions have the potential to affect contaminant distribution. Two (2) ways by which climatic and meteorological conditions may affect contaminant distribution include the downward leaching of contaminants by means of the infiltration of precipitation, and the migration of contaminants via groundwater levels and/or flow, which may fluctuate seasonally.

Metals do not readily dissolve in groundwater well below the fill material. Therefore, groundwater was not impacted from leaching of metal contaminants identified in the fill material.

Prior to future site redevelopment, the VOC's identified in the groundwater will be verified and if present, it will be remediated.

Potential for Vapour Intrusion

During redevelopment of the subject site, all soils exceeding the MECP Table 3 residential standards will be removed from the subject site and disposed off-site. As such, there is no anticipated potential for future vapour intrusion at the subject site.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the properties addressed 1518, 1524 and 1526 Stittsville Main Street in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the areas of environmental concern (APECs) that were identified during the Phase I ESA.

The Phase II ESA was carried out in conjunction with a Geotechnical Investigation and consisted of drilling twelve boreholes on the Phase II Property, three of which were constructed with groundwater monitoring well installations.

The soil profile generally consisted of a topsoil and/or brown silty sand with crushed stone fill material, followed by some native silty sand, underlain by limestone interbedded shale bedrock. Bedrock was encountered at a depth ranging from 4.22 - 5.94 meters below the ground surface. Soil samples were obtained from the boreholes and screened based on visual observations and vapour measurements. Some brown silty sand with traces of cobbles, concrete, brick and/or wood were identified in the fill material, although no olfactory evidence or contamination were identified during the subsurface investigation.

Based on the screening results in combination with sample depth and location, six (6) soil sample were submitted for laboratory analysis of metals, PAHs and/or VOCs. The analytical results from the subsurface investigation identified metal concentrations (lead and mercury) in excess of the MECP Table 3 Residential Standards at BH4-20.

Previous subsurface investigations identified VOC concentrations (Tetrachloroethylene) in soil which exceeds MECP Table 3 Residential Standards.

Groundwater samples were recovered and analyzed for PHC's, VOCs and/or metals. No free-phase product was observed on the groundwater at any of the monitoring well locations during the groundwater sampling events. Tetrachloroethylene concentrations were identified in all sampled monitoring wells and exceeded the MECP Table 3 Residential Standards. Chloroform concentration identified in sample obtained from borehole BH2-11 was identified in excess of the MECP Table 3 Residential Standards. The presence of chloroform is considered to be related to the use of municipal water during the drilling program.

Previous groundwater sampling also identified chloroform, tetrachloroethylene and cis-1,2-dichloroethylene within the groundwater that exceeded MECP Table 3 Standards.

Recommendations

As noted in the report, a portion of the Phase II Property will be redeveloped for residential land use and as such, the residential portion of the property will require a Record of Site Condition (RSC).

Soil

Impacted Fill Material and Soil was identified on the Phase II Property. The impacted soil is not considered to pose a risk to the current use of the site and can be managed during the redevelopment of the property, if required. Any soil which exceeds the MECP Table 3 Standards will need to be disposed of at an approved waste disposal facility.

Testing of the fill material will be required in conjunction with the excavation program to segregate clean soil from impacted soil and for final confirmatory purposes.

Groundwater

Impacted groundwater was identified on the Phase II Property. The impacted groundwater is not considered to pose a risk to the current use of the site and can be managed during the redevelopment of the property, if required.

Monitoring Wells

The monitoring wells on the Phase II Property should be maintained for future groundwater monitoring purposes. If they are not going to be used in the future, they should be abandoned according to 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 subject site and/or historical information that differ from our findings, we request that we be notified immediately in order to allow for a reassessment.

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

Paterson Group Inc.



Mark St Pierre, B.Eng.



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



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FIGURES AND DRAWINGS

FIGURE 1 – KEY PLAN

Drawing PE4767-3 – Test Hole Location Plan

Drawing PE4767-4 – Analytical Testing Plan –Soils

Drawing PE4767-5 – Analytical Testing Plan – Groundwater

Drawing PE4767-6 – Proposed Redevelopment Plan

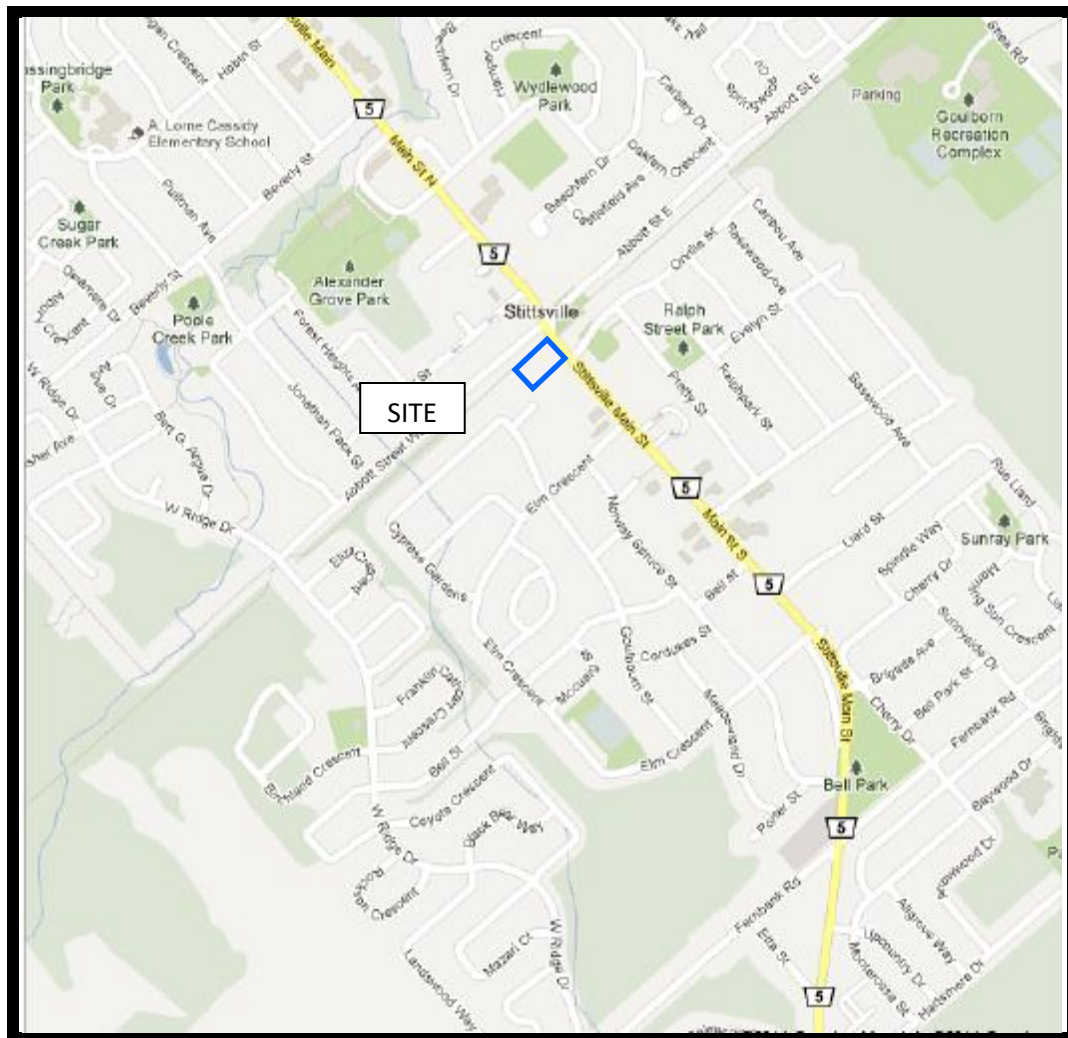
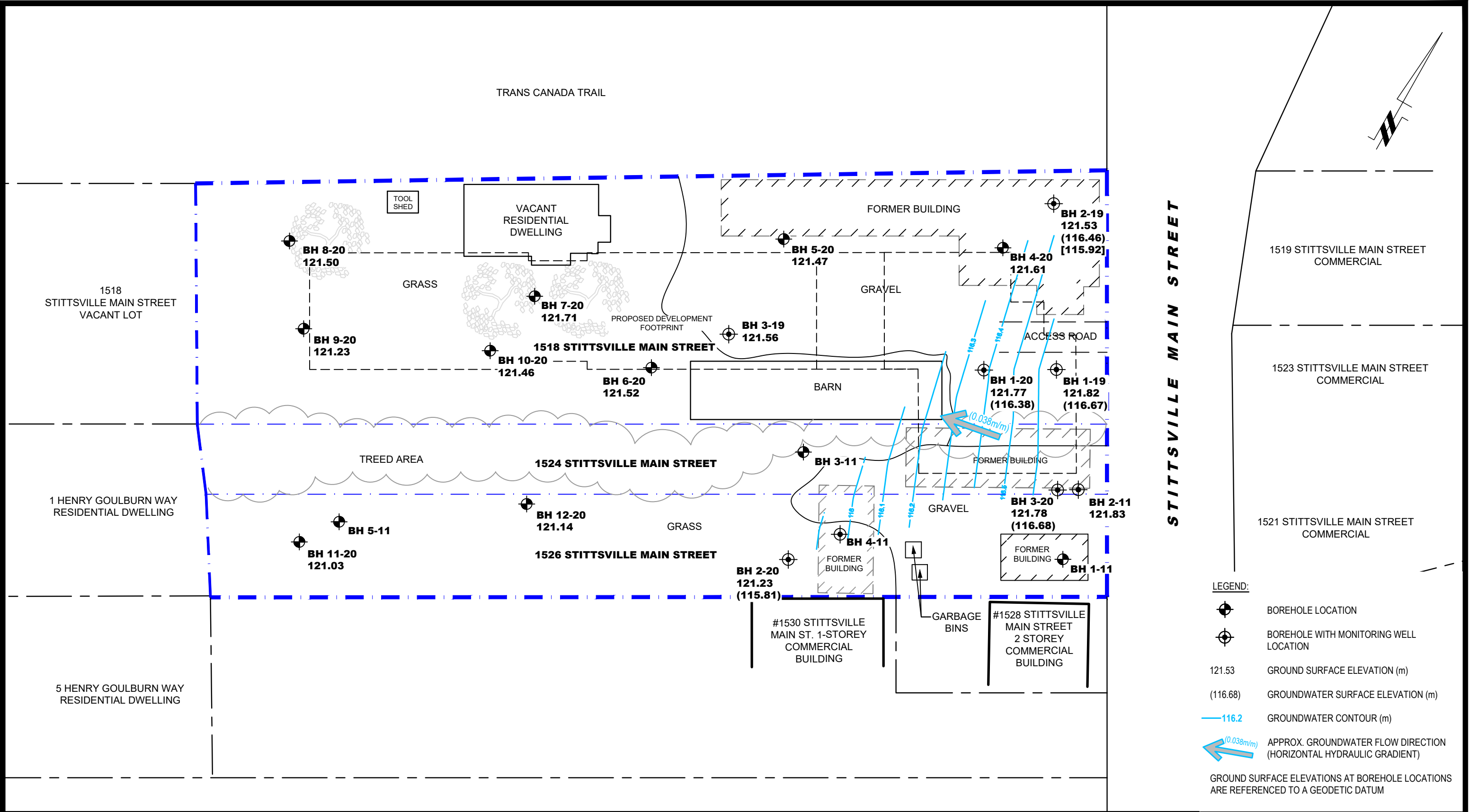


FIGURE 1
KEY PLAN



LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 121.53 GROUND SURFACE ELEVATION (m)
- (116.68) GROUNDWATER SURFACE ELEVATION (m)
- 116.2 GROUNDWATER CONTOUR (m)
- APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

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

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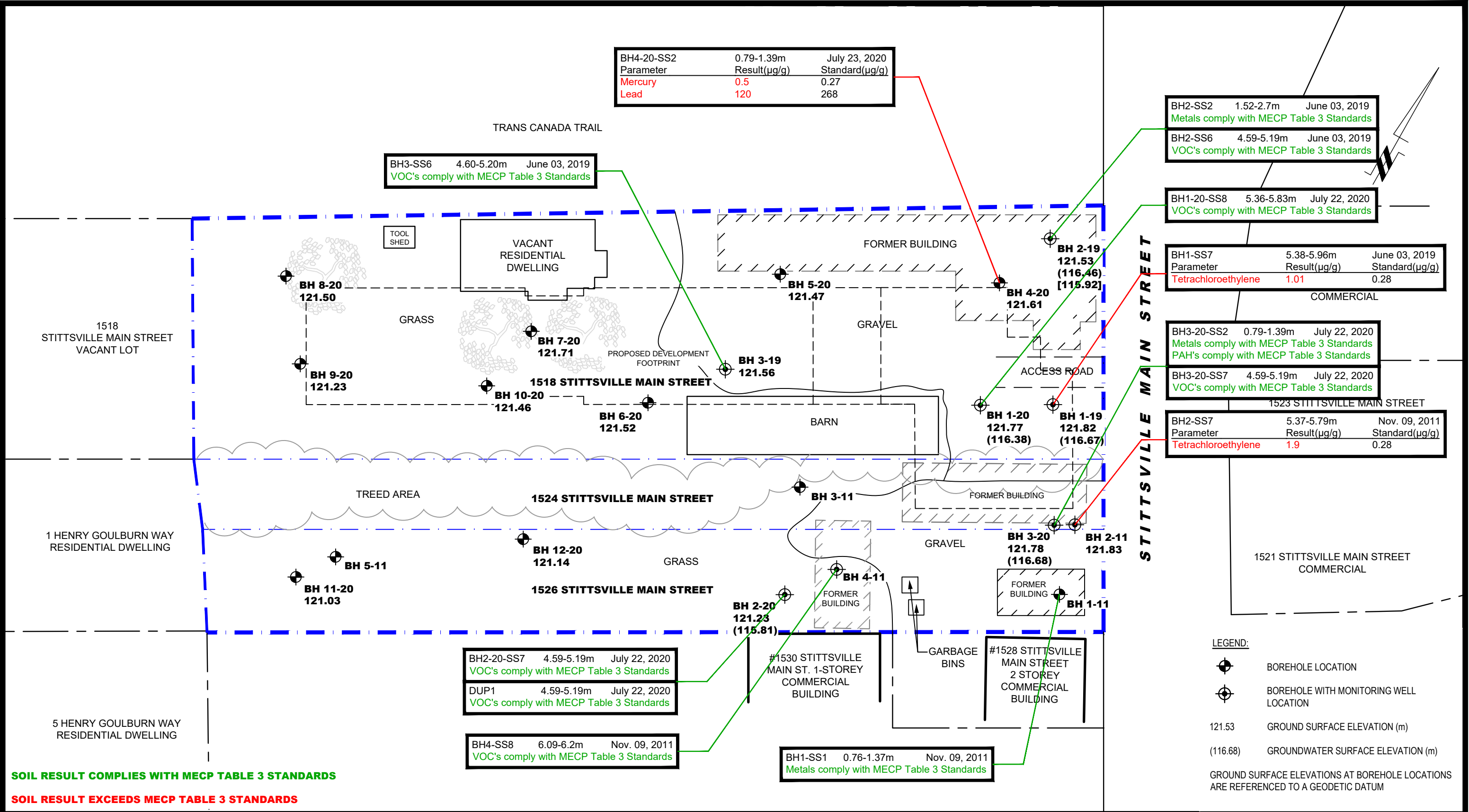
INVERNESS HOMES
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1518, 1524, 1526 STITTSVILLE MAIN STREET

STITTSVILLE, ONTARIO

Title: **TEST HOLE LOCATION PLAN**

Scale: 1:400	Date: 10/2020
Drawn by: MPG	Report No.: PE4767-2
Checked by: MSP	Dwg. No.: PE4767-3
Approved by: MB	Revision No.:

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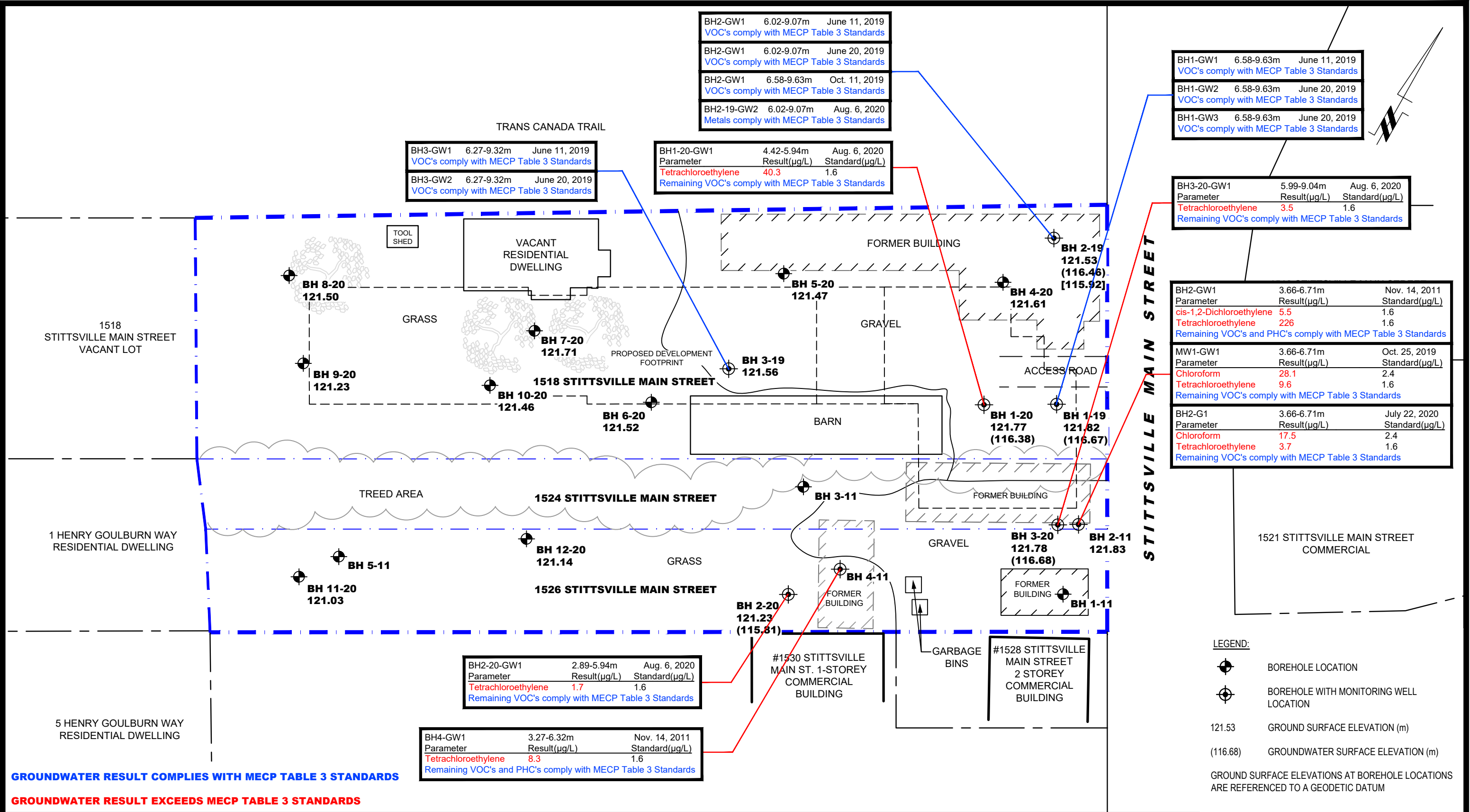
1518, 1524, 1526 STITTSVILLE MAIN STREET

STITTSVILLE, ONTARIO

Title: ANALYTICAL TETSING PLAN - SOIL

Scale:	1:400	Date:	10/2020
Drawn by:	MPG	Report No.:	PE4767-2
Checked by:	MSP	Dwg. No.:	PE4767-4
Approved by:	MB	Revision No.:	

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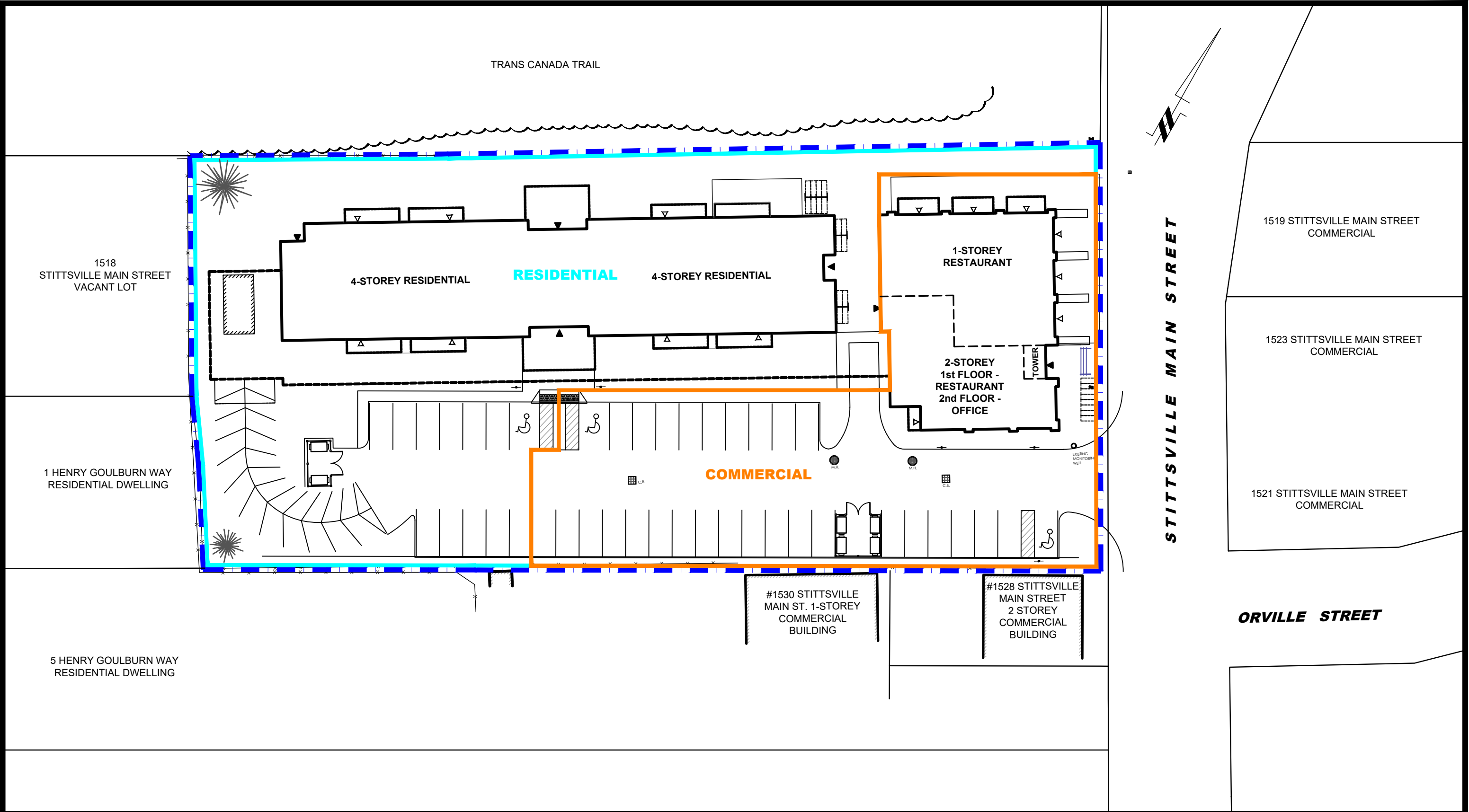
1518, 1524, 1526 STITTSVILLE MAIN STREET

STITTSVILLE, ONTARIO

Title: **ANALYTICAL TETSING PLAN - GROUNDWATER**

Scale:	1:400	Date:	10/2020
Drawn by:	MPG	Report No.:	PE4767-2
Checked by:	MSP	Dwg. No.:	PE4767-5
Approved by:	MSD	Revision No.:	

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NO.	REVISIONS	DATE	INITIAL

INVERNESS HOMES	
PHASE II - ENVIRONMENTAL SITE ASSESSMENT	
1518, 1524, 1526 STITTSVILLE MAIN STREET	
STITTSVILLE,	ONTARIO
Title: PROPOSED REDEVELOPMENT PLAN	

Scale:	1:400	Date:	11/2020
Drawn by:	MPG	Report No.:	PE4767-2
Checked by:	MSP	Dwg. No.:	PE4767-6
Approved by:	MB	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

Archaeological
Services

patersongroup

Sampling & Analysis Plan

Phase II Environmental Site Assessment
1520,1524,1526 Stittsville Main Street
Ottawa, Ontario

Prepared For

Uniform Developments

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October 2020

Report: PE4767-SAP

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2.0	ANALYTICAL TESTING PROGRAM.....	2
3.0	STANDARD OPERATING PROCEDURES	3
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3.3	Monitoring Well Sampling Procedure	7
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1.0 SAMPLING PROGRAM

Paterson was retained by Mr. Joshua Laginski of Inverness Homes, to conduct a Phase II Environmental Site Assessment (ESA) for the properties addressed 1518, 1524 and 1526, 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
BH1-20	Place northwest of former dry cleaners for geotechnical purposes and to assess APECs 1.	Borehole advanced to at least 3 m within the groundwater table to facilitate installation of groundwater monitoring wells.
BH2-20	Place southeast of former dry cleaners for geotechnical purposes and to assess APECs 1.	Boreholes to be advanced until practical refusal and within the groundwater table to facilitate installation of groundwater monitoring wells.
BH3-20	Placed on the footprint of former dry cleaners for geotechnical purposes and to vertically assess APEC 1.	Borehole advanced to at least 3 m within the groundwater table to facilitate installation of groundwater monitoring wells.
BH4-20	Placed on the northeastern portion of the property for geotechnical purposes and to assess the quality of the fill material (APEC 2).	Boreholes to be advanced until practical refusal.
BH5-20	Placed for geotechnical purposes.	Boreholes to be advanced until practical refusal.
BH6-20	Placed for geotechnical purposes.	Boreholes to be advanced until practical refusal.
BH7-20	Placed for geotechnical purposes.	Boreholes to be advanced until practical refusal.
BH8-20	Placed for geotechnical purposes.	Boreholes to be advanced until practical refusal.
BH9-20	Placed for geotechnical purposes.	Boreholes to be advanced until practical refusal.
BH10-20	Placed for geotechnical purposes.	Boreholes to be advanced until practical refusal.

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 MOECC 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.

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1520, 1524 and 1526 Stittsville Main Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE July 22, 2020

FILE NO.

PE4767

HOLE NO.

BH 1-20

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)				
								○ Lower Explosive Limit %				
GROUND SURFACE								20	40	60	80	
FILL: Brown silty sand with crushed stone	0.66	AU	1			0	121.77					
FILL: Red-brown silty sand, trace organics	1.37	SS	2	54	5	1	120.77					
Compact, brown SILTY SAND		SS	3	46	12	2	119.77					
		SS	4	54	17							
		SS	5	58	33	3	118.77					
		SS	6	50	28	4	117.77					
		SS	7	67	24	5	116.77					
GLACIAL TILL: Dense, brown silty sand with gravel, cobbles and boulders	5.18	SS	8	67	55							
End of Borehole	5.94											
Practical refusal to augering at 5.94m depth.												
(GWL @ 5.39m - Aug. 6, 2020)												
								100	200	300	400	500
								RKI Eagle Rdg. (ppm)				
								▲ Full Gas Resp. △ Methane Elim.				

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1520, 1524 and 1526 Stittsville Main Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

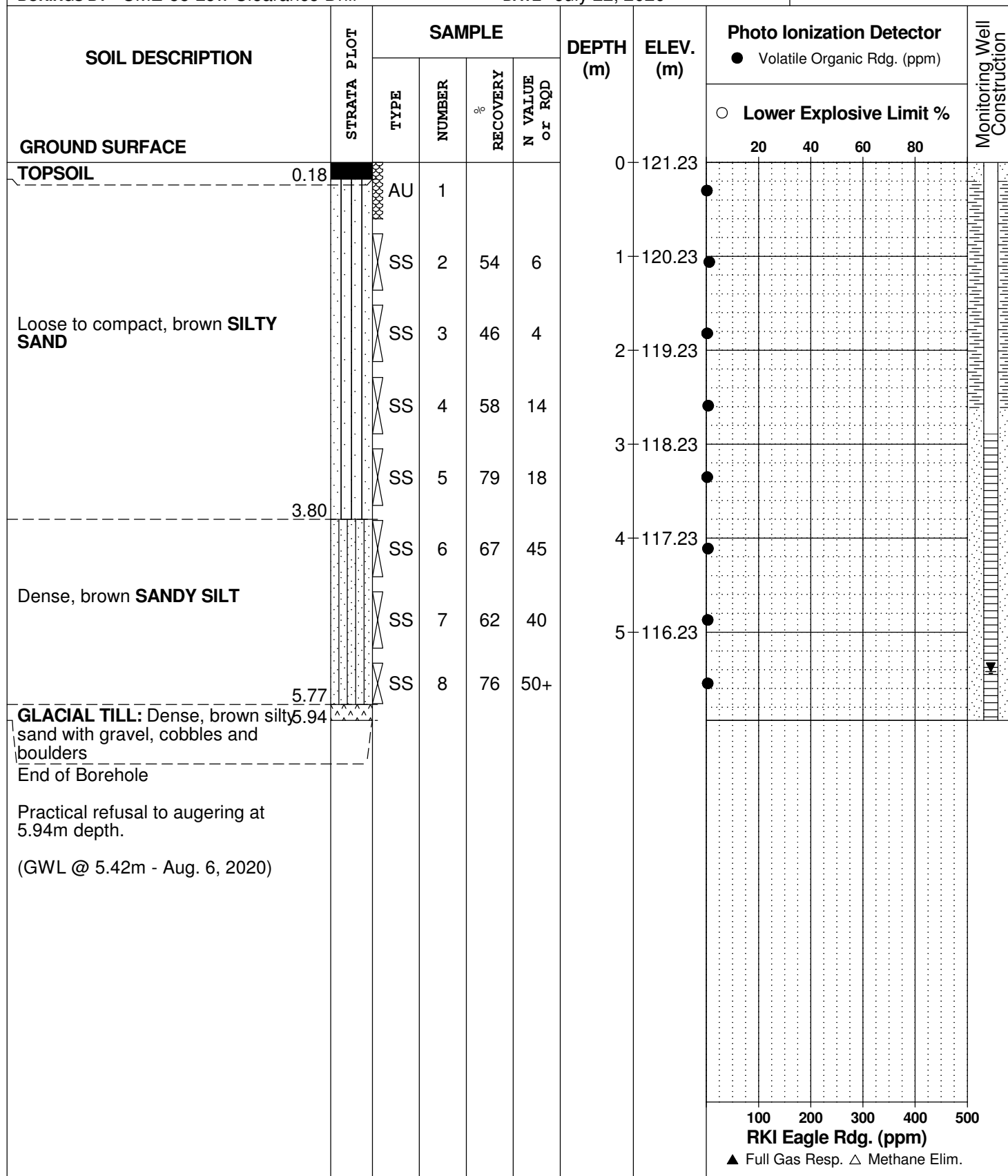
DATE July 22, 2020

FILE NO.

PE4767

HOLE NO.

BH 2-20



SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1520, 1524 and 1526 Stittsville Main Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

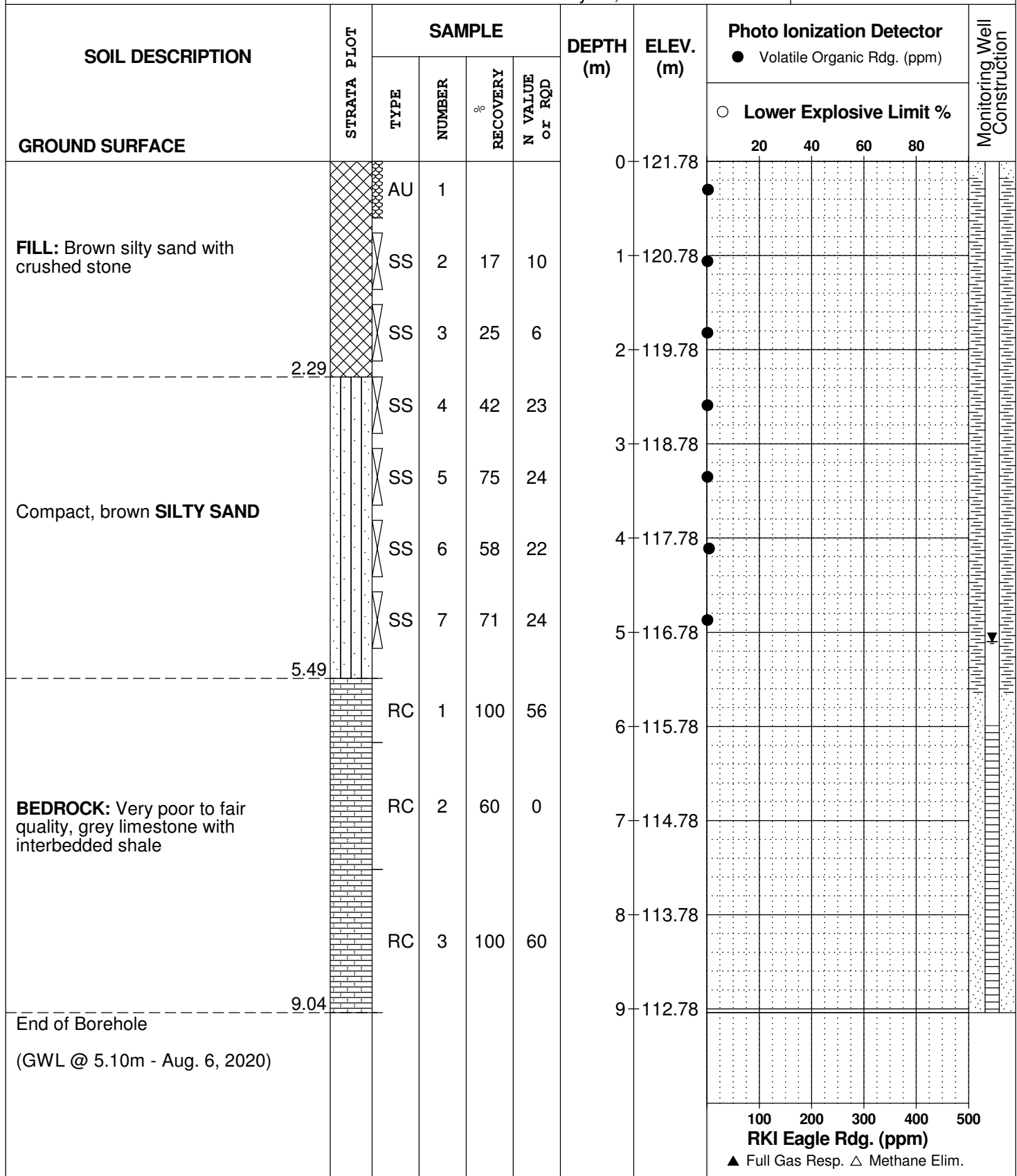
DATE July 22, 2020

FILE NO.

PE4767

HOLE NO.

BH 3-20



SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1520, 1524 and 1526 Stittsville Main Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE July 22, 2020

FILE NO.

PE4767

HOLE NO.

BH 4-20

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	% RECOVERY	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %				
GROUND SURFACE									20	40	60	80	
FILL: Brown sand with gravel	0.53	AU	1			0	121.61	●					
FILL: Brown silty sand with gravel, some cobbles, concrete, trace brick, wood	2.13	SS	2	29	23	1	120.61	●					
		SS	3	12	50+	2	119.61	●					
Compact, brown SILTY SAND	5.18	SS	4	58	16	3	118.61	●					
		SS	5	54	21	4	117.61	●					
		SS	6	62	27	5	116.61	●					
		SS	7	75	21								
End of Borehole													
									100	200	300	400	500
									RKI Eagle Rdg. (ppm)				
									▲ Full Gas Resp. △ Methane Elim.				

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1520, 1524 and 1526 Stittsville Main Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE July 22, 2020

FILE NO.

PE4767

HOLE NO.

BH 5-20

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)				
								○ Lower Explosive Limit %				
GROUND SURFACE								20	40	60	80	
FILL: Brown silty sand with gravel, trace organics	0.38	AU	1			0	121.47					
Compact, brown SILTY SAND		SS	2	54	6	1	120.47					
		SS	3	50	13	2	119.47					
		SS	4	54	20	3	118.47					
		SS	5	79	33	4	117.47					
		SS	6	58	33	5	116.47					
		SS	7	79	28	6	115.47					
End of Borehole	5.18											

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1520, 1524 and 1526 Stittsville Main Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE July 23, 2020

FILE NO. **PE4767**

HOLE NO. **BH 6-20**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction			
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %	20	40		60	80	
GROUND SURFACE															
FILL: Brown silty sand with gravel, trace organics	0.38	AU	1			0	121.52								
Compact to dense, brown SILTY SAND		SS	2	54	9	1	120.52								
		SS	3	67	18	2	119.52								
		SS	4	71	28	3	118.52								
		SS	5	62	26	4	117.52								
		SS	6	79	25	5	116.52								
		SS	7	62	31	6	116.52								
End of Borehole	5.11					5	116.52								
Practical refusal to augering at 5.11m depth.															

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1520, 1524 and 1526 Stittsville Main Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE July 23, 2020

FILE NO.

PE4767

HOLE NO.

BH 7-20

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector					Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)					
								○ Lower Explosive Limit %					
GROUND SURFACE								20	40	60	80		
TOPSOIL	0.10					0	121.71						
Loose to dense, brown SILTY SAND		AU	1										
		SS	2	50	5	1	120.71						
		SS	3	50	8	2	119.71						
		SS	4	75	26	3	118.71						
		SS	5	75	28	4	117.71						
		SS	6	83	33	5	116.71						
Compact, brown SANDY SILT	4.57												
		SS	7	92	28								
End of Borehole	5.18												
								100	200	300	400	500	
								RKI Eagle Rdg. (ppm)					
								▲ Full Gas Resp. △ Methane Elim.					

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1520, 1524 and 1526 Stittsville Main Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE July 23, 2020

FILE NO.

PE4767

HOLE NO.

BH 8-20

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %				
20	40					60	80						
GROUND SURFACE													
FILL: Topsoil with sand, some gravel, organics and boulders	0.51	AU	1			0	121.50						
Loose to compact, brown SILTY SAND		SS	2	50	5	1	120.50						
		SS	3	42	3	2	119.50						
		SS	4	50	18								
		SS	5	58	23	3	118.50						
		SS	6	75	50+	4	117.50						
Dense, brown SANDY SILT	3.81												
GLACIAL TILL: Brown silty sand with weathered bedrock	4.19												
End of Borehole	4.22												
Practical refusal to augering at 4.22m depth.													

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1520, 1524 and 1526 Stittsville Main Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE July 23, 2020

FILE NO.

PE4767

HOLE NO.

BH 9-20

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector					Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)					
								○ Lower Explosive Limit %					
GROUND SURFACE								20	40	60	80		
TOPSOIL	0.15		AU	1		0	121.23						
Loose to compact, brown SILTY SAND			SS	2	50	6	1	120.23					
			SS	3	75	8	2	119.23					
			SS	4	62	13	3	118.23					
			SS	5	54	18	4	117.23					
			SS	6	58	32	5	116.23					
			SS	7	79	31	5	116.23					
Dense, brown SANDY SILT , trace gravel	4.57												
End of Borehole	5.18												
								100	200	300	400	500	
								RKI Eagle Rdg. (ppm)					
								▲ Full Gas Resp. △ Methane Elim.					

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1520, 1524 and 1526 Stittsville Main Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE July 23, 2020

FILE NO.

PE4767

HOLE NO.

BH10-20

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector					Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)					
								○ Lower Explosive Limit %					
GROUND SURFACE								20	40	60	80		
TOPSOIL	0.13	AU	1			0	121.46	●					
Loose, red-brown SILTY SAND, trace gravel	1.37	SS	2	58	6	1	120.46	●					
Loose to compact, brown SILTY SAND		SS	3	50	4	2	119.46	●					
		SS	4	58	8	3	118.46	●					
		SS	5	79	28	4	117.46	●					
		SS	6	67	30	5	116.46	●					
		SS	7	59	50+	6	115.46	●					
Dense, brown SANDY SILT, trace clay	4.57												
End of Borehole	5.00												
Practical refusal to augering at 5.00m depth.													

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1520, 1524 and 1526 Stittsville Main Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill

DATE July 22, 2020

FILE NO. **PE4767**

HOLE NO. **BH11-20**

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector				Monitoring Well Construction
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)	○ Lower Explosive Limit %			
GROUND SURFACE												
TOPSOIL	0.18	AU	1			0	121.03					
Loose to compact, red-brown SILTY SAND - brown by 1.4m depth		SS	2	42	5	1	120.03					
		SS	3	75	10	2	119.03					
		SS	4	75	14							
		SS	5	71	27	3	118.03					
Compact to dense, grey SANDY SILT , trace clay	3.05	SS	6	58	32	4	117.03					
		SS	7	46	31	5	116.03					
GLACIAL TILL: Dense, brown silty sand with gravel, cobbles and boulders	4.57											
End of Borehole	5.18											
								<div>100 200 300 400 500</div> <div>RKI Eagle Rdg. (ppm)</div> <div>▲ Full Gas Resp. △ Methane Elim.</div>				

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
1520, 1524 and 1526 Stittsville Main Street
Ottawa, Ontario

DATUM Geodetic

REMARKS

BORINGS BY CME-55 Low Clearance Drill














DATE July 22, 2020

FILE NO.

PE4767

HOLE NO.

BH12-20

SOIL DESCRIPTION	STRATA PLOT	SAMPLE				DEPTH (m)	ELEV. (m)	Photo Ionization Detector					Monitoring Well Construction	
		TYPE	NUMBER	RECOVERY %	N VALUE or RQD			● Volatile Organic Rdg. (ppm)						
								○ Lower Explosive Limit %						
GROUND SURFACE									20	40	60	80		
TOPSOIL	0.20		AU	1			0	121.14						
Loose, brown SILTY SAND , some gravel			SS	2	8	8	1	120.14						
	1.52		SS	3	50	5	2	119.14						
Loose to compact, brown SILTY SAND			SS	4	58	10	3	118.14						
			SS	5	62	18								
			SS	6	50	50+								
GLACIAL TILL: Dense, brown silty sand with weathered bedrock	3.81 4.22						4	117.14						
End of Borehole														
Practical refusal to augering at 4.22m depth.														

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

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

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

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

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

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

CONSOLIDATION TEST

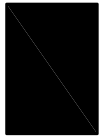
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidation ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

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

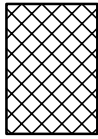
STRATA PLOT



Topsoil



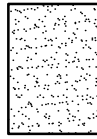
Asphalt



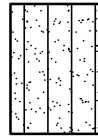
Fill



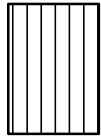
Peat



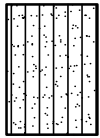
Sand



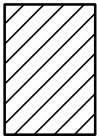
Silty Sand



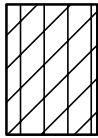
Silt



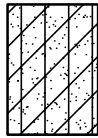
Sandy Silt



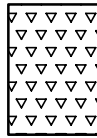
Clay



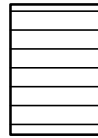
Silty Clay



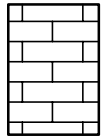
Clayey Silty Sand



Glacial Till



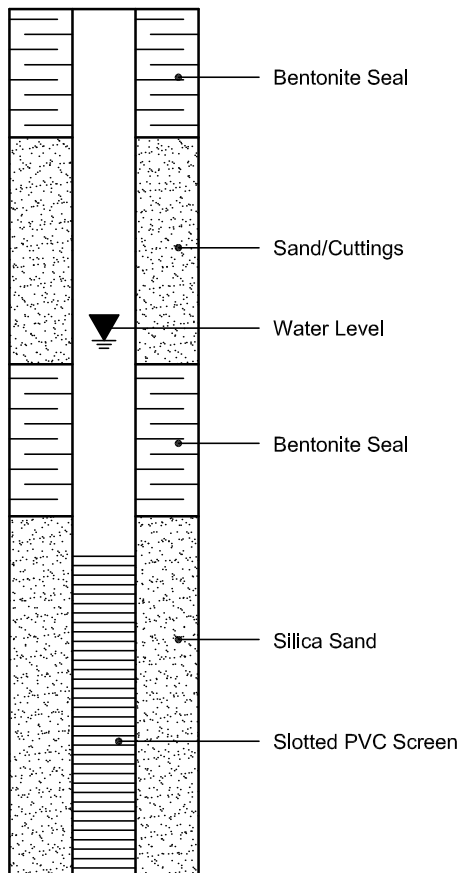
Shale



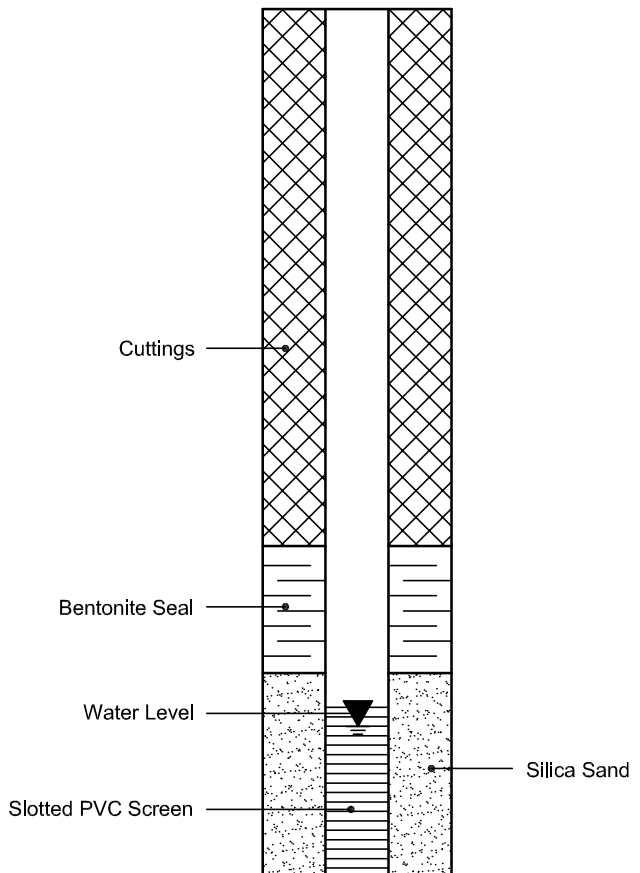
Bedrock

MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Rd South
Nepean, ON K2E 7J5
Attn: Mark St. Pierre

Client PO: 30459
Project: PE4767
Custody: 128563

Report Date: 29-Jul-2020
Order Date: 23-Jul-2020

Order #: 2030460

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

Paracel ID	Client ID
2030460-01	BH1-20-SS8
2030460-02	BH2-20-SS7
2030460-03	BH3-20-SS2
2030460-04	BH3-20-SS7

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 29-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2020

Client PO: 30459

Project Description: PE4767

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	24-Jul-20	28-Jul-20
Mercury by CVAA	EPA 7471B - CVAA, digestion	28-Jul-20	29-Jul-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	28-Jul-20	28-Jul-20
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	23-Jul-20	27-Jul-20
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	24-Jul-20	26-Jul-20
Solids, %	Gravimetric, calculation	28-Jul-20	28-Jul-20

Certificate of Analysis

Report Date: 29-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2020

Client PO: 30459

Project Description: PE4767

Client ID:	BH1-20-SS8	BH2-20-SS7	BH3-20-SS2	BH3-20-SS7
Sample Date:	22-Jul-20 09:00	22-Jul-20 09:00	22-Jul-20 09:00	22-Jul-20 09:00
Sample ID:	2030460-01	2030460-02	2030460-03	2030460-04
MDL/Units	Soil	Soil	Soil	Soil

Physical Characteristics

% Solids	0.1 % by Wt.	90.7	81.0	97.2	87.4
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Metals

Antimony	1.0 ug/g dry	-	-	<1.0	-
Arsenic	1.0 ug/g dry	-	-	3.2	-
Barium	1.0 ug/g dry	-	-	198	-
Beryllium	0.5 ug/g dry	-	-	<0.5	-
Boron	5.0 ug/g dry	-	-	10.3	-
Cadmium	0.5 ug/g dry	-	-	<0.5	-
Chromium	5.0 ug/g dry	-	-	14.3	-
Chromium (VI)	0.2 ug/g dry	-	-	<0.2	-
Cobalt	1.0 ug/g dry	-	-	5.8	-
Copper	5.0 ug/g dry	-	-	12.4	-
Lead	1.0 ug/g dry	-	-	13.1	-
Mercury	0.1 ug/g dry	-	-	<0.1	-
Molybdenum	1.0 ug/g dry	-	-	<1.0	-
Nickel	5.0 ug/g dry	-	-	13.1	-
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	-	-	21.4	-
Zinc	20.0 ug/g dry	-	-	<20.0	-

Volatiles

Acetone	0.50 ug/g dry	<0.50	<0.50	-	<0.50
Benzene	0.02 ug/g dry	<0.02	<0.02	-	<0.02
Bromodichloromethane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Bromoform	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Bromomethane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Carbon Tetrachloride	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Chlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Chloroform	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Dibromochloromethane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	<0.05

Certificate of Analysis

Report Date: 29-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2020

Client PO: 30459

Project Description: PE4767

	Client ID: Sample Date: Sample ID:	BH1-20-SS8 22-Jul-20 09:00 2030460-01	BH2-20-SS7 22-Jul-20 09:00 2030460-02	BH3-20-SS2 22-Jul-20 09:00 2030460-03	BH3-20-SS7 22-Jul-20 09:00 2030460-04
	MDL/Units	Soil	Soil	Soil	Soil
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
1,1-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
1,2-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
1,2-Dichloropropane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Hexane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	<0.50	-	<0.50
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	<0.50	-	<0.50
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Methylene Chloride	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Styrene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Tetrachloroethylene	0.05 ug/g dry	0.25	<0.05	-	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Trichloroethylene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Trichlorofluoromethane	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Vinyl chloride	0.02 ug/g dry	<0.02	<0.02	-	<0.02
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	<0.05
4-Bromofluorobenzene	Surrogate	119%	116%	-	124%
Dibromofluoromethane	Surrogate	85.4%	85.9%	-	83.2%
Toluene-d8	Surrogate	122%	121%	-	119%
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	-	<0.02	-
Acenaphthylene	0.02 ug/g dry	-	-	<0.02	-

Certificate of Analysis

Report Date: 29-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2020

Client PO: 30459

Project Description: PE4767

	MDL/Units	Client ID:	BH1-20-SS8	BH2-20-SS7	BH3-20-SS2	BH3-20-SS7
		Sample Date:	22-Jul-20 09:00	22-Jul-20 09:00	22-Jul-20 09:00	22-Jul-20 09:00
	Sample ID:	2030460-01	2030460-02	2030460-03	2030460-04	
		Soil	Soil	Soil	Soil	
Anthracene	0.02 ug/g dry	-	-	<0.02	-	
Benzo [a] anthracene	0.02 ug/g dry	-	-	<0.02	-	
Benzo [a] pyrene	0.02 ug/g dry	-	-	<0.02	-	
Benzo [b] fluoranthene	0.02 ug/g dry	-	-	<0.02	-	
Benzo [g,h,i] perylene	0.02 ug/g dry	-	-	<0.02	-	
Benzo [k] fluoranthene	0.02 ug/g dry	-	-	<0.02	-	
Chrysene	0.02 ug/g dry	-	-	<0.02	-	
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	-	<0.02	-	
Fluoranthene	0.02 ug/g dry	-	-	<0.02	-	
Fluorene	0.02 ug/g dry	-	-	<0.02	-	
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	-	<0.02	-	
1-Methylnaphthalene	0.02 ug/g dry	-	-	<0.02	-	
2-Methylnaphthalene	0.02 ug/g dry	-	-	<0.02	-	
Methylnaphthalene (1&2)	0.04 ug/g dry	-	-	<0.04	-	
Naphthalene	0.01 ug/g dry	-	-	<0.01	-	
Phenanthrene	0.02 ug/g dry	-	-	<0.02	-	
Pyrene	0.02 ug/g dry	-	-	<0.02	-	
2-Fluorobiphenyl	Surrogate	-	-	121%	-	
Terphenyl-d14	Surrogate	-	-	90.4%	-	

Certificate of Analysis

Report Date: 29-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2020

Client PO: 30459

Project Description: PE4767

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (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	1.12		ug/g		83.9	50-140			
Surrogate: Terphenyl-d14	1.26		ug/g		94.6	50-140			
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						

Certificate of Analysis

Report Date: 29-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2020

Client PO: 30459

Project Description: PE4767

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	3.82		ug/g		119	50-140			
Surrogate: Dibromofluoromethane	2.26		ug/g		70.7	50-140			
Surrogate: Toluene-d8	3.88		ug/g		121	50-140			

Certificate of Analysis

Report Date: 29-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2020

Client PO: 30459

Project Description: PE4767

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	1.3	1.0	ug/g dry	1.1			14.5	30	
Arsenic	4.0	1.0	ug/g dry	3.7			6.6	30	
Barium	64.5	1.0	ug/g dry	56.9			12.6	30	
Beryllium	0.6	0.5	ug/g dry	0.6			9.7	30	
Boron	7.6	5.0	ug/g dry	6.6			14.6	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	22.6	5.0	ug/g dry	18.5			20.1	30	
Cobalt	7.7	1.0	ug/g dry	6.4			18.0	30	
Copper	20.5	5.0	ug/g dry	16.9			18.9	30	
Lead	16.5	1.0	ug/g dry	14.3			13.9	30	
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	1.1	1.0	ug/g dry	ND			NC	30	
Nickel	18.7	5.0	ug/g dry	15.1			21.3	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	27.0	10.0	ug/g dry	22.3			18.8	30	
Zinc	64.1	20.0	ug/g dry	45.5			NC	30	
Physical Characteristics									
% Solids	87.5	0.1	% by Wt.	81.2			7.4	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g dry	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g dry	ND			NC	40	
Anthracene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [a] pyrene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [g,h,i] perylene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Chrysene	ND	0.02	ug/g dry	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g dry	ND			NC	40	
Fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Fluorene	ND	0.02	ug/g dry	ND			NC	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g dry	ND			NC	40	
1-Methylnaphthalene	ND	0.02	ug/g dry	ND			NC	40	
2-Methylnaphthalene	ND	0.02	ug/g dry	ND			NC	40	
Naphthalene	ND	0.01	ug/g dry	ND			NC	40	
Phenanthrene	ND	0.02	ug/g dry	ND			NC	40	
Pyrene	ND	0.02	ug/g dry	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	0.994		ug/g dry		70.9	50-140			
Surrogate: Terphenyl-d14	1.10		ug/g dry		78.3	50-140			
Volatiles									
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	ND	0.02	ug/g dry	ND			NC	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	
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	

Certificate of Analysis

Report Date: 29-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2020

Client PO: 30459

Project Description: PE4767

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	ND	0.05	ug/g dry	ND			NC	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	ND	0.05	ug/g dry	ND			NC	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	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: 4-Bromofluorobenzene	4.78		ug/g dry		114	50-140			
Surrogate: Dibromofluoromethane	3.56		ug/g dry		85.4	50-140			
Surrogate: Toluene-d8	5.18		ug/g dry		124	50-140			

Certificate of Analysis

Report Date: 29-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2020

Client PO: 30459

Project Description: PE4767

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	44.7	1.0	ug/g	ND	88.5	70-130			
Arsenic	53.6	1.0	ug/g	1.5	104	70-130			
Barium	75.0	1.0	ug/g	22.8	105	70-130			
Beryllium	49.6	0.5	ug/g	ND	98.8	70-130			
Boron	48.7	5.0	ug/g	ND	92.1	70-130			
Cadmium	47.5	0.5	ug/g	ND	94.9	70-130			
Chromium (VI)	3.3	0.2	ug/g	ND	61.5	70-130			QM-05
Chromium	62.6	5.0	ug/g	7.4	111	70-130			
Cobalt	55.6	1.0	ug/g	2.6	106	70-130			
Copper	58.3	5.0	ug/g	6.8	103	70-130			
Lead	54.7	1.0	ug/g	5.7	98.0	70-130			
Mercury	1.68	0.1	ug/g	ND	112	70-130			
Molybdenum	54.3	1.0	ug/g	ND	108	70-130			
Nickel	59.1	5.0	ug/g	6.0	106	70-130			
Selenium	47.8	1.0	ug/g	ND	95.4	70-130			
Silver	54.9	0.3	ug/g	ND	110	70-130			
Thallium	48.2	1.0	ug/g	ND	96.2	70-130			
Uranium	51.6	1.0	ug/g	ND	103	70-130			
Vanadium	65.2	10.0	ug/g	ND	113	70-130			
Zinc	70.8	20.0	ug/g	ND	105	70-130			
Semi-Volatiles									
Acenaphthene	0.123	0.02	ug/g	ND	70.3	50-140			
Acenaphthylene	0.116	0.02	ug/g	ND	66.2	50-140			
Anthracene	0.129	0.02	ug/g	ND	73.9	50-140			
Benzo [a] anthracene	0.137	0.02	ug/g	ND	78.2	50-140			
Benzo [a] pyrene	0.137	0.02	ug/g	ND	78.0	50-140			
Benzo [b] fluoranthene	0.196	0.02	ug/g	ND	112	50-140			
Benzo [g,h,i] perylene	0.118	0.02	ug/g	ND	67.6	50-140			
Benzo [k] fluoranthene	0.177	0.02	ug/g	ND	101	50-140			
Chrysene	0.144	0.02	ug/g	ND	82.5	50-140			
Dibenzo [a,h] anthracene	0.115	0.02	ug/g	ND	65.5	50-140			
Fluoranthene	0.121	0.02	ug/g	ND	68.8	50-140			
Fluorene	0.127	0.02	ug/g	ND	72.7	50-140			
Indeno [1,2,3-cd] pyrene	0.119	0.02	ug/g	ND	67.9	50-140			
1-Methylnaphthalene	0.145	0.02	ug/g	ND	82.9	50-140			
2-Methylnaphthalene	0.178	0.02	ug/g	ND	102	50-140			
Naphthalene	0.131	0.01	ug/g	ND	74.8	50-140			
Phenanthrene	0.123	0.02	ug/g	ND	70.1	50-140			
Pyrene	0.119	0.02	ug/g	ND	68.0	50-140			
Surrogate: 2-Fluorobiphenyl	0.916		ug/g		65.4	50-140			
Surrogate: Terphenyl-d14	1.00		ug/g		71.4	50-140			
Volatiles									
Acetone	5.99	0.50	ug/g	ND	59.9	50-140			
Benzene	2.57	0.02	ug/g	ND	64.2	60-130			
Bromodichloromethane	2.45	0.05	ug/g	ND	61.2	60-130			
Bromoform	4.38	0.05	ug/g	ND	110	60-130			
Bromomethane	2.46	0.05	ug/g	ND	61.5	50-140			
Carbon Tetrachloride	2.51	0.05	ug/g	ND	62.7	60-130			

Certificate of Analysis

Report Date: 29-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 23-Jul-2020

Client PO: 30459

Project Description: PE4767

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Chlorobenzene	4.02	0.05	ug/g	ND	101	60-130			
Chloroform	2.45	0.05	ug/g	ND	61.3	60-130			
Dibromochloromethane	4.15	0.05	ug/g	ND	104	60-130			
Dichlorodifluoromethane	2.62	0.05	ug/g	ND	65.4	50-140			
1,2-Dichlorobenzene	3.70	0.05	ug/g	ND	92.5	60-130			
1,3-Dichlorobenzene	3.53	0.05	ug/g	ND	88.3	60-130			
1,4-Dichlorobenzene	3.62	0.05	ug/g	ND	90.6	60-130			
1,1-Dichloroethane	2.84	0.05	ug/g	ND	71.0	60-130			
1,2-Dichloroethane	2.87	0.05	ug/g	ND	71.9	60-130			
1,1-Dichloroethylene	2.52	0.05	ug/g	ND	63.0	60-130			
cis-1,2-Dichloroethylene	2.41	0.05	ug/g	ND	60.2	60-130			
trans-1,2-Dichloroethylene	2.41	0.05	ug/g	ND	60.4	60-130			
1,2-Dichloropropane	3.75	0.05	ug/g	ND	93.9	60-130			
cis-1,3-Dichloropropylene	3.88	0.05	ug/g	ND	97.0	60-130			
trans-1,3-Dichloropropylene	2.51	0.05	ug/g	ND	62.7	60-130			
Ethylbenzene	4.16	0.05	ug/g	ND	104	60-130			
Ethylene dibromide (dibromoethane, 1,2-	4.38	0.05	ug/g	ND	110	60-130			
Hexane	2.47	0.05	ug/g	ND	61.7	60-130			
Methyl Ethyl Ketone (2-Butanone)	6.35	0.50	ug/g	ND	63.5	50-140			
Methyl Isobutyl Ketone	6.60	0.50	ug/g	ND	66.0	50-140			
Methyl tert-butyl ether	5.34	0.05	ug/g	ND	53.4	50-140			
Methylene Chloride	2.52	0.05	ug/g	ND	62.9	60-130			
Styrene	3.85	0.05	ug/g	ND	96.3	60-130			
1,1,1,2-Tetrachloroethane	4.15	0.05	ug/g	ND	104	60-130			
1,1,1,2,2-Tetrachloroethane	4.43	0.05	ug/g	ND	111	60-130			
Tetrachloroethylene	4.00	0.05	ug/g	ND	99.9	60-130			
Toluene	4.05	0.05	ug/g	ND	101	60-130			
1,1,1-Trichloroethane	3.50	0.05	ug/g	ND	87.4	60-130			
1,1,2-Trichloroethane	2.72	0.05	ug/g	ND	68.0	60-130			
Trichloroethylene	3.72	0.05	ug/g	ND	92.9	60-130			
Trichlorofluoromethane	2.72	0.05	ug/g	ND	68.0	50-140			
Vinyl chloride	2.47	0.02	ug/g	ND	61.7	50-140			
m,p-Xylenes	8.32	0.05	ug/g	ND	104	60-130			
o-Xylene	4.30	0.05	ug/g	ND	107	60-130			
Surrogate: 4-Bromofluorobenzene	2.72		ug/g		85.1	50-140			
Surrogate: Dibromofluoromethane	2.46		ug/g		76.8	50-140			
Surrogate: Toluene-d8	2.92		ug/g		91.3	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 30459

Report Date: 29-Jul-2020

Order Date: 23-Jul-2020

Project Description: PE4767

Qualifier Notes:

QC Qualifiers :

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

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.



2030460

Nº 128563

Client Name: Paterson Group	Project Ref: PE 4767	Page ___ of ___
Contact Name: Mark St Pierre	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular
Address: 154 Colonnade Road South	PO #: 30459	
Telephone: 613-226-7381	E-mail: mstpierre@patersongroup.ca	
		Date Required: _____

Regulation 153/04		Other Regulation		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)		Required Analysis											
<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Res/Park <input type="checkbox"/> Med/Fine	<input type="checkbox"/> REG 558 <input type="checkbox"/> PWQO	<input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input checked="" type="checkbox"/> Coarse	<input type="checkbox"/> CCME <input type="checkbox"/> MISA	<input checked="" type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other	<input type="checkbox"/> SU - Sani <input type="checkbox"/> SU - Storm	Sample Taken											
<input type="checkbox"/> Table _____	Mun: _____																
For RSC: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Other: _____															
Sample ID/Location Name				Matrix	Air Volume	# of Containers	Date	Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)		
1	BH1-20 - SS8			S		2	July 23, 2020		X								
2	BH2-20 - SS7			S		2			X								
3	BH3-20 - SS2			S		1				X	X	X	X				
4	BH3-20 - SS7			S		2			X								
5																	
6																	
7																	
8																	
9																	
10																	

Comments:		Method of Delivery: Paracel	
Relinquished By (Sign):	Received By Driver/Depot: A. J. J. J.	Received at Lab: Juneeporn Dakemai	Verified By:
Relinquished By (Print): Mark St Pierre	Date/Time: 23/07/20 3:40	Date/Time: JUL 23, 2020 04:54	Date/Time: 7-23-20 17:04
Date/Time: July 23, 2020	Temperature: 21.1 °C	Temperature: 20.4 °C	pH Verified: <input type="checkbox"/> By: _____

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Rd South
Nepean, ON K2E 7J5
Attn: Mark St. Pierre

Client PO: 30463
Project: PE4767
Custody: 128568

Report Date: 30-Jul-2020
Order Date: 24-Jul-2020

Order #: 2030589

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

Paracel ID

2030589-01

Client ID

BH4-20-SS2

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 30-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Jul-2020

Client PO: 30463

Project Description: PE4767

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	25-Jul-20	28-Jul-20
Mercury by CVAA	EPA 7471B - CVAA, digestion	30-Jul-20	30-Jul-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	30-Jul-20	30-Jul-20
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	25-Jul-20	29-Jul-20
Solids, %	Gravimetric, calculation	30-Jul-20	30-Jul-20

Certificate of Analysis

Report Date: 30-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Jul-2020

Client PO: 30463

Project Description: PE4767

Client ID:	BH4-20-SS2	-	-	-
Sample Date:	23-Jul-20 09:00	-	-	-
Sample ID:	2030589-01	-	-	-
MDL/Units	Soil	-	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	93.4	-	-	-
----------	--------------	------	---	---	---

Metals

Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	5.8	-	-	-
Barium	1.0 ug/g dry	185	-	-	-
Beryllium	0.5 ug/g dry	<0.5	-	-	-
Boron	5.0 ug/g dry	10.1	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	5.0 ug/g dry	22.9	-	-	-
Chromium (VI)	0.2 ug/g dry	<0.2	-	-	-
Cobalt	1.0 ug/g dry	5.6	-	-	-
Copper	5.0 ug/g dry	43.3	-	-	-
Lead	1.0 ug/g dry	268	-	-	-
Mercury	0.1 ug/g dry	0.5	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	5.0 ug/g dry	11.6	-	-	-
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	23.9	-	-	-
Zinc	20.0 ug/g dry	236	-	-	-

Semi-Volatiles

Acenaphthene	0.02 ug/g dry	<0.02	-	-	-
Acenaphthylene	0.02 ug/g dry	0.07	-	-	-
Anthracene	0.02 ug/g dry	0.04	-	-	-
Benzo [a] anthracene	0.02 ug/g dry	0.12	-	-	-
Benzo [a] pyrene	0.02 ug/g dry	0.17	-	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	0.25	-	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	0.17	-	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	0.12	-	-	-
Chrysene	0.02 ug/g dry	0.13	-	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	0.05	-	-	-
Fluoranthene	0.02 ug/g dry	0.24	-	-	-
Fluorene	0.02 ug/g dry	<0.02	-	-	-

Certificate of Analysis

Report Date: 30-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Jul-2020

Client PO: 30463

Project Description: PE4767

	Client ID:	BH4-20-SS2	-	-	-
	Sample Date:	23-Jul-20 09:00	-	-	-
	Sample ID:	2030589-01	-	-	-
	MDL/Units	Soil	-	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	0.15	-	-	-
1-Methylnaphthalene	0.02 ug/g dry	<0.02	-	-	-
2-Methylnaphthalene	0.02 ug/g dry	<0.02	-	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	<0.04	-	-	-
Naphthalene	0.01 ug/g dry	<0.01	-	-	-
Phenanthrene	0.02 ug/g dry	0.09	-	-	-
Pyrene	0.02 ug/g dry	0.20	-	-	-
2-Fluorobiphenyl	Surrogate	89.3%	-	-	-
Terphenyl-d14	Surrogate	92.8%	-	-	-

Certificate of Analysis

Report Date: 30-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Jul-2020

Client PO: 30463

Project Description: PE4767

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	0.782		ug/g		58.7	50-140			
Surrogate: Terphenyl-d14	1.24		ug/g		93.0	50-140			

Certificate of Analysis

Report Date: 30-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Jul-2020

Client PO: 30463

Project Description: PE4767

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	1.3	1.0	ug/g dry	ND			NC	30	
Arsenic	5.4	1.0	ug/g dry	4.9			9.4	30	
Barium	94.6	1.0	ug/g dry	81.1			15.4	30	
Beryllium	0.8	0.5	ug/g dry	0.6			19.6	30	
Boron	11.0	5.0	ug/g dry	8.6			24.5	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	26.7	5.0	ug/g dry	23.4			13.0	30	
Cobalt	9.6	1.0	ug/g dry	8.4			13.1	30	
Copper	24.0	5.0	ug/g dry	21.0			13.3	30	
Lead	20.3	1.0	ug/g dry	18.8			8.0	30	
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	21.4	5.0	ug/g dry	18.9			12.3	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	36.7	10.0	ug/g dry	31.9			13.9	30	
Zinc	76.4	20.0	ug/g dry	67.9			11.7	30	
Physical Characteristics									
% Solids	95.3	0.1	% by Wt.	93.2			2.3	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g dry	ND			NC	40	
Acenaphthylene	ND	0.02	ug/g dry	ND			NC	40	
Anthracene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [a] anthracene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [a] pyrene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [b] fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [g,h,i] perylene	ND	0.02	ug/g dry	ND			NC	40	
Benzo [k] fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Chrysene	ND	0.02	ug/g dry	ND			NC	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g dry	ND			NC	40	
Fluoranthene	ND	0.02	ug/g dry	ND			NC	40	
Fluorene	ND	0.02	ug/g dry	ND			NC	40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g dry	ND			NC	40	
1-Methylnaphthalene	0.021	0.02	ug/g dry	0.023			10.0	40	
2-Methylnaphthalene	0.021	0.02	ug/g dry	0.021			1.3	40	
Naphthalene	0.011	0.01	ug/g dry	0.012			7.3	40	
Phenanthrene	ND	0.02	ug/g dry	ND			NC	40	
Pyrene	ND	0.02	ug/g dry	ND			NC	40	
Surrogate: 2-Fluorobiphenyl	1.30		ug/g dry		83.9	50-140			
Surrogate: Terphenyl-d14	1.49		ug/g dry		96.2	50-140			

Certificate of Analysis

Report Date: 30-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Jul-2020

Client PO: 30463

Project Description: PE4767

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	50.0	1.0	ug/g	ND	99.8	70-130			
Arsenic	58.9	1.0	ug/g	2.0	114	70-130			
Barium	93.7	1.0	ug/g	32.4	123	70-130			
Beryllium	53.7	0.5	ug/g	ND	107	70-130			
Boron	54.3	5.0	ug/g	ND	102	70-130			
Cadmium	51.8	0.5	ug/g	ND	103	70-130			
Chromium (VI)	4.0	0.2	ug/g	ND	64.5	70-130			QM-05
Chromium	71.6	5.0	ug/g	9.4	125	70-130			
Cobalt	60.8	1.0	ug/g	3.4	115	70-130			
Copper	63.5	5.0	ug/g	8.4	110	70-130			
Lead	62.6	1.0	ug/g	7.5	110	70-130			
Mercury	1.87	0.1	ug/g	ND	124	70-130			
Molybdenum	58.1	1.0	ug/g	ND	116	70-130			
Nickel	64.4	5.0	ug/g	7.6	114	70-130			
Selenium	52.3	1.0	ug/g	ND	104	70-130			
Silver	44.9	0.3	ug/g	ND	89.7	70-130			
Thallium	53.9	1.0	ug/g	ND	108	70-130			
Uranium	58.3	1.0	ug/g	ND	116	70-130			
Vanadium	76.7	10.0	ug/g	12.8	128	70-130			
Zinc	84.3	20.0	ug/g	27.2	114	70-130			
Semi-Volatiles									
Acenaphthene	0.136	0.02	ug/g	ND	70.5	50-140			
Acenaphthylene	0.112	0.02	ug/g	ND	58.0	50-140			
Anthracene	0.124	0.02	ug/g	ND	64.1	50-140			
Benzo [a] anthracene	0.118	0.02	ug/g	ND	61.1	50-140			
Benzo [a] pyrene	0.114	0.02	ug/g	ND	58.8	50-140			
Benzo [b] fluoranthene	0.177	0.02	ug/g	ND	91.6	50-140			
Benzo [g,h,i] perylene	0.125	0.02	ug/g	ND	64.9	50-140			
Benzo [k] fluoranthene	0.154	0.02	ug/g	ND	79.6	50-140			
Chrysene	0.141	0.02	ug/g	ND	73.1	50-140			
Dibenzo [a,h] anthracene	0.122	0.02	ug/g	ND	63.0	50-140			
Fluoranthene	0.128	0.02	ug/g	ND	66.2	50-140			
Fluorene	0.123	0.02	ug/g	ND	63.8	50-140			
Indeno [1,2,3-cd] pyrene	0.120	0.02	ug/g	ND	62.1	50-140			
1-Methylnaphthalene	0.141	0.02	ug/g	0.023	61.1	50-140			
2-Methylnaphthalene	0.175	0.02	ug/g	0.021	79.7	50-140			
Naphthalene	0.166	0.01	ug/g	0.012	79.7	50-140			
Phenanthrene	0.124	0.02	ug/g	ND	64.2	50-140			
Pyrene	0.130	0.02	ug/g	ND	67.3	50-140			
Surrogate: 2-Fluorobiphenyl	0.880		ug/g		57.0	50-140			
Surrogate: Terphenyl-d14	1.15		ug/g		74.7	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 30463

Report Date: 30-Jul-2020

Order Date: 24-Jul-2020

Project Description: PE4767

Qualifier Notes:

QC Qualifiers :

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

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.



2030589

Nº 128568

Client Name: ~~Paracel~~ Paterson Group

Project Ref: PE 4767

Page 1 of 1

Contact Name: Mark St Pierre

Quote #:

Turnaround Time

Address: 154 Colonnade Road South

PO #: 30463

☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular

Telephone: 613-226-7381

E-mail: mstpierre@patersongroup.ca

Date Required:

Regulation 153/04		Other Regulation		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)		Required Analysis											
<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Res/Park <input type="checkbox"/> Med/Fine	<input type="checkbox"/> REG 558 <input type="checkbox"/> PWQO	<input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input checked="" type="checkbox"/> Coarse	<input type="checkbox"/> CCME <input type="checkbox"/> MISA	<input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other	<input type="checkbox"/> SU - Sani <input type="checkbox"/> SU - Storm	Sample Taken											
<input type="checkbox"/> Table _____	Mun: _____																
For RSC: <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No		<input type="checkbox"/> Other: _____															
Sample ID/Location Name				Matrix	Air Volume	# of Containers	Date	Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)		
1	BH4-20-SS2			S	-	1	July 23 2020					X	X	X	X		
2																	
3																	
4																	
5																	
6																	
7																	
8																	
9																	
10																	

Comments:

Method of Delivery:

Paracel

Relinquished By (Signature):

Received By Driver/Depot:

Received at Lab:

Verified By:

Relinquished By (Print): Mark St Pierre

Date/Time: 24/07/20 4:05

Date/Time: July 24, 2020 16:32

Date/Time: 7-24-2017/10/

Date/Time: July 24, 2020

Temperature: °C 16.8

Temperature: 16.8 °C

pH Verified: ☐ By:

Chain of Custody (Env.) xlsx

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Rd South
Nepean, ON K2E 7J5
Attn: Mark St. Pierre

Client PO: 30464
Project: PE4767
Custody: 128569

Report Date: 30-Jul-2020
Order Date: 24-Jul-2020

Order #: 2030590

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

Paracel ID
2030590-01

Client ID
Dup1

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 30-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Jul-2020

Client PO: 30464

Project Description: PE4767

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	27-Jul-20	27-Jul-20
Solids, %	Gravimetric, calculation	30-Jul-20	30-Jul-20

Certificate of Analysis

Report Date: 30-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Jul-2020

Client PO: 30464

Project Description: PE4767

Client ID:	Dup1	-	-	-
Sample Date:	22-Jul-20 09:00	-	-	-
Sample ID:	2030590-01	-	-	-
MDL/Units	Soil	-	-	-

Physical Characteristics

% Solids	0.1 % by Wt.	80.6	-	-	-
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Volatiles

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

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 30464

Report Date: 30-Jul-2020

Order Date: 24-Jul-2020

Project Description: PE4767

	MDL/Units	Client ID:			
		Sample Date:	Dup1	-	-
		Sample ID:	22-Jul-20 09:00	-	-
			2030590-01	-	-
			Soil	-	-
Toluene	0.05 ug/g dry		<0.05	-	-
1,1,1-Trichloroethane	0.05 ug/g dry		<0.05	-	-
1,1,2-Trichloroethane	0.05 ug/g dry		<0.05	-	-
Trichloroethylene	0.05 ug/g dry		<0.05	-	-
Trichlorofluoromethane	0.05 ug/g dry		<0.05	-	-
Vinyl chloride	0.02 ug/g dry		<0.02	-	-
m,p-Xylenes	0.05 ug/g dry		<0.05	-	-
o-Xylene	0.05 ug/g dry		<0.05	-	-
Xylenes, total	0.05 ug/g dry		<0.05	-	-
4-Bromofluorobenzene	Surrogate		102%	-	-
Dibromofluoromethane	Surrogate		112%	-	-
Toluene-d8	Surrogate		109%	-	-

Certificate of Analysis

Report Date: 30-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Jul-2020

Client PO: 30464

Project Description: PE4767

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	7.90		ug/g		98.8	50-140			
Surrogate: Dibromofluoromethane	9.57		ug/g		120	50-140			
Surrogate: Toluene-d8	8.39		ug/g		105	50-140			

Certificate of Analysis

Report Date: 30-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Jul-2020

Client PO: 30464

Project Description: PE4767

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Physical Characteristics									
% Solids	95.3	0.1	% by Wt.	93.2			2.3	25	
Volatiles									
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	ND	0.02	ug/g dry	ND			NC	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	
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	ND	0.05	ug/g dry	ND			NC	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	0.058	0.05	ug/g dry	0.067			15.0	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	0.458	0.05	ug/g dry	0.430			6.3	50	
o-Xylene	0.135	0.05	ug/g dry	0.134			0.7	50	
Surrogate: 4-Bromofluorobenzene	8.27		ug/g dry		98.3	50-140			
Surrogate: Dibromofluoromethane	9.49		ug/g dry		113	50-140			
Surrogate: Toluene-d8	9.15		ug/g dry		109	50-140			

Certificate of Analysis

Report Date: 30-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 24-Jul-2020

Client PO: 30464

Project Description: PE4767

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	10.8	0.50	ug/g	ND	108	50-140			
Benzene	4.91	0.02	ug/g	ND	123	60-130			
Bromodichloromethane	4.94	0.05	ug/g	ND	123	60-130			
Bromoform	4.56	0.05	ug/g	ND	114	60-130			
Bromomethane	2.59	0.05	ug/g	ND	64.7	50-140			
Carbon Tetrachloride	4.66	0.05	ug/g	ND	117	60-130			
Chlorobenzene	4.90	0.05	ug/g	ND	123	60-130			
Chloroform	5.09	0.05	ug/g	ND	127	60-130			
Dibromochloromethane	4.88	0.05	ug/g	ND	122	60-130			
Dichlorodifluoromethane	3.31	0.05	ug/g	ND	82.7	50-140			
1,2-Dichlorobenzene	4.78	0.05	ug/g	ND	119	60-130			
1,3-Dichlorobenzene	4.78	0.05	ug/g	ND	120	60-130			
1,4-Dichlorobenzene	4.61	0.05	ug/g	ND	115	60-130			
1,1-Dichloroethane	4.88	0.05	ug/g	ND	122	60-130			
1,2-Dichloroethane	4.62	0.05	ug/g	ND	116	60-130			
1,1-Dichloroethylene	5.01	0.05	ug/g	ND	125	60-130			
cis-1,2-Dichloroethylene	4.73	0.05	ug/g	ND	118	60-130			
trans-1,2-Dichloroethylene	4.54	0.05	ug/g	ND	114	60-130			
1,2-Dichloropropane	4.91	0.05	ug/g	ND	123	60-130			
cis-1,3-Dichloropropylene	5.11	0.05	ug/g	ND	128	60-130			
trans-1,3-Dichloropropylene	4.77	0.05	ug/g	ND	119	60-130			
Ethylbenzene	5.06	0.05	ug/g	ND	127	60-130			
Ethylene dibromide (dibromoethane, 1,2-	4.27	0.05	ug/g	ND	107	60-130			
Hexane	4.58	0.05	ug/g	ND	114	60-130			
Methyl Ethyl Ketone (2-Butanone)	11.5	0.50	ug/g	ND	115	50-140			
Methyl Isobutyl Ketone	12.5	0.50	ug/g	ND	125	50-140			
Methyl tert-butyl ether	12.8	0.05	ug/g	ND	128	50-140			
Methylene Chloride	4.17	0.05	ug/g	ND	104	60-130			
Styrene	4.99	0.05	ug/g	ND	125	60-130			
1,1,1,2-Tetrachloroethane	4.68	0.05	ug/g	ND	117	60-130			
1,1,2,2-Tetrachloroethane	4.86	0.05	ug/g	ND	122	60-130			
Tetrachloroethylene	4.76	0.05	ug/g	ND	119	60-130			
Toluene	4.93	0.05	ug/g	ND	123	60-130			
1,1,1-Trichloroethane	4.69	0.05	ug/g	ND	117	60-130			
1,1,2-Trichloroethane	4.40	0.05	ug/g	ND	110	60-130			
Trichloroethylene	5.13	0.05	ug/g	ND	128	60-130			
Trichlorofluoromethane	4.97	0.05	ug/g	ND	124	50-140			
Vinyl chloride	3.45	0.02	ug/g	ND	86.2	50-140			
m,p-Xylenes	9.92	0.05	ug/g	ND	124	60-130			
o-Xylene	4.40	0.05	ug/g	ND	110	60-130			
Surrogate: 4-Bromofluorobenzene	7.94		ug/g		99.3	50-140			
Surrogate: Dibromofluoromethane	9.72		ug/g		122	50-140			
Surrogate: Toluene-d8	7.67		ug/g		95.9	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 30464

Report Date: 30-Jul-2020

Order Date: 24-Jul-2020

Project Description: PE4767

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

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

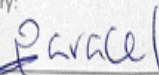
%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated

Soil results are reported on a dry weight basis when the units are denoted with 'dry'.

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



Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Rd South
Nepean, ON K2E 7J5
Attn: Mark St. Pierre

Client PO: 30538
Project: PE4767
Custody: 128606

Report Date: 11-Aug-2020
Order Date: 7-Aug-2020

Order #: 2032461

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

Paracel ID	Client ID
2032461-01	BH1-20-GW1
2032461-02	BH2-20-GW1
2032461-03	BH3-20-GW1
2032461-04	BH2-19-GW2

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 30538

Report Date: 11-Aug-2020

Order Date: 7-Aug-2020

Project Description: PE4767

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent - water	MOE E3056 - colourimetric	8-Aug-20	8-Aug-20
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	7-Aug-20	10-Aug-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	10-Aug-20	10-Aug-20
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	7-Aug-20	8-Aug-20

Certificate of Analysis

Report Date: 11-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30538

Project Description: PE4767

Client ID:	BH1-20-GW1	BH2-20-GW1	BH3-20-GW1	BH2-19-GW2
Sample Date:	06-Aug-20 09:00	06-Aug-20 09:00	06-Aug-20 09:00	06-Aug-20 09:00
Sample ID:	2032461-01	2032461-02	2032461-03	2032461-04
MDL/Units	Water	Water	Water	Water

Metals

Mercury	0.1 ug/L	-	-	-	<0.1
Antimony	0.5 ug/L	-	-	-	<0.5
Arsenic	1 ug/L	-	-	-	<1
Barium	1 ug/L	-	-	-	114
Beryllium	0.5 ug/L	-	-	-	<0.5
Boron	10 ug/L	-	-	-	101
Cadmium	0.1 ug/L	-	-	-	<0.1
Chromium	1 ug/L	-	-	-	<1
Chromium (VI)	10 ug/L	-	-	-	<10
Cobalt	0.5 ug/L	-	-	-	<0.5
Copper	0.5 ug/L	-	-	-	<0.5
Lead	0.1 ug/L	-	-	-	<0.1
Molybdenum	0.5 ug/L	-	-	-	1.5
Nickel	1 ug/L	-	-	-	<1
Selenium	1 ug/L	-	-	-	<1
Silver	0.1 ug/L	-	-	-	<0.1
Sodium	200 ug/L	-	-	-	94500
Thallium	0.1 ug/L	-	-	-	<0.1
Uranium	0.1 ug/L	-	-	-	3.4
Vanadium	0.5 ug/L	-	-	-	<0.5
Zinc	5 ug/L	-	-	-	6

Volatiles

Acetone	5.0 ug/L	<5.0	<5.0	<5.0	-
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-

Certificate of Analysis

Report Date: 11-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30538

Project Description: PE4767

	Client ID: Sample Date: Sample ID:	BH1-20-GW1 06-Aug-20 09:00 2032461-01 Water	BH2-20-GW1 06-Aug-20 09:00 2032461-02 Water	BH3-20-GW1 06-Aug-20 09:00 2032461-03 Water	BH2-19-GW2 06-Aug-20 09:00 2032461-04 Water
	MDL/Units				
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	-
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	40.3	1.7	3.5	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	-
4-Bromofluorobenzene	Surrogate	108%	112%	112%	-
Dibromofluoromethane	Surrogate	96.0%	94.4%	94.8%	-
Toluene-d8	Surrogate	102%	102%	102%	-

Certificate of Analysis

Report Date: 11-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30538

Project Description: PE4767

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
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						

Certificate of Analysis

Report Date: 11-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30538

Project Description: PE4767

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	86.2		ug/L		108	50-140			
Surrogate: Dibromofluoromethane	76.3		ug/L		95.4	50-140			
Surrogate: Toluene-d8	82.4		ug/L		103	50-140			

Certificate of Analysis

Report Date: 11-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30538

Project Description: PE4767

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Mercury	ND	0.1	ug/L	ND			NC	20	
Antimony	ND	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	ND	1	ug/L	ND			NC	20	
Beryllium	ND	0.5	ug/L	ND			NC	20	
Boron	ND	10	ug/L	ND			NC	20	
Cadmium	ND	0.1	ug/L	ND			NC	20	
Chromium (VI)	ND	10	ug/L	ND			NC	20	
Chromium	ND	1	ug/L	ND			NC	20	
Cobalt	ND	0.5	ug/L	ND			NC	20	
Copper	ND	0.5	ug/L	ND			NC	20	
Lead	ND	0.1	ug/L	ND			NC	20	
Molybdenum	ND	0.5	ug/L	ND			NC	20	
Nickel	ND	1	ug/L	ND			NC	20	
Selenium	ND	1	ug/L	ND			NC	20	
Silver	ND	0.1	ug/L	ND			NC	20	
Sodium	481	200	ug/L	343			NC	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	ND	0.1	ug/L	ND			NC	20	
Vanadium	ND	0.5	ug/L	ND			NC	20	
Zinc	ND	5	ug/L	ND			NC	20	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2)	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	

Certificate of Analysis

Report Date: 11-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30538

Project Description: PE4767

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	83.8		ug/L		105	50-140			
Surrogate: Dibromofluoromethane	76.1		ug/L		95.1	50-140			
Surrogate: Toluene-d8	82.3		ug/L		103	50-140			

Certificate of Analysis

Report Date: 11-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30538

Project Description: PE4767

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Mercury	3.55	0.1	ug/L	ND	118	70-130			
Antimony	42.1	0.5	ug/L	ND	84.1	80-120			
Arsenic	51.9	1	ug/L	ND	104	80-120			
Barium	50.8	1	ug/L	ND	101	80-120			
Beryllium	52.0	0.5	ug/L	ND	104	80-120			
Boron	48	10	ug/L	ND	93.6	80-120			
Cadmium	51.1	0.1	ug/L	ND	102	80-120			
Chromium (VI)	188	10	ug/L	ND	94.0	70-130			
Chromium	54.8	1	ug/L	ND	109	80-120			
Cobalt	53.1	0.5	ug/L	ND	106	80-120			
Copper	51.8	0.5	ug/L	ND	103	80-120			
Lead	50.3	0.1	ug/L	ND	101	80-120			
Molybdenum	41.1	0.5	ug/L	ND	82.2	80-120			
Nickel	52.8	1	ug/L	ND	105	80-120			
Selenium	53.7	1	ug/L	ND	107	80-120			
Silver	48.1	0.1	ug/L	ND	96.3	80-120			
Sodium	10200	200	ug/L	343	98.2	80-120			
Thallium	46.6	0.1	ug/L	ND	93.2	80-120			
Uranium	45.9	0.1	ug/L	ND	91.8	80-120			
Vanadium	50.9	0.5	ug/L	ND	102	80-120			
Zinc	56	5	ug/L	ND	112	80-120			
Volatiles									
Acetone	79.5	5.0	ug/L	ND	79.5	50-140			
Benzene	38.7	0.5	ug/L	ND	96.6	60-130			
Bromodichloromethane	32.3	0.5	ug/L	ND	80.8	60-130			
Bromoform	49.6	0.5	ug/L	ND	124	60-130			
Bromomethane	33.7	0.5	ug/L	ND	84.4	50-140			
Carbon Tetrachloride	27.0	0.2	ug/L	ND	67.6	60-130			
Chlorobenzene	38.5	0.5	ug/L	ND	96.3	60-130			
Chloroform	34.4	0.5	ug/L	ND	86.0	60-130			
Dibromochloromethane	37.2	0.5	ug/L	ND	92.9	60-130			
Dichlorodifluoromethane	38.6	1.0	ug/L	ND	96.4	50-140			
1,2-Dichlorobenzene	43.8	0.5	ug/L	ND	110	60-130			
1,3-Dichlorobenzene	42.1	0.5	ug/L	ND	105	60-130			
1,4-Dichlorobenzene	43.1	0.5	ug/L	ND	108	60-130			
1,1-Dichloroethane	32.3	0.5	ug/L	ND	80.7	60-130			
1,2-Dichloroethane	43.2	0.5	ug/L	ND	108	60-130			
1,1-Dichloroethylene	30.2	0.5	ug/L	ND	75.4	60-130			
cis-1,2-Dichloroethylene	36.3	0.5	ug/L	ND	90.8	60-130			
trans-1,2-Dichloroethylene	33.3	0.5	ug/L	ND	83.2	60-130			
1,2-Dichloropropane	39.1	0.5	ug/L	ND	97.8	60-130			
cis-1,3-Dichloropropylene	42.5	0.5	ug/L	ND	106	60-130			
trans-1,3-Dichloropropylene	42.6	0.5	ug/L	ND	107	60-130			
Ethylbenzene	37.8	0.5	ug/L	ND	94.6	60-130			
Ethylene dibromide (dibromoethane, 1,2-	35.3	0.2	ug/L	ND	88.4	60-130			
Hexane	30.2	1.0	ug/L	ND	75.4	60-130			
Methyl Ethyl Ketone (2-Butanone)	99.0	5.0	ug/L	ND	99.0	50-140			
Methyl Isobutyl Ketone	107	5.0	ug/L	ND	107	50-140			

Certificate of Analysis

Report Date: 11-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Aug-2020

Client PO: 30538

Project Description: PE4767

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methyl tert-butyl ether	88.2	2.0	ug/L	ND	88.2	50-140			
Methylene Chloride	32.2	5.0	ug/L	ND	80.4	60-130			
Styrene	39.2	0.5	ug/L	ND	97.9	60-130			
1,1,1,2-Tetrachloroethane	37.8	0.5	ug/L	ND	94.4	60-130			
1,1,2,2-Tetrachloroethane	30.7	0.5	ug/L	ND	76.8	60-130			
Tetrachloroethylene	38.3	0.5	ug/L	ND	95.8	60-130			
Toluene	39.4	0.5	ug/L	ND	98.5	60-130			
1,1,1-Trichloroethane	30.3	0.5	ug/L	ND	75.8	60-130			
1,1,2-Trichloroethane	38.2	0.5	ug/L	ND	95.4	60-130			
Trichloroethylene	43.5	0.5	ug/L	ND	109	60-130			
Trichlorofluoromethane	33.4	1.0	ug/L	ND	83.5	60-130			
Vinyl chloride	40.8	0.5	ug/L	ND	102	50-140			
m,p-Xylenes	78.8	0.5	ug/L	ND	98.5	60-130			
o-Xylene	39.9	0.5	ug/L	ND	99.8	60-130			
Surrogate: 4-Bromofluorobenzene	89.1		ug/L		111	50-140			
Surrogate: Dibromofluoromethane	79.4		ug/L		99.2	50-140			
Surrogate: Toluene-d8	79.7		ug/L		99.6	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 30538

Report Date: 11-Aug-2020

Order Date: 7-Aug-2020

Project Description: PE4767

Qualifier Notes:

Login Qualifiers :

Container(s) - Labeled improperly/insufficient information - Date reads Aug 6th

Applies to samples: BH1-20-GW1, BH2-20-GW1, BH3-20-GW1, BH2-19-GW2

QC Qualifiers :

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

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

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated



Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Rd South
Nepean, ON K2E 7J5
Attn: Mark St. Pierre

Client PO: 30445
Project: PE4767
Custody: 128524

Report Date: 27-Jul-2020
Order Date: 22-Jul-2020

Order #: 2030320

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

Paracel ID	Client ID
2030320-01	BH2-G1

Approved By:



Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 27-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 22-Jul-2020

Client PO: 30445

Project Description: PE4767

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	24-Jul-20	25-Jul-20

Certificate of Analysis

Report Date: 27-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 22-Jul-2020

Client PO: 30445

Project Description: PE4767

Client ID:	BH2-G1	-	-	-
Sample Date:	22-Jul-20 09:00	-	-	-
Sample ID:	2030320-01	-	-	-
MDL/Units	Water	-	-	-

Volatiles

Acetone	5.0 ug/L	<5.0	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-
Chloroform	0.5 ug/L	17.5	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	3.7	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-

Certificate of Analysis

Report Date: 27-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 22-Jul-2020

Client PO: 30445

Project Description: PE4767

	Client ID:	BH2-G1	-	-	-
	Sample Date:	22-Jul-20 09:00	-	-	-
	Sample ID:	2030320-01	-	-	-
	MDL/Units	Water	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	103%	-	-	-
Dibromofluoromethane	Surrogate	114%	-	-	-
Toluene-d8	Surrogate	93.8%	-	-	-

Certificate of Analysis

Report Date: 27-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 22-Jul-2020

Client PO: 30445

Project Description: PE4767

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	84.9		ug/L		106	50-140			
Surrogate: Dibromofluoromethane	89.5		ug/L		112	50-140			
Surrogate: Toluene-d8	76.3		ug/L		95.4	50-140			

Certificate of Analysis

Report Date: 27-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 22-Jul-2020

Client PO: 30445

Project Description: PE4767

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	5.45	0.5	ug/L	6.09			11.1	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	83.6		ug/L		104	50-140			
Surrogate: Dibromofluoromethane	95.1		ug/L		119	50-140			
Surrogate: Toluene-d8	75.9		ug/L		94.9	50-140			

Certificate of Analysis

Report Date: 27-Jul-2020

Client: Paterson Group Consulting Engineers

Order Date: 22-Jul-2020

Client PO: 30445

Project Description: PE4767

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Volatiles									
Acetone	85.0	5.0	ug/L	ND	85.0	50-140			
Benzene	39.8	0.5	ug/L	ND	99.5	60-130			
Bromodichloromethane	31.5	0.5	ug/L	ND	78.6	60-130			
Bromoform	36.2	0.5	ug/L	ND	90.5	60-130			
Bromomethane	33.7	0.5	ug/L	ND	84.3	50-140			
Carbon Tetrachloride	26.2	0.2	ug/L	ND	65.4	60-130			
Chlorobenzene	32.8	0.5	ug/L	ND	81.9	60-130			
Chloroform	35.0	0.5	ug/L	ND	87.4	60-130			
Dibromochloromethane	26.6	0.5	ug/L	ND	66.4	60-130			
Dichlorodifluoromethane	43.5	1.0	ug/L	ND	109	50-140			
1,2-Dichlorobenzene	28.0	0.5	ug/L	ND	70.0	60-130			
1,3-Dichlorobenzene	27.0	0.5	ug/L	ND	67.6	60-130			
1,4-Dichlorobenzene	27.7	0.5	ug/L	ND	69.2	60-130			
1,1-Dichloroethane	33.0	0.5	ug/L	ND	82.4	60-130			
1,2-Dichloroethane	45.1	0.5	ug/L	ND	113	60-130			
1,1-Dichloroethylene	32.1	0.5	ug/L	ND	80.2	60-130			
cis-1,2-Dichloroethylene	38.4	0.5	ug/L	ND	96.0	60-130			
trans-1,2-Dichloroethylene	34.8	0.5	ug/L	ND	87.1	60-130			
1,2-Dichloropropane	39.8	0.5	ug/L	ND	99.5	60-130			
cis-1,3-Dichloropropylene	40.1	0.5	ug/L	ND	100	60-130			
trans-1,3-Dichloropropylene	35.1	0.5	ug/L	ND	87.8	60-130			
Ethylbenzene	32.8	0.5	ug/L	ND	82.0	60-130			
Ethylene dibromide (dibromoethane, 1,2-	29.5	0.2	ug/L	ND	73.8	60-130			
Hexane	37.6	1.0	ug/L	ND	94.0	60-130			
Methyl Ethyl Ketone (2-Butanone)	108	5.0	ug/L	ND	108	50-140			
Methyl Isobutyl Ketone	109	5.0	ug/L	ND	109	50-140			
Methyl tert-butyl ether	90.0	2.0	ug/L	ND	90.0	50-140			
Methylene Chloride	32.9	5.0	ug/L	ND	82.4	60-130			
Styrene	33.8	0.5	ug/L	ND	84.6	60-130			
1,1,1,2-Tetrachloroethane	32.2	0.5	ug/L	ND	80.4	60-130			
1,1,2,2-Tetrachloroethane	33.0	0.5	ug/L	ND	82.6	60-130			
Tetrachloroethylene	32.3	0.5	ug/L	ND	80.7	60-130			
Toluene	33.2	0.5	ug/L	ND	83.1	60-130			
1,1,1-Trichloroethane	31.0	0.5	ug/L	ND	77.5	60-130			
1,1,2-Trichloroethane	38.9	0.5	ug/L	ND	97.3	60-130			
Trichloroethylene	38.4	0.5	ug/L	ND	96.1	60-130			
Trichlorofluoromethane	35.5	1.0	ug/L	ND	88.8	60-130			
Vinyl chloride	45.1	0.5	ug/L	ND	113	50-140			
m,p-Xylenes	69.3	0.5	ug/L	ND	86.7	60-130			
o-Xylene	34.4	0.5	ug/L	ND	85.9	60-130			
Surrogate: 4-Bromofluorobenzene	81.1		ug/L		101	50-140			
Surrogate: Dibromofluoromethane	93.9		ug/L		117	50-140			
Surrogate: Toluene-d8	74.8		ug/L		93.5	50-140			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 30445

Report Date: 27-Jul-2020

Order Date: 22-Jul-2020

Project Description: PE4767

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

n/a: not applicable

ND: Not Detected

MDL: Method Detection Limit

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

%REC: Percent recovery.

RPD: Relative percent difference.

NC: Not Calculated



Client Name: <u>Paterson</u>	Project Ref: <u>PE 4767</u>	Page <u>1</u> of <u>1</u>
Contact Name: <u>Mark St Pierre</u>	Quote #:	Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular
Address: <u>154 Colonnade Road South</u>	PO #: <u>30445</u>	
Telephone: <u>613-226-7381</u>	E-mail: <u>mstpierre@patersongroup.ca</u>	
		Date Required: _____

Regulation 153/04		Other Regulation		Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)		Required Analysis																
<input type="checkbox"/> Table 1 <input checked="" type="checkbox"/> Res/Park <input type="checkbox"/> Med/Fine	<input type="checkbox"/> REG 558 <input type="checkbox"/> PWQO	<input type="checkbox"/> Table 2 <input type="checkbox"/> Ind/Comm <input checked="" type="checkbox"/> Coarse	<input type="checkbox"/> CCME <input type="checkbox"/> MISA	<input type="checkbox"/> Table 3 <input type="checkbox"/> Agri/Other	<input type="checkbox"/> SU - Sani <input type="checkbox"/> SU - Storm	Sample Taken		PHCs F1-F4+BTEX		VOCs		PAHs		Metals by ICP		Hg		CrVI		B (HWS)		
For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No		Mun: _____		Other: _____		Matrix	Air Volume	# of Containers	Date	Time												
Sample ID/Location Name																						
1 BH2- XXXX G1						GW		2	July 22, 2020													
2																						
3																						
4																						
5																						
6																						
7																						
8																						
9																						
10																						

Comments:		Method of Delivery: <u>Paracel</u>	
Relinquished By (Sign): <u>[Signature]</u>	Received By Driver/Depot: <u>A. J. L. L. L.</u>	Received at Lab: <u>Sunriseperm Lab</u>	Verified By: <u>[Signature]</u>
Relinquished By (Print): <u>Mark St Pierre</u>	Date/Time: <u>22/07/20 4:00</u>	Date/Time: <u>07/22/2020 04:40</u>	Date/Time: <u>July 2020, 22 17:26</u>
Date/Time: <u>July 22, 2020</u>	Temperature: <u>17.1</u> °C	Temperature: <u>17.4</u> °C	pH Verified: <input type="checkbox"/> By: _____