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Phase II Environmental Site Assessment

335 Roosevelt Avenue
Ottawa, Ontario

Prepared For

Uniform Developments

August 4, 2020

Report: PE2144-3

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the property addressed 335 Roosevelt Avenue 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 on the Phase II Property during the Phase I ESA.

The Phase II ESA was carried out in conjunction with a Geotechnical Investigation and consisted of drilling seven (7) boreholes on the Phase II Property, three (3) of which were constructed with groundwater monitoring well installations.

The soil profile generally consisted of an asphaltic concrete pavement structure and/or fill, followed by silty sand, underlain by limestone and terminated down to a maximum depth of 9.17m below the ground surface. Soil samples were obtained from the boreholes and screened based on visual observations. Some brick and asphaltic concrete debris 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 was submitted for laboratory analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), polychlorinated biphenyls (PCBs), petroleum hydrocarbons (PHCs, F_1-F_4), volatile organic compounds (VOCs) and/or metals. All analyzed parameters were in compliance of the selected MECP Table 7 Residential Standards. The analytical soil results from 2010 identified metal concentrations (Arsenic, Barium and Molybdenum) in excess of the current standards at BH5.

Groundwater samples were recovered and analyzed for PCBs, PHCs, 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. Benzene concentration was identified at BH5-20 and in excess of the MECP Table 7 Standards. Chloroform concentrations were identified in excess of the standards. The presence of chloroform is associated with the municipal water used during coring and as such, it is not considered a contaminant of concern. All other groundwater results, including the 2010 results were in compliance with the MECP Table 7 Standards.

Recommendations

As noted in the report, the Phase II Property will be redeveloped for residential land use and as such, the Phase II Property will require a Record of Site Condition (RSC). This will require that metals impacted soil/fill and BTEX impacted groundwater that does not comply with Table 7 Residential Standards, be remediated.

Soil

Fill/soil material across the Phase II Property identified PHCs (F3-F4), xylene and metal concentrations in excess of the Table 1 Standards, which are used to classify the soil for off-site disposal. It is our recommendation that the impacted fill/soil material be removed from the subject site during the redevelopment process. The excavation of the soil from the property should be monitored and confirmed by Paterson. Soil/ fill in excess of Table 1, will need to be removed and disposed of at an approved waste disposal facility.

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

Groundwater

It is recommended that further groundwater testing be conducted to confirm that the chloroform was a result of the core water used as well as to verify any benzene impact. If the groundwater is contaminated, remediation of the groundwater using a licenced hauling company pumping from the excavation may be a viable option, depending upon the groundwater level at the time of the remediation, however, if a significant volume of water is anticipated, a pump and treat system would likely be more economical. Depending upon the methodology selected, post remediation groundwater monitoring will be required up to 12 months prior to filing an RSC.

Monitoring Wells

It is our recommendation that the monitoring wells installed on the subject site should remain viable for future monitoring. If they are not going to be used in the future, they should be abandoned according to Ontario Regulation 903. The wells will be registered with the MECP under this regulation.

1.0 INTRODUCTION

At the request of Uniform Developments, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the property addressed 335 Roosevelt Avenue, in the City of Ottawa, Ontario, herein referred to as the Phase II Property. The purpose of this Phase II ESA was to address areas of potential environmental concern (APECs) identified on the commercial portion of the Phase I Property, during the Phase I ESA conducted by Paterson.

1.1 Site Description

Address:	335 Roosevelt Avenue, Ottawa, Ontario
Legal Description:	Lot 38 of RP 114; Lots 14 and 15; Lots 21 and 22 and Part of Lot 20; Lots 17 and 18, Part of Winston Avenue and Part of Moira Avenue of RP 179 (formerly Part of Lot 30, Concession 1 of Ottawa Front, Nepean), in the City of Ottawa.
Location:	The site is located on the north side of Wilmont Avenue, where it transects with Winston Avenue and bounded on the east side of Roosevelt Avenue, in the City of Ottawa, Ontario. Refer to Figure 1 - Key Plan in the Figures section following the text.
Latitude and Longitude:	45° 23’ 35.84" N, 75° 45' 28.65" W
Zoning:	R5B – Residential 5th Density Zone
Area:	0.54 hectares (approximately)

1.2 Property Ownership

Paterson was retained to complete this Phase II ESA by Mr. Dan Tomka from Uniform Developments. The head office of Uniform Developments is located at 300-117 CenterPoint Drive, Ottawa, Ontario. Mr. Tomka can be reached by telephone at (613) 225-0770.

1.3 Current and Proposed Future Uses

The Phase II Property is occupied by a commercial/industrial structure and two (2) warehouses that are presently vacant. The central portion of the site is currently used for storing landscaping materials (i.e. interlocking, flagstones, gardening accessories). Five (5) sea-cans were also present on-site.

It is our understanding that the proposed development of the Phase II Property includes two (2) residential apartment buildings with at least 21-storeys to be situated on the western and eastern portions of the subject land.

1.4 Applicable Site Condition Standard

The site condition standards for the property were obtained from Table 7 of the document entitled “Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act”, prepared by the Ministry of the Environment, Conservation and Parks (MECP), April 2011. The selected MECP Table 7 Standards are based on the following considerations:

- ❑ Coarse-grained soil conditions
- ❑ Generic site conditions standards for shallow soils
- ❑ 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, which are considered conservative, were chosen to represent the current site conditions of the Phase II 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 residential area, consisting primarily of residential dwellings with some occasional commercial land use along Richmond Road.

The Phase II Property is occupied by three (3) commercial buildings that are no longer in-use. The site itself is occupied by a landscaping company to store landscaping materials.

The majority of the site is asphaltic concrete paved with landscaped areas along the north, west and east property boundaries. The site is relatively flat and at the grade of the adjacent streets and neighbouring lands. Site drainage occurs through both sheet flow and infiltration on the paved and landscaped areas.

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

2.2 Past Investigations

- *"Phase I & II Environmental Site Assessment, Commercial Property, 335 Roosevelt Avenue, Ottawa, Ontario,"* prepared by Paterson Group Inc. (Paterson), dated November 30, 2010.

Paterson conducted a Phase I-II ESA at 335 Roosevelt Avenue in November 2010. Based on the findings of the historical research, potential environmental concerns were identified as a result of the heating oil spill on the property located at 389 Wilmont Avenue, immediately south of the site. Concerns were also identified with the use of the subject site as an aluminum product manufacturer and the historical use of the immediately adjacent property to the east of the subject site as a heavy equipment distributor. A subsequent Phase II ESA was conducted to address the aforementioned potential environmental concerns.

The subsurface investigation was conducted in November of 2010 and consisted of the placement of five (5) boreholes on the subject property (BH1 to BH5). BH1 was placed just outside the north east corner of the building occupied by Fendor. BH3 was placed on the northeast corner of the subject property (near the Surface Medics building). BH5 was placed directly north of 389 Wilmont Ave, which at that time, was under remediation due to a former furnace oil spill. The remaining boreholes were placed at selected locations around the subject property for general coverage. Two (2) boreholes, BH3 and BH5 were completed as monitoring wells.

The general soil profile consisted of a layer of asphaltic concrete or gravel overlying sand and gravel fill followed by clayey silt overlying limestone bedrock. The depth of fill ranged from to 0.46 m to 0.97 m. The depth to bedrock ranged

from 0.60 m to 1.17 m. It was noted at the time of the program that some poor-quality fill material containing pieces of brick, glass, asphaltic concrete and slag was encountered in BH 5 at depths between 0.3 m and 0.9 m.

One soil sample from BH5 was submitted for metals analysis. Based on the analytical results, several metal parameter concentrations (arsenic, barium, cadmium and molybdenum) exceeded the 2004 MOE Table 1 Residential Standards (shallow bedrock). These metal parameters also exceed the current MECP Table 7 Residential Standards for shallow bedrock.

Three (3) groundwater samples were submitted for BTEX, PHC and VOC. Based on the analytical results, no detectable BTEX, PHC or VOC concentrations were identified in the groundwater samples analyzed from BH1, BH5 and MW208. All groundwater results complied with the former and current standards. The locations of these boreholes are presented on drawing PE2144-4-Test Hole Location Plan, appended to this report.

Based on the findings of the Phase II ESA, it was recommended at that time, that a soil remediation program be conducted on the property to remove and dispose of the metal impacted fill material during redevelopment.

A Phase I-ESA was completed by Paterson in July of 2020 in general accordance with the Ontario Regulation (O.Reg.) 153/04, as amended. The Phase I ESA identified six (6) 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 PE2144-2 – Site Plan.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted during the interim of May 25 to June 12, 2020. The field program consisted of drilling seven (7) boreholes, three (3) of which were instrumented with groundwater monitoring wells. Boreholes were drilled at depths ranging from 1.17 to 9.17 m below the ground surface (mbgs).

3.2 Media Investigated

During the subsurface investigation, soil samples and groundwater samples were obtained and submitted for laboratory analysis. The rationale for sampling and analyzing the media is based on the Contaminants of Potential Concern (CPCs) identified in the Phase I ESA. These CPCs include Polychlorinated Biphenyls (PBCs); Benzene, Toluene, Ethylbenzene and Xylene (BTEX); Petroleum hydrocarbons (PHCs, F1-F4), Volatile Organic Compounds (VOCs), and metals (including Hg and CrVI) in soil and/or groundwater.

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

According to the Geological Survey of Canada website, the bedrock in the area of the Phase I Property is reported to consist of interbedded limestone and dolomite of the Gull River Formation. The overburden is reported to consist of plain till with a drift thickness of 1 to 2 m across the site.

Groundwater is expected to flow in a northwesterly/westerly direction towards the Ottawa River.

Subsurface Structures and Utilities

The Phase I Property is situated in a municipally serviced area. Underground utility services on the property include natural gas, water and sewer services which enter the site from Roosevelt Avenue, Wilmont Avenue and Winston Avenue.

Existing Buildings and Structures

The Phase I Property is occupied by three (3) slab-on-grade buildings; one large manufacturing facility type building situated on the western portion of the site, and two (2) relatively smaller warehouse/garage style buildings situated on the eastern portion of the site, all of which have been abandoned.

Fill Placement

Based on the historical review in combination with the previous Phase I-II ESA report, fill material of an unknown quality was identified on-site. It is expected that that fill material is associated with the demolition of the former on-site buildings.

Water Bodies and Areas of Natural Significance

No areas of natural significance or water bodies were identified on the Phase I Property or within a 250 m search radius. The Ottawa River is located 252 m northwest of the Phase I Property.

Potable Water Well Records and Monitoring Well Records

There are no potable water wells or monitoring wells on the Phase I Property.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area consists primarily of residential properties.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.1 of the Phase I ESA report (Report: PE2144-2), six (6) PCAs are considered to result APECs on the Phase I Property. These APECs are summarized in Table 1, along with their respective locations and contaminants of potential concern (CPCs) on the Phase I Property.

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

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1: Resulting from the former Windows and Aluminum Products Manufacturer	Western portion of the Phase I Property.	PCA 34 – "*Metal Fabrication.*"	On-site	VOCs Metals (including Hg, CrVI)	Soil and/or Groundwater
APEC 2: Resulting from the former coating facility	Eastern portion of the Phase I Property	PCA 33 – *"Metal Treatments, Coating, Plating and Finishing."*	On-site	VOCs Metals (including Hg, CrVI)	Soil and/or Groundwater

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

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 3: Resulting from the former automotive repair garage	Eastern portion of the Phase I Property	PCA 52 - "*Storage, maintenance, fuelling, repair of equipment, vehicles, and material used to maintain transportation systems,"*	On-site	BTEX PHCs (F_1-F_4)	Soil and/or Groundwater
APEC 4: Resulting from fill material of unknown quality	Entire Phase I Property	PCA 30 – "*Importation of Fill Material of Unknown Quality."*	On-site	Metals (including Hg, CrVI)	Soil and/or Groundwater
APEC 5: Resulting from the presence of a pole-mounted transformer.	Central portion of the Phase I Property	PCA 55 – *"Transformer Manufacturing, Processing and Use,"*	On-site	PCBs PHCs (F_1-F_4)	Soil and/or Groundwater
APEC 6: Resulting from the former furnace oil spill in 2005	Central south portion of the Phase I Property	Other – "*Former furnace oil spill."*	On-site	BTEX PHCs (F_1-F_4)	Soil and/or Groundwater

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

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

Contaminants of Potential Concern

Based on the APECs identified in the Phase I Property, the contaminants of potential concern (CPCs) in the soil and/or groundwater beneath the subject land include the following:

- Benzene, ethylbenzene, toluene and xylenes (BTEX);
- Petroleum hydrocarbons (PHCs, Fractions F_1-F_4);
- Polychlorinated biphenyl (PCB);
- Volatile organic compounds (VOCs); and
- Metals plus Mercury (Hg), and Hexavalent Chromium (CrVI).

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I- ESA is considered to be sufficient to conclude that there are PCAs that have resulted in APECs on the Phase I Property. Additional off-site PCAs identified within the study area are not considered to represent APECs, based on their separation distances and/or orientations relative to the subject land.

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

3.4 Deviations from Sampling and Analysis Plan

The Sampling and Analysis Plan for this project is included in Appendix 1 of this report.

3.5 Impediments

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

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation, completed in conjunction with a Geotechnical Investigation, was conducted during the interim of May 25 to June 12, 2020. The field program consisted of drilling seven (7) boreholes on the Phase II Property.

The boreholes were drilled to a maximum depth of 9.17 mbgs. Three (3) boreholes were completed as groundwater monitoring wells to access the groundwater table.

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 PE2144-4 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

A total of 13 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 an asphaltic concrete pavement structure or gravel, underlain by a fill material, followed by some native soil, underlain by limestone bedrock. Practical refusal to auguring was completed in BH3, BH4, BH6 and BH7 to depths ranging from 0.74 to 1.19 m below the existing grade. Bedrock was encountered in the remaining boreholes at depths ranging from 0.94 to 1.09 mbgs.

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.

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, 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 diameter, Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed below in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

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

Table 2: Monitoring Well Construction Details						
Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1-20	66.56	5.89	2.89-5.89	2.44-5.89	0.13-2.44	Flushmount
BH2-20	66.61	9.17	6.17-9.17	5.82-9.17	0.13-5.82	Flushmount
BH5-20	66.50	6.04	3.04-6.04	2.72-6.04	0.13-2.72	Flushmount

4.5 Field Measurement of Water Quality Parameters

Groundwater samples were collected on June 16, 2020. The water levels were the only parameter measured in the field during the November sampling events.

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 3 and 4.

Table 3: Soil Samples Submitted and Analyzed Parameters							
Sample ID	Sample Depth (m) and Stratigraphic Unit	Parameters Analyzed					Rationale
		BTEX	PCBs	PHCs (F1-F4)	VOCs	Metals*	
May 25, 2020							
BH1-AU1	0.076-0.61 Fill	X	X	X	X	X	Assess the quality of the fill material and presence of a pole mounted transformer.
BH2-AU1	0.05-0.06 Fill					X	Assess the quality of the fill material.
BH2-SS2	0.76-0.83 Silty Sand	X		X			Assess the potential impact due to the former use of the site.

Table 3: Soil Samples Submitted and Analyzed Parameters							
Sample ID	Sample Depth (m) and Stratigraphic Unit	Parameters Analyzed					Rationale
		BTEX	PCBs	PHCs (F1-F4)	VOCs	Metals*	
BH3-SS2	0.76-1.02 Silty Sand	X		X		X	Assess the potential impact due to the former use of the site and the quality of the fill material.
June 12, 2020							
BH5-AU1	0.0-0.61 Fill					X	Assess the quality of the fill material.
BH5-SS2	0.76-0.99 Silty Sand	X		X			Assess the potential impact due to the former use of the site.
Note: ❑ BTEX included in the VOCs group of parameters ❑ * Hg and CrVI included in the Metals group of parameters							

Table 4: Groundwater Samples Submitted and Analyzed Parameters							
Sample ID	Screened Interval (m)	Parameters Analyzed					Rationale
		BTEX	PCBs	PHCs (F1-F4)	VOCs	Metals*	
June 12, 2020							
BH1-GW1	2.89-5.89	X	X	X	X	X	Assess the potential groundwater impact due to the former use of the site and presence of a pole mounted transformer.
BH2-GW1	6.17-9.17	X		X	X	X	Assess the potential groundwater impact due to the former use of the site.
BH5-GW1	3.05-6.05	X		X	X		Assess the potential groundwater impact due to the former use of the site.
DUP+		X		X	X		Duplicate for quality control.
Note: ▪ BTEX included in the VOCs group of parameters ▪ * Hg and CrVI included in the Metals group of parameters ▪ + PHC F1 tested only							

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

The borehole locations were selected by Paterson for both environmental and geotechnical purposes. Boreholes were located and surveyed in the field by Paterson. The locations and elevations of the boreholes are presented on Drawing PE2144-4 – 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 consist of an asphaltic concrete pavement structure and/or gravel, followed by fill material, some native soil, underlain by limestone bedrock. The boreholes were terminated at depths ranging from 4.22 to 9.70 mbgs.

Bedrock was confirmed during the drilling program. Practical refusal to auguring was completed in BH3, BH4, BH6 and BH7 to depths ranging from 0.74 to 1.19 m below the existing grade. Bedrock was encountered in the remaining boreholes at depths ranging from 0.94 to 1.09 mbgs.

Groundwater was encountered within bedrock at depths ranging from approximately 2.67 to 3.66mbgs. Site geology details are provided in the Soil Profile and Test Data Sheets provided in Appendix 1.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling event which occurred on June 16, 2020, using an electronic water level meter. Groundwater levels are summarized below in Table 5.

Table 5: Groundwater Level Measurements				
Borehole Location	**Ground Surface Elevation (m)**	**Water Level Depth (m below grade)**	**Water Level Elevation (m ASL)**	**Date of Measurement**
BH1-20	66.56	3.32	63.24	June 16, 2020
BH2-20	66.61	3.66	62.95	June 16, 2020
BH5-20	66.50	2.67	63.83	June 16, 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 PE2144-4 – Groundwater Contour Plan. Based on the contour mapping, groundwater flow beneath the Phase II Property is in westerly direction. A horizontal hydraulic gradient of approximately 0.14m/m was calculated.

5.3 Fine-Course Soil Texture

No grain size analysis was completed for the subject site. Coarse grained standards were chosen as the site consists of coarse grain soils.

5.4 Soil: Field Screening

No visual or olfactory odours were identified in the soil samples. Soil samples were selected based on visual screening, sample depth and/or sample location.

5.5 Soil Quality

Six (6) soil samples were submitted for BTEX, PCBs, PHC (F_1-F_4), VOCs and/or Metals analyses. The results of the analytical testing are presented in Tables 6, 7 and 8. The laboratory certificate of analysis is provided in Appendix 1.

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

Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 7 Residential Standards (µg/g)
		May 25, 2020			June 12, 2020	
		BH1-AU1	BH2-SS2	BH3-SS2	BH5-SS2	
Total PCBs	0.05	nd	NA	NA	NA	0.35
Benzene	0.2	nd	nd	nd	nd	0.21
Toluene	0.5	0.09	nd	nd	nd	2.3
Ethylbenzene	0.5	nd	nd	nd	nd	021
Xylenes	0.5	0.18	nd	nd	nd	3.1
PHC F_1	7	nd	nd	nd	nd	55
PHC F_2	4	<40	nd	nd	nd	98
PHC F_3	8	(285)	80	40	20	300
PHC F_4	6	(1630)	(632)	(306)	30	2800
PHC F_4 (gravimetric)	50	(2470)	(1100)	(457)	NA	2800

Notes:
- MDL – Method Detection Limit
- NA – Parameter not tested
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds the selected MECP Table 7 Standards
- (-) – Value exceeds Table 1 Standards

No detectable BTEX or PCBs were identified in the soil sample analyzed. PHC, fractions F3 and F4 concentrations were identified in the soil samples. All parameter concentrations comply with the selected MECP Table 7 Residential Standards.

Three of the four soil samples (BH1-AU1, BH2-SS2 and BH3-SS2) exceeded the Table 1 Standards.

Table 7: Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 7 Residential Standards (µg/g)
		May 25, 2020			June 12, 2020	
		BH1-AU1	BH2-AU1	BH3-SS2	BH5-AU1	
Antimony	1.0	nd	nd	nd	nd	7.5
Arsenic	1.0	2.4	2.7	3.4	6.5	18
Barium	1.0	101	133	115	79.0	390
Beryllium	0.5	nd	nd	nd	nd	4
Boron	5.0	11.9	11.7	17.1	7.0	120
Cadmium	0.5	nd	nd	nd	nd	1.2
Chromium	5.0	12.8	12.8	18.6	20.3	160
Chromium (VI)	0.2	nd	nd	nd	nd	8
Cobalt	1.0	4.5	4.3	5.5	7.4	22
Copper	5.0	13.1	14.1	16.2	24.8	140
Lead	1.0	34.5	20.3	19.4	25.7	120
Mercury	0.1	nd	nd	nd	nd	0.27
Molybdenum	1.0	nd	nd	nd	(3.1)	6.9
Nickel	5.0	11.1	10.8	17.8	15.5	100
Selenium	1.0	nd	nd	nd	nd	2.4
Silver	0.3	nd	nd	nd	nd	20
Thallium	1.0	nd	nd	nd	nd	1
Uranium	1.0	nd	nd	nd	nd	23
Vanadium	10.0	24.7	17.6	19.1	34.3	86
Zinc	20.0	36.7	36.8	48.9	95.1	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds the selected MECP Table 7 Standards
- (-) – Value exceeds Table 1 Standards

Metal concentrations were identified in the soil samples. All parameter concentrations comply with the selected MECP Table 7 Residential Standards.

Molybdenum concentration at BH5-AU1 exceeded the MECP Table 1 Standards.

Table 8: Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g) May 25, 2020 BH1-AU1	MECP Table 7 Residential Standards (µg/g
Acetone	0.50	nd	16
Benzene	0.02	nd	0.21
Bromodichloromethane	0.05	nd	13
Bromoform	0.05	nd	0.27
Bromomethane	0.05	nd	0.05
Carbon Tetrachloride	0.05	nd	0.05
Chlorobenzene	0.05	nd	2.4
Chloroform	0.05	nd	0.05
Dibromochloromethane	0.05	nd	9.4
Dichlorodifluoromethane	0.05	nd	16
1,2-Dichlorobenzene	0.05	nd	3.4
1,3-Dichlorobenzene	0.05	nd	4.8
1,4-Dichlorobenzene	0.05	nd	0.083
1,1-Dichloroethane	0.05	nd	3.5
1,2-Dichloroethane	0.05	nd	0.05
1,1-Dichloroethylene	0.05	nd	0.05
cis-1,2-Dichloroethylene	0.05	nd	3.4
trans-1,2-Dichloroethylene	0.05	nd	0.084
1,2-Dichloropropane	0.05	nd	0.05
1,3-Dichloropropene, total	0.05	nd	0.05
Ethylbenzene	0.05	nd	2
Ethylene dibromide (dibromoethane, 1,2-)	0.05	nd	0.05
Hexane	0.05	nd	2.8
Methyl Ethyl Ketone (2-Butanone)	0.50	nd	16
Methyl Isobutyl Ketone	0.50	nd	1.7
Methyl tert-butyl ether	0.05	nd	0.75
Methylene Chloride	0.05	nd	0.1
Styrene	0.05	nd	0.7
1,1,1,2-Tetrachloroethane	0.05	nd	0.058
1,1,2,2-Tetrachloroethane	0.05	nd	0.05
Tetrachloroethylene	0.05	nd	0.28
Toluene	0.05	0.09	2.3
1,1,1-Trichloroethane	0.05	nd	0.38
1,1,2-Trichloroethane	0.05	nd	0.05
Trichloroethylene	0.05	nd	0.061
Trichlorofluoromethane	0.05	nd	4
Vinyl Chloride	0.02	nd	0.02
Xylenes, total	0.05	0.18	3.1

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds the selected MECP Table 7 Standards
- (-) – Value exceeds Table 1 Standards

Toluene and xylenes were identified in the soil sample analyzed. VOC parameter concentrations comply with the selected MECP Table 7 Residential Standards.

The analytical results in soil with respect to borehole locations are shown on Drawings PE2144-5- Analytical Testing Plan – Soil.

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

Table 9: Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Soil Sample	Depth Interval (m BGS)
Toluene	0.9	BH1-AU1	0.076-0.61, Fill
Xylenes	0.18		
PHC F_3	(285)		
PHC F_4	(1630)		
PHC F_4 (gravimetric)	(2470)		
Arsenic	6.5	BH5-AU1	0.0-0.61, Fill
Barium	133	BH2-AU1	0.05-0.06, Fill
Boron	17.1	BH3-SS2	0.76-1.02, Silty Sand
Chromium	20.3	BH5-AU1	0.0-0.61, Fill
Cobalt	7.4		
Copper	24.8		
Lead	34.5	BH1-AU1	0.076-0.61, Fill
Mercury	0.2		
Molybdenum	(3.1)	BH5-AU1	0.0-0.61, Fill
Nickel	17.8	BH3-SS2	0.76-1.02, Silty Sand
Vanadium	34.3	BH5-AU1	0.0-0.61, Fill
Zinc	95.1		

Notes:
- **Bold and Underlined** – Value exceeds the selected MECP Standards
- (-) – Value exceeds Table 1 Standards

The maximum BTEX, PHC and metal parameter concentrations in the soil samples analyzed are in compliance with the selected standards. The remaining parameters were not detected above the laboratory method detection limits.

Parameter concentrations in parenthesises exceed the background soil conditions (MECP Table 1).

5.6 Groundwater Quality

Groundwater samples were submitted for laboratory analysis of BTEX, PHC (F_1-F_4), PCBs, VOCs and/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 10, 11 and 12. The laboratory certificates of analysis are provided in Appendix 1.

Table 10: Analytical Test Results – Groundwater
PCBs, BTEX and PHC (F_1-F_4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)				MECP Table 7 Standards (µg/L)
		June 16, 2020				
		BH1-GW1	BH2-GW1	BH5-GW1	DUP1	
Total PBCs	0.05	nd	NA	NA	NA	0.2
Benzene	0.5	nd	nd	**0.7**	**0.6**	0.5
Toluene	0.5	nd	nd	2.7	2.6	54
Ethylbenzene	0.5	nd	nd	nd	nd	320
Xylenes	0.5	1.4	0.7	0.5	0.6	72
PHC F_1	25	nd	nd	nd	nd	420
PHC F_2	100	nd	nd	nd	NA	150
PHC F_3	100	nd	nd	nd	NA	500
PHC F_4	100	nd	nd	nd	NA	500

Notes:
- MDL – Method Detection Limit
- NA – Parameter not tested
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds the selected MECP Table 7 Standards
- (-) – Value exceeds Table 1 Standards

With the exception of benzene, all other parameter concentrations in the groundwater samples comply with the selected MECP Table 7 Standards.

Table 11: Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)		MECP Table 7 Standards (µg/L)
		June 16, 2020		
		BH1-GW1	BH2-GW1	
Antimony	0.5	nd	nd	16000
Arsenic	1	nd	nd	1500
Barium	1	51	69	23000
Beryllium	0.5	nd	nd	53
Boron	10	58	156	36000
Cadmium	0.1	nd	nd	2.1
Chromium	1	nd	nd	640
Chromium (VI)	10	nd	nd	110
Cobalt	0.5	nd	nd	52
Copper	0.5	1.3	2.0	69
Lead	0.1	nd	nd	20
Mercury	0.1	nd	nd	0.1
Molybdenum	0.5	16.3	30.1	7300
Nickel	1	nd	2	390
Selenium	1	nd	nd	50
Silver	0.1	nd	nd	1.2
Sodium	200	30000	44600	1800000
Thallium	0.1	nd	0.1	400
Uranium	0.1	0.7	1.5	330
Vanadium	0.5	0.5	nd	200
Zinc	5	nd	7	890

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

All metal concentrations in the groundwater samples comply with the selected MECP Table 7 Standards.

Table 12: Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 7 Standards (µg/L)
		June 16, 2020			
		BH1-GW1	BH2-GW1	BH5-GW1	
Acetone	5.0	nd	nd	nd	100000
Benzene	0.5	nd	nd	**0.7**	0.5
Bromodichloromethane	0.5	nd	nd	nd	67000
Bromoform	0.5	nd	nd	nd	5
Bromomethane	0.5	nd	nd	nd	0.89
Carbon Tetrachloride	0.2	nd	nd	nd	0.2
Chlorobenzene	0.5	nd	nd	nd	140
Chloroform	0.5	**2.8**	**6.6**	**9.9**	2
Dibromochloromethane	0.5	nd	nd	nd	65000
Dichlorodifluoromethane	1.0	nd	nd	nd	3500
1,2-Dichlorobenzene	0.5	nd	nd	nd	150
1,3-Dichlorobenzene	0.5	nd	nd	nd	7600
1,4-Dichlorobenzene	0.5	nd	nd	nd	0.5
1,1-Dichloroethane	0.5	nd	nd	nd	11
1,2-Dichloroethane	0.5	nd	nd	nd	0.5
1,1-Dichloroethylene	0.5	nd	nd	nd	0.5
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	0.58
1,3-Dichloropropene, total	0.5	nd	nd	nd	0.5
Ethylbenzene	0.5	nd	nd	nd	54
Ethylene dibromide (dibromoethane, 1,2-)	0.2	nd	nd	nd	0.2
Hexane	1.0	nd	nd	nd	5
Methyl Ethyl Ketone (2-Butanone)	5.0	nd	nd	nd	21000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	5200
Methyl tert-butyl ether	2.0	nd	nd	nd	15
Methylene Chloride	5.0	nd	nd	nd	26
Styrene	0.5	nd	nd	nd	43
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	1.1
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	0.5
Tetrachloroethylene	0.5	nd	nd	nd	0.5
Toluene	0.5	nd	nd	2.7	320
1,1,1-Trichloroethane	0.5	nd	nd	nd	23
1,1,2-Trichloroethane	0.5	nd	nd	nd	0.5
Trichloroethylene	0.5	nd	nd	nd	0.5
Trichlorofluoromethane	1.0	nd	nd	nd	2000
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes, total	0.5	1.4	0.7	0.5	72

Notes:
- MDL – Method Detection Limit
- NA – Parameter not tested
- nd – not detected above the MDL
- **Bold and Underlined** – Value exceeds the selected MECP Table 7 Standards

With the exception of benzene (in BH5-GW1) and the chloroform concentrations all other VOC parameters comply with the selected MECP Table 7 Standards.

The chloroform present in all three (3) groundwater samples is a result of the municipal water used for coring bedrock and as such, is not considered a contaminant.

Analytical results of BTEX. PCBs, PHCs, VOCs and/or metals in the groundwater with respect to borehole locations are shown on Drawings PE2144-6- Analytical Testing Plan – Groundwater.

The maximum concentrations of analyzed parameters in the groundwater at the site are summarized in Table 13.

Table 13: Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Groundwater Sample	Screened Interval (m BGS)
Benzene	**0.7**	BH5-GW1	3.04-6.04
Toluene	2.7		
Xylenes	1.4	BH1-GW1	2.89-5.89
Chloroform	**9.9**	BH5-GW1	3.04-6.04
Barium	69	BH2-GW1	6.17-9.17
Boron	156		
Copper	2.0		
Molybdenum	30.1		
Nickel	2		
Sodium	44600		
Thallium	0.1		
Uranium	1.5	BH2-GW1	6.17-9.17
Vanadium	0.5	BH1-GW1	2.89-5.89
Zinc	7	BH2-GW1	6.17-9.17

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

With the exception of benzene at BH5, all groundwater test results are in compliance with the selected MECP Table 7 Standards. The remaining parameters were not detected above the laboratory method detection limits.

5.7 Quality Assurance and Quality Control Results

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

As per the sampling and analysis plan, a duplicate groundwater sample (DUP1) from BH5-GW1 was obtained and analyzed for BTEX and PHC, F1 parameters.

The RPD calculations for the original and duplicate sample of the groundwater are provided below in Table 14.

Table 14: QA/QC Results – Soil
Metals

Parameters	BH5-GW1	DUP1	RPD (%)	QA/QC Result
Benzene	**0.7**	**0.6**	7.69	Within acceptable range
Toluene	2.7	2.6	1.89	Within acceptable range
Ethylbenzene	nd	nd	NA	NA
Xylenes	0.5	0.6	9.09	Within acceptable range
PHC F_1	nd	nd	NA	NA

The RPD results are 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 identifed and considered to represent APECs on the Phase II Property:

- APEC 1: Resulting from the former on-site Windows and Aluminum Products Manufacturer on the western portion of the Phase I Property (PCA 34).
- APEC 2: Resulting from the former coating facility on the eastern portion of the Phase I Property (PCA 33).

- APEC 5: Resulting from the former on-site automotive repair garage on the eastern portion of the Phase I Property (PCA 52).
- APEC 4: Resulting from fill material of unknown quality, associated with the importation of fill material of unknown quality on the entire Phase I Property (PCA 30).
- APEC 5: Resulting from the presence of a pole-mounted transformer on the central south portion of the Phase I Property (PCA 55).
- APEC 6: Resulting from the former furnace oil spill in 2005 at 389 Wilmont Avenue (PCA - Other).

Contaminants of Potential Concern

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

- Benzene, ethylbenzene, toluene and xylenes (BTEX);
- Petroleum hydrocarbons (PHCs, Fractions F_1-F_4);
- Polychlorinated biphenyl (PCB);
- Volatile organic compounds (VOCs); and
- Metals plus Mercury (Hg), and Hexavalent Chromium (CrVI).

Subsurface Structures and Utilities

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

Physical Setting

Site Stratigraphy

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is illustrated on Drawings PE2144-7 through PE2144-10 for soil and groundwater cross-sections. The site stratigraphy consists of:

- Asphaltic concrete or gravel at all boreholes, except BH5.

- Fill material consisting of silty sand with crushed stone with some traces of brick and asphalt. The fill material was encountered at depths ranging from 0 to 0.05 mbgs.
- Silty sand was encountered beneath the fill layer and encountered at depths ranging from 0.51 to 0.94 mbgs and extended to depths ranging from 0.74 to 1.10 mbgs. Groundwater was not encountered in this layer at BH2 and BH3.
- Limestone bedrock was encountered in BH1, BH2 and BH5, extending to depths ranging from approximately 5.89 to 9.17 mbgs. Groundwater was encountered in this layer at all three boreholes.

Hydrogeological Characteristics

Groundwater at the Phase II Property was encountered in limestone bedrock, ranging from depths of approximately 2.67 to 3.66 mbgs. Groundwater flow was measured in a westerly direction with a hydraulic gradient of 0.14m/m. Groundwater contours are shown on Drawing PE2144-4–Test Hole Location Plan.

Approximate Depth to Water Table

Depth to the water table at the subject site varies between approximately 2.67 to 3.66 mbgs.

Approximate Depth to Bedrock

Bedrock was confirmed during the drilling program at depths ranging from 0.74 to 1.09 mbgs in BH1, BH2 and BH5.

Sections 41 and 43.1 of the Regulation

Section 41 of the Regulation does not apply to the subject site as there are no areas of natural significance or bodies of water located on the subject site or within 30 m of the subject site. The subject site is not considered to be environmentally sensitive.

Section 43.1 of the Regulation applies to the subject site as bedrock is located less than 2 m below ground surface and thus, considered a 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 with some traces of brick and asphalt concrete in several boreholes.

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

Existing Buildings and Structures

The Phase II Property is occupied by three (3) slab-on-grade buildings; one large manufacturing facility type building situated on the western portion of the site, and two (2) relatively smaller warehouse/garage style buildings situated on the eastern portions of the site, 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 21-storey and 18-storey residential buildings to be situated on the western and eastern portions of the Phase II Property.

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 Ottawa River is located 252 m northwest of the Phase II Property.

Environmental Condition

Areas Where Contaminants are Present

The 2010 subsurface investigation identified Arsenic, Barium and Molybdenum in the fill material at BH5 in excess of the current MECP Table 7 Residential Standards.

Based on our recent findings, the metal impact appears to be isolated in the immediate area.

Benzene and chloroform were identified in excess of the selected standards. Chloroform is associated with the municipal water used during coring and as such, is not considered a contaminant.

Benzene was identified in the groundwater sample retrieved from BH5-20. This contaminant appears to be isolated in the immediate area of the former furnace oil spill had occurred.

Types of Contaminants

Based on the analytical results for soil and groundwater, the contaminants of concern include arsenic, barium, molybdenum and benzene, which were identified in the fill material and groundwater at BH5 and BH5-20, respectively.

Contaminated Media

Based on the findings of the Phase II ESA, the fill material at BH3 is impacted with metals, specifically arsenic, barium and molybdenum and benzene at BH5-20.

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 residence at 389 Wilmont Avenue. The groundwater impact was also identified in the same area (BH5-20).

Distribution and Migration of Contaminants

Based on the findings of the Phase II ESA, the groundwater may not have stabilized or may have contained sediment. The distribution or migration of contaminants is not considered to have occurred.

Discharge of Contaminants

The metals impact on the central south part of the Phase II Property is considered to have resulted from the demolition debris from the former buildings on-site. The benzene contamination identified in groundwater is likely caused by sediment present in the groundwater sample.

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. The soil/fill material did not contained benzene; therefore, groundwater was not impacted from leaching.

Prior to future site redevelopment, the benzene in the groundwater will be verified and if present, it will be remediated.

Potential for Vapour Intrusion

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

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the property addressed 335 Roosevelt Avenue 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 on the Phase II Property during the Phase I ESA.

The Phase II ESA was carried out in conjunction with a Geotechnical Investigation and consisted of drilling seven (7) boreholes on the Phase II Property, three (3) of which were constructed with groundwater monitoring well installations.

The soil profile generally consisted of an asphaltic concrete pavement structure and/or fill, followed by silty sand, underlain by limestone and terminated down to a maximum depth of 9.17m below the ground surface. Soil samples were obtained from the boreholes and screened based on visual observations. Some brick and asphaltic concrete debris 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 was submitted for laboratory analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), polychlorinated biphenyls (PCBs), petroleum hydrocarbons (PHCs, F_1-F_4), volatile organic compounds (VOCs) and/or metals. All analyzed parameters were in compliance of the selected MECP Table 7 Residential Standards. The analytical soil results from 2010 identified metal concentrations (Arsenic, Barium and Molybdenum) in excess of the current standards at BH5.

Groundwater samples were recovered and analyzed for PCBs, PHCs, 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. Benzene concentration was identified at BH5-20 and in excess of the MECP Table 7 Standards. Chloroform concentrations were identified in excess of the standards. The presence of chloroform is associated with the municipal water used during coring and as such, it is not considered a contaminant of concern. All other groundwater results, including the 2010 results were in compliance with the MECP Table 7 Standards.

Recommendations

As noted in the report, the Phase II Property will be redeveloped for residential land use and as such, the Phase II Property will require a Record of Site Condition (RSC). This will require that metals impacted soil/fill and BTEX impacted groundwater that does not comply with Table 7 Residential Standards, be remediated.

Soil

Fill/soil material across the Phase II Property identified PHCs (F3-F4), xylene and metal concentrations in excess of the Table 1 Standards, which are used to classify the soil for off-site disposal. It is our recommendation that the impacted fill/soil material be removed from the subject site during the redevelopment process. The excavation of the soil from the property should be monitored and confirmed by Paterson. Soil/ fill in excess of Table 1, will need to be removed and disposed of at an approved waste disposal facility.

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

Groundwater

It is recommended that further groundwater testing be conducted to confirm that the chloroform was a result of the core water used as well as to verify any benzene impact. If the groundwater is contaminated, remediation of the groundwater using a licenced hauling company pumping from the excavation may be a viable option, depending upon the groundwater level at the time of the remediation, however, if a significant volume of water is anticipated, a pump and treat system would likely be more economical. Depending upon the methodology selected, post remediation groundwater monitoring will be required up to 12 months prior to filing an RSC.

Monitoring Wells

It is our recommendation that the monitoring wells installed on the subject site should remain viable for future monitoring. If they are not going to be used in the future, they should be abandoned according to Ontario Regulation 903. The wells will be registered with the MECP under this regulation.

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared 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 Uniform Developments. Notification from Uniform Developments and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.

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

Mark D'Arcy, P.Eng., QP_{ESA}

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FIGURES

FIGURE 1 – KEY PLAN

Drawing PE2144-4 – Test Hole Location Plan and Groundwater Contour Plan

Drawing PE2144-5-Analytical Test plan – Soils

Drawing PE2144-6-Analytical Test plan – Groundwater

Drawing PE2144-7-Cross-section – A-A' – Soil

Drawing PE2144-8-Cross-section – A-A' – Groundwater

Drawing PE2144-9-Cross-section – B-B' – Soil

Drawing PE2144-10-Cross-section – B-B' – Groundwater

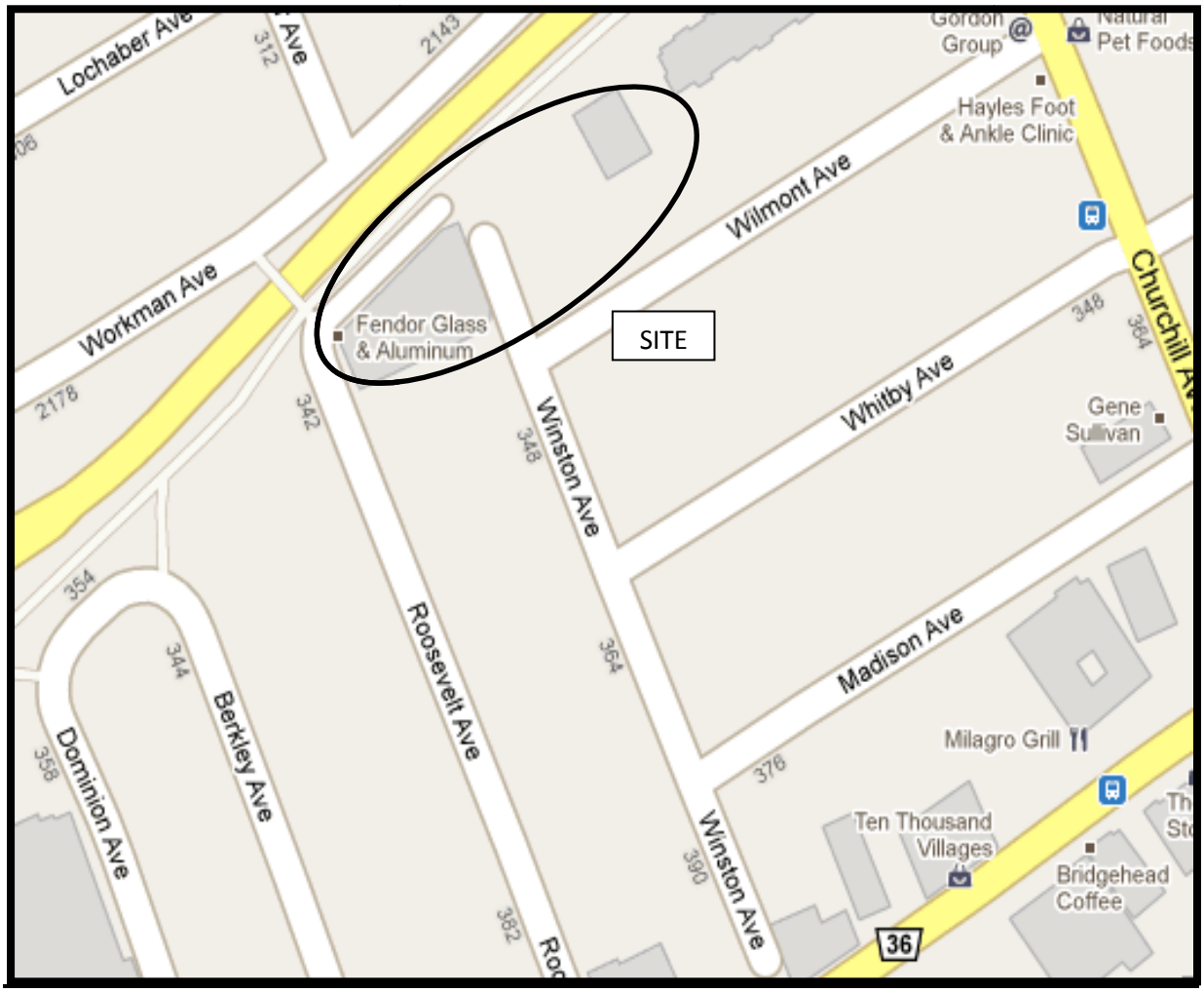


FIGURE 1

KEY PLAN

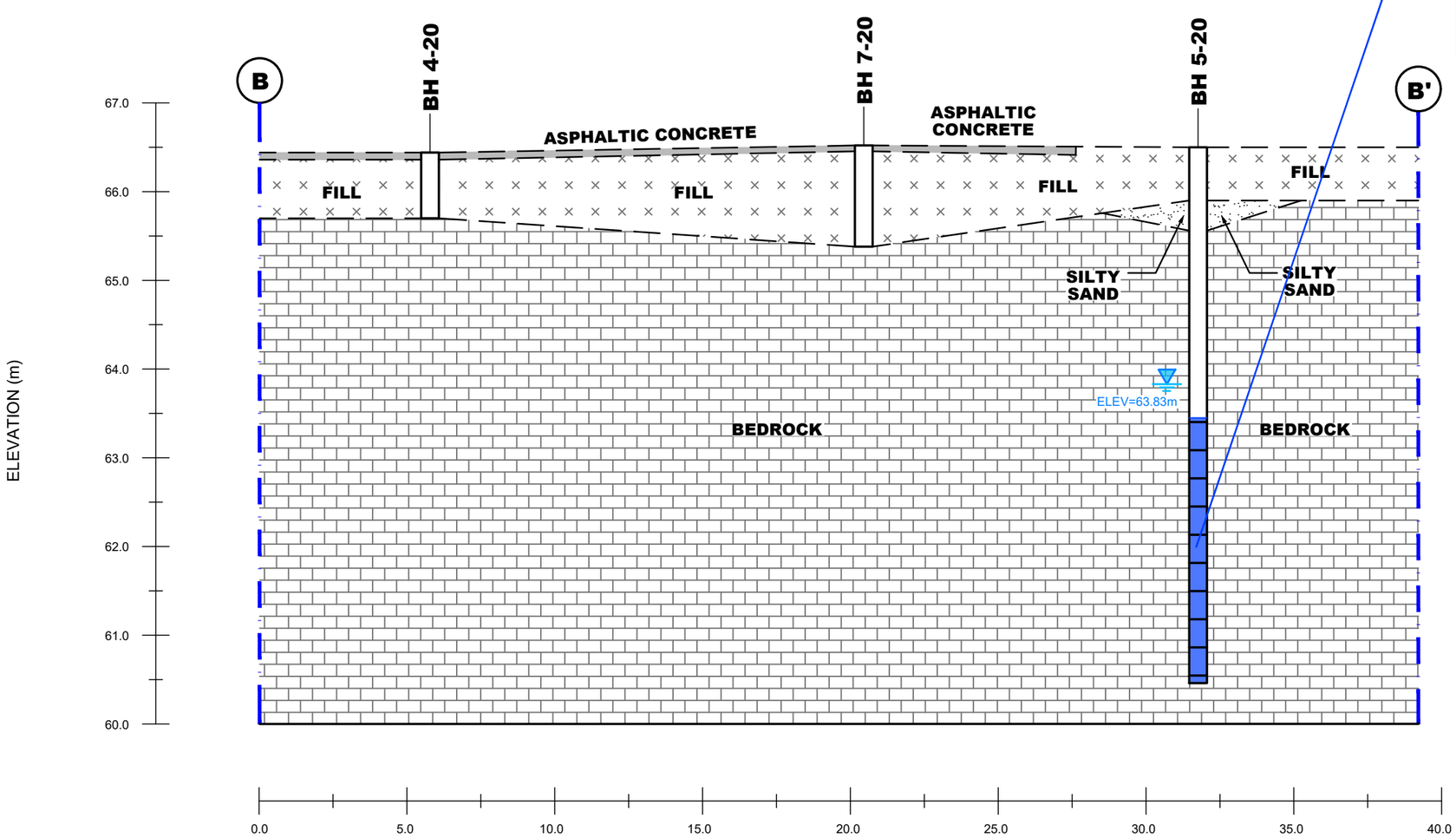
BH5-GW1	3.05-6.05m	16-Jun-20
Parameter	Result(µg/L)	Standard(µg/L)
Benzene	0.7	0.5
Chloroform	9.9	2

Remaining VOCs comply with Table 7 Standards

PHCs comply with MECP Table 7 Standards

DUP(BH5)	3.05-6.05m	16-Jun-20
Parameter	Result(µg/L)	Standard(µg/L)
Benzene	0.6	0.5

PHC-F1 complies with MECP Table 7 Standards



GROUNDWATER RESULT COMPLIES WITH MECP TABLE 7 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 7 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

UNIFORM DEVELOPMENTS

SUPPLEMENTAL PHASE II - ENVIRONMENTAL SITE ASSESSMENT
335 ROOSEVELT AVENUE

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - GROUNDWATER

Scale: AS SHOWN	Date: 07/2020
Drawn by: MPG	Report No.: PE2144-3
Checked by: MW	Dwg. No.: PE2144-10
Approved by: MSD	Revision No.:

11x17

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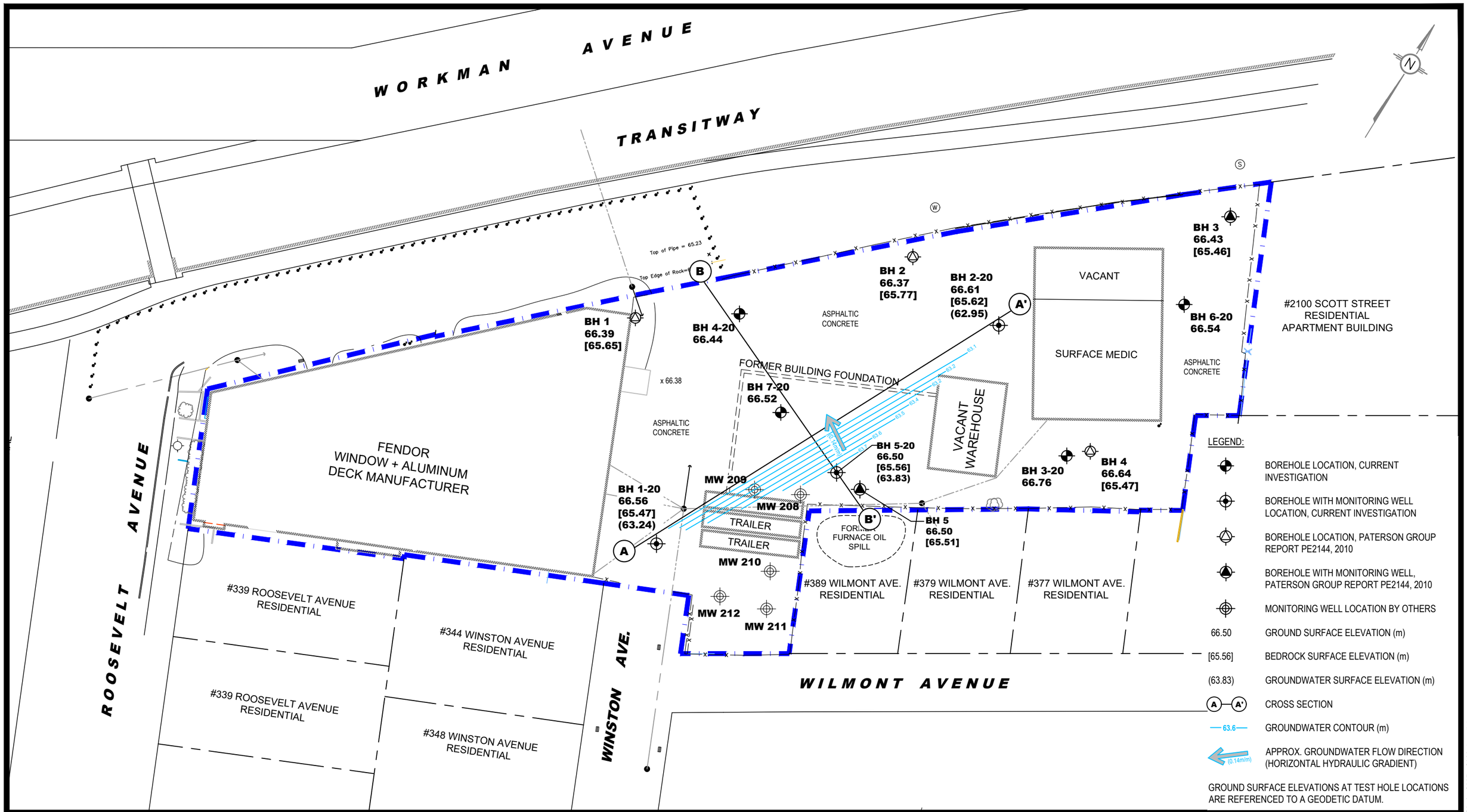

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UNIFORM DEVELOPMENTS

SUPPLEMENTAL PHASE II - ENVIRONMENTAL SITE ASSESSMENT
335 ROOSEVELT AVENUE

OTTAWA, ONTARIO

Title: **TEST HOLE LOCATION PLAN**

Scale: 1:500	Date: 07/2020
Drawn by: MPG	Report No.: PE2144-3
Checked by: MW	Dwg. No.: PE2144-4
Approved by: MSD	Revision No.:

11x17

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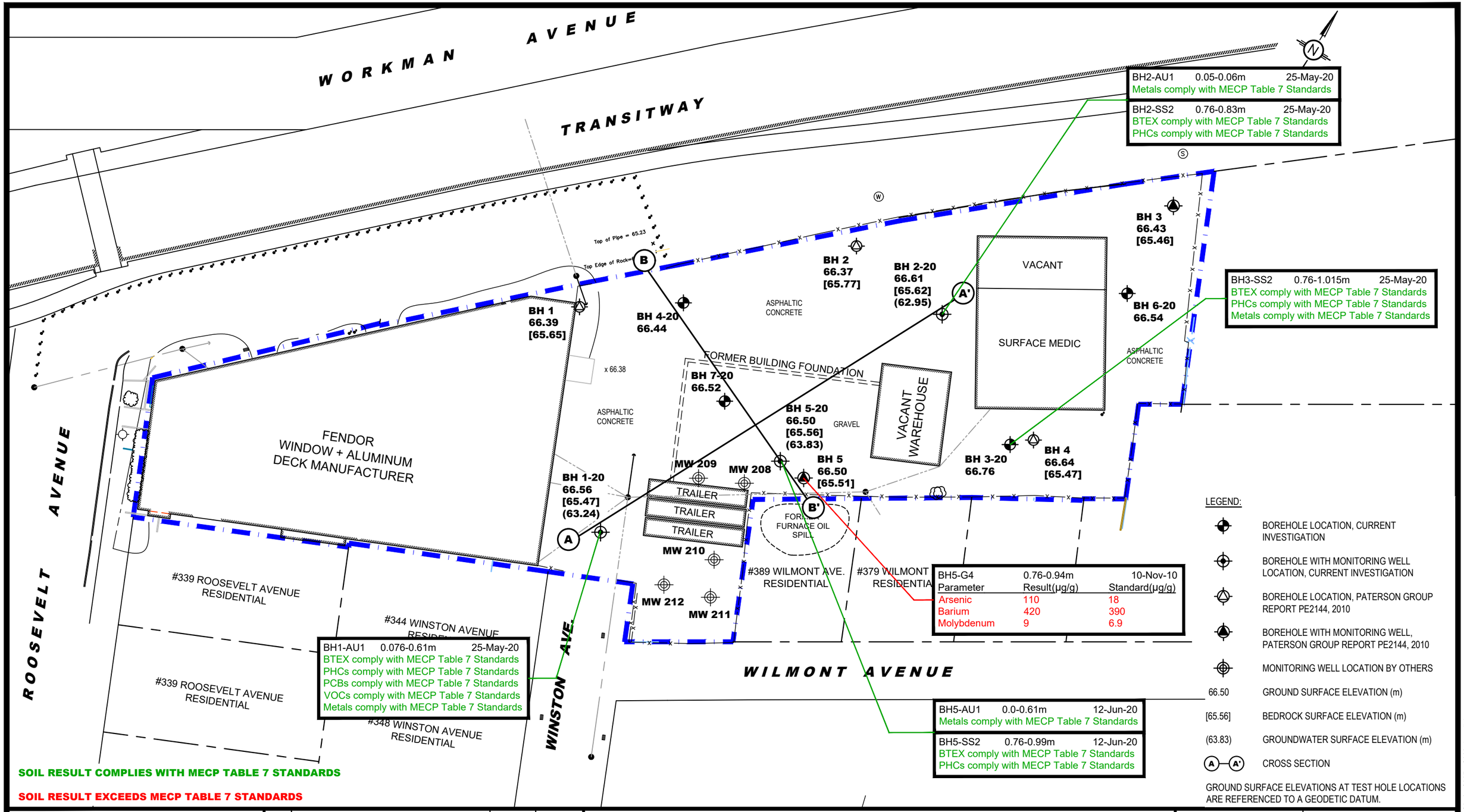

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UNIFORM DEVELOPMENTS

SUPPLEMENTAL PHASE II - ENVIRONMENTAL SITE ASSESSMENT
335 ROOSEVELT AVENUE

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL

Scale: 1:500	Date: 07/2020
Drawn by: MPG	Report No.: PE2144-3
Checked by: MW	Dwg. No.: PE2144-5
Approved by: MSD	Revision No.:

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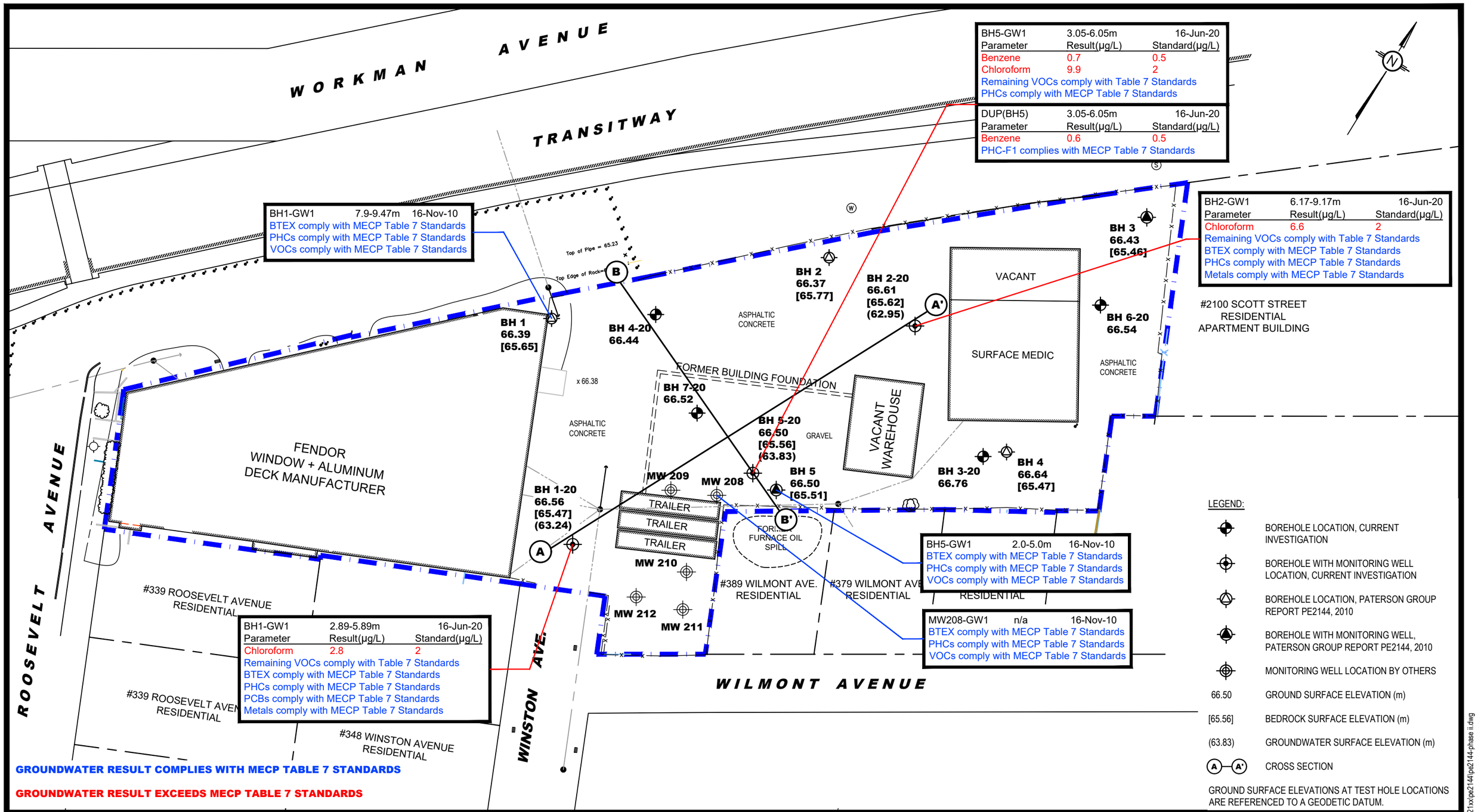

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NO.	REVISIONS	DATE	INITIAL

UNIFORM DEVELOPMENTS

SUPPLEMENTAL PHASE II - ENVIRONMENTAL SITE ASSESSMENT
335 ROOSEVELT AVENUE

OTTAWA, ONTARIO

Title: **ANALYTICAL TESTING PLAN - GROUNDWATER**

Scale: 1:500	Date: 07/2020
Drawn by: MPG	Report No.: PE2144-3
Checked by: MW	Dwg. No.: PE2144-6
Approved by: MSD	Revision No.:

11x17

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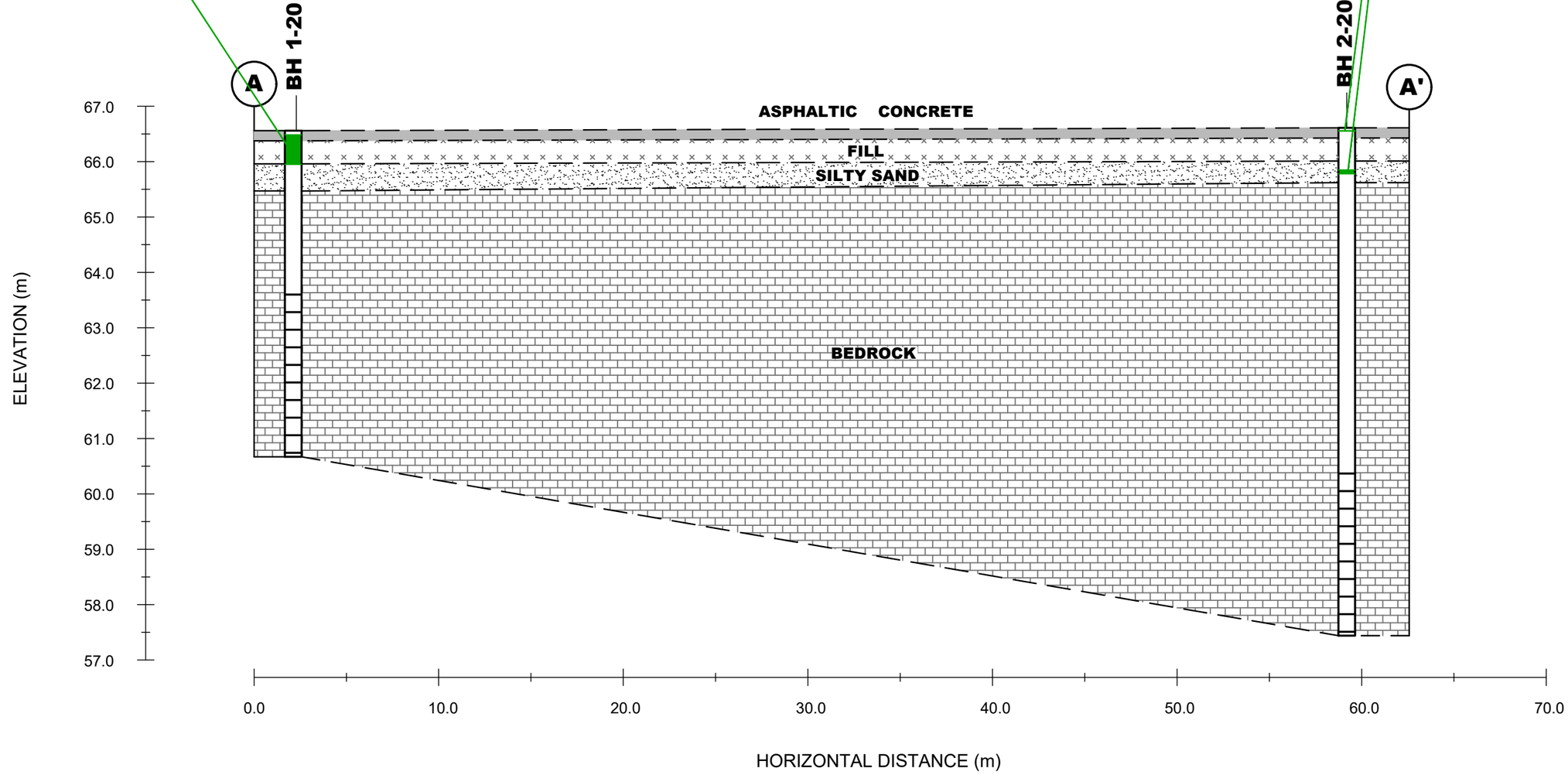
BH1-AU1 0.076-0.61m 25-May-20
BTEX comply with MECP Table 7 Standards
PHCs comply with MECP Table 7 Standards
PCBs comply with MECP Table 7 Standards
VOCs comply with MECP Table 7 Standards
Metals comply with MECP Table 7 Standards

BH2-AU1 0.05-0.06m 25-May-20
Metals comply with MECP Table 7 Standards

BH2-SS2 0.76-0.83m 25-May-20
BTEX comply with MECP Table 7 Standards
PHCs comply with MECP Table 7 Standards



SOIL RESULT COMPLIES WITH MECP TABLE 7 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 7 STANDARDS

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UNIFORM DEVELOPMENTS

SUPPLEMENTAL PHASE II - ENVIRONMENTAL SITE ASSESSMENT
335 ROOSEVELT AVENUE

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL

Scale: AS SHOWN	Date: 07/2020
Drawn by: MPG	Report No.: PE2144-3
Checked by: MW	Dwg. No.: PE2144-7
Approved by: MSD	Revision No.:

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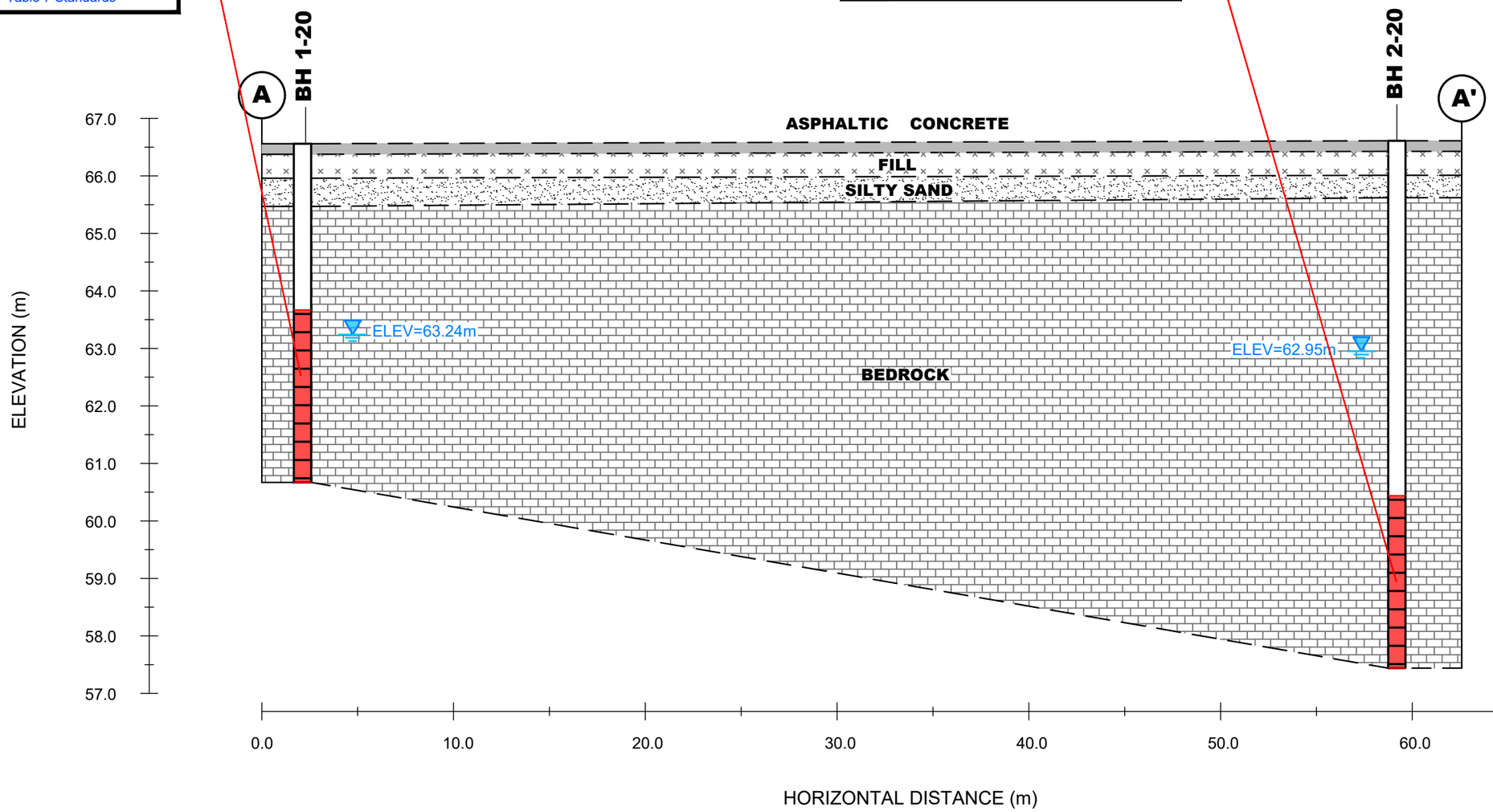
BH1-GW1	2.89-5.89m	16-Jun-20
Parameter	Result(µg/L)	Standard(µg/L)
Chloroform	2.8	2

Remaining VOCs comply with Table 7 Standards
BTEX comply with MECP Table 7 Standards
PHCs comply with MECP Table 7 Standards
PCBs comply with MECP Table 7 Standards
Metals comply with MECP Table 7 Standards

BH2-GW1	6.17-9.17m	16-Jun-20
Parameter	Result(µg/L)	Standard(µg/L)
Chloroform	6.6	2

Remaining VOCs comply with Table 7 Standards
BTEX comply with MECP Table 7 Standards
PHCs comply with MECP Table 7 Standards
Metals comply with MECP Table 7 Standards



GROUNDWATER RESULT COMPLIES WITH MECP TABLE 7 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 7 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

UNIFORM DEVELOPMENTS

SUPPLEMENTAL PHASE II - ENVIRONMENTAL SITE ASSESSMENT
335 ROOSEVELT AVENUE

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - GROUNDWATER

Scale: AS SHOWN	Date: 07/2020
Drawn by: MPG	Report No.: PE2144-3
Checked by: MW	Dwg. No.: PE2144-8
Approved by: MSD	Revision No.:

11x17

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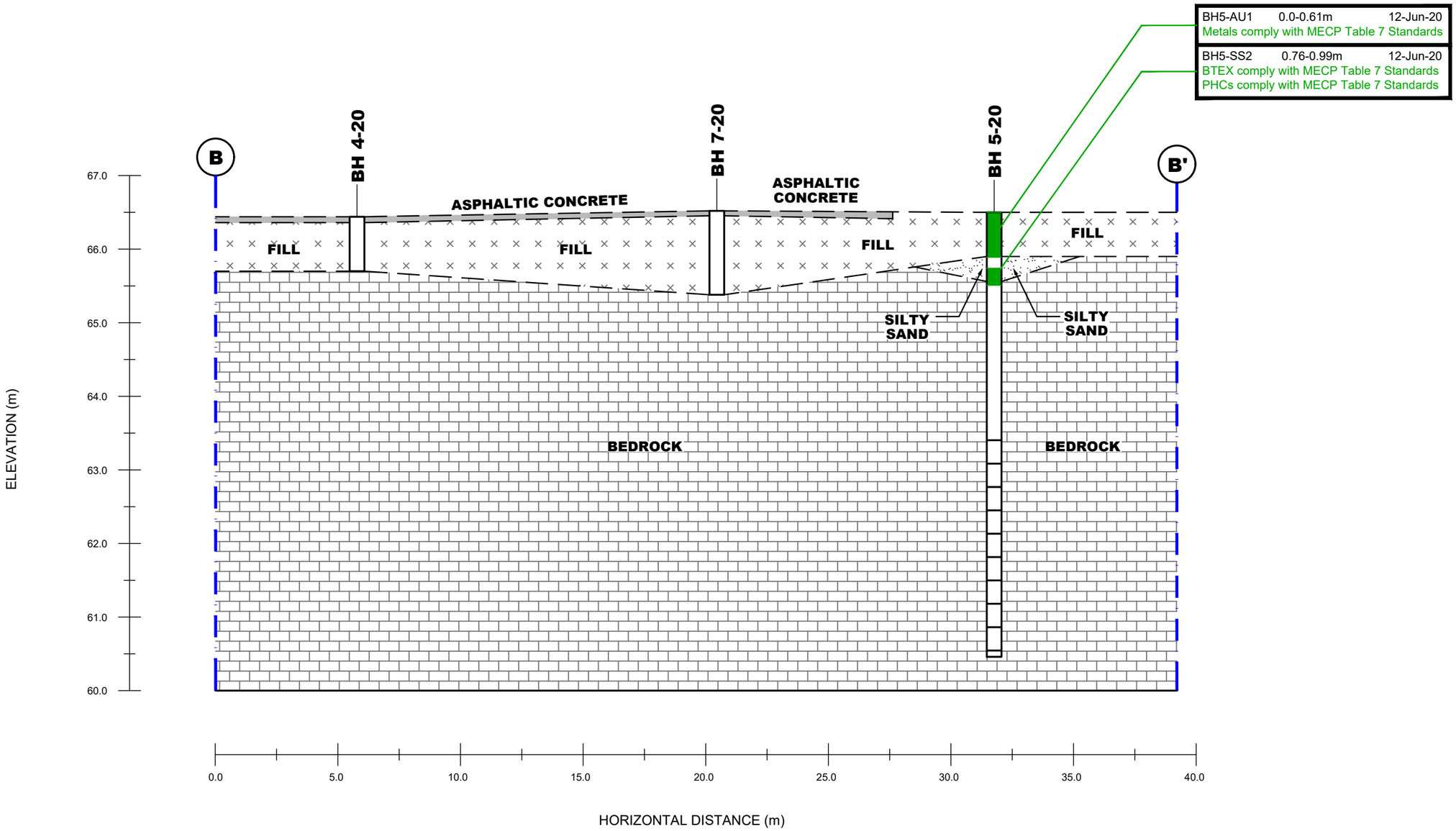
BH5-AU1 0.0-0.61m 12-Jun-20
Metals comply with MECP Table 7 Standards

BH5-SS2 0.76-0.99m 12-Jun-20
BTEX comply with MECP Table 7 Standards
PHCs comply with MECP Table 7 Standards



SOIL RESULT COMPLIES WITH MECP TABLE 7 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 7 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

UNIFORM DEVELOPMENTS

SUPPLEMENTAL PHASE II - ENVIRONMENTAL SITE ASSESSMENT
335 ROOSEVELT AVENUE

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL

Scale: AS SHOWN	Date: 07/2020
Drawn by: MPG	Report No.: PE2144-3
Checked by: MW	Dwg. No.: PE2144-9
Approved by: MSD	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

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Sampling & Analysis Plan

Phase II Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

Prepared For

Uniform Developments

May 2020

Report: PE2144-SAP

Table of Contents

1.0 SAMPLING PROGRAM 1
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1.0 SAMPLING PROGRAM

Paterson was retained by Mr. Dan Tomka of Uniform Developments, to conduct a Phase II Environmental Site Assessment (ESA) for the property addressed 335 Roosevelt Avenue, in the City of Ottawa, Ontario.

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

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-20	Place beneath the pole mounted transformer to assess APECs 1 and 5.	Borehole advanced to at least 5 m within the groundwater table to facilitate installation of groundwater monitoring wells.
BH2-20	Place on the western side of the eastern building to assess APECs 2 and 3.	Boreholes to be advanced to at least 9 m within the groundwater table to facilitate installation of groundwater monitoring wells.
BH3-20	Placed on the southeastern portion of the property for geotechnical purposes and to assess the quality of the fill material (APEC 4).	Boreholes to be advanced until practical refusal.
BH4-20	Placed on the northern portion of the property for geotechnical purposes and to assess the quality of the fill material (APEC 4).	Boreholes to be advanced until practical refusal.
BH5-20	Placed on the central portion of the property for geotechnical purposes and to assess APECs 4 and APEC 5.	Boreholes to be advanced to at least 6 m within the groundwater table to facilitate installation of groundwater monitoring wells.
BH6-20	Placed on the eastern property boundary of the property for geotechnical purposes and to assess APEC 4.	Boreholes to be advanced until practical refusal.
BH7-20	Placed on the central portion of the property boundary of the property for geotechnical purposes and to assess APEC 4.	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.

patersongroup

Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

DATUM TBM - Mag nail in utility pole, along southeast property line. Geodetic elevation = 67.30m.

REMARKS

BORINGS BY CME 55 Power Auger **DATE** 9 Nov 10

FILE NO. PE2144

HOLE NO. BH 1

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.39
Asphaltic concrete 0.05		AU	1				
FILL: Dark brown silty sand, some gravel 0.46		SS	2		50+		
0.74		RC	1	94	22	1	65.39
Grey-brown **SILTY CLAY,** some sand		RC	2	100	51	2	64.39
BEDROCK: Grey limestone						3	63.39
- black shaley limestone from 1.5 to 2.5m depth		RC	3	100	78	4	62.39
		RC	4	100	84	5	61.39
		RC	5	100	35	6	60.39
		RC	6	100	96	7	59.39
		RC	7	100	100	8	58.39
9.47						9	57.39
End of Borehole							
(GWL @ 4.88m-Nov. 16/10)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Lower Explosive Limit %

20 40 60 80

Piezometer Construction

100 200 300 400 500

Gastech 1314 Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

DATUM TBM - Mag nail in utility pole, along southeast property line. Geodetic elevation = 67.30m.

REMARKS

BORINGS BY CME 55 Power Auger **DATE** 9 Nov 10

FILE NO. PE2144

HOLE NO. BH 2

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.37
Asphaltic concrete 0.05							
FILL: Dark brown silty sand, some gravel 0.46		AU	1				
Grey-brown **SILTY CLAY** 0.60		SS	2	0	50+		
		RC	1	84	58	1	65.37
		RC	2	600	57	2	64.37
BEDROCK: Grey limestone						3	63.37
- black shaley limestone from 1.6m to 2.5m depth		RC	3	98	83	4	62.37
		RC	4	100	92	5	61.37
		RC	5	98	98	6	60.37
		RC	6	100	93	7	59.37
		SS	7	100	100	8	58.37
9.42						9	57.37
End of Borehole							
(GWL @ 6.53m-Nov. 16/10)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Lower Explosive Limit %

20 40 60 80

Piezometer Construction

100 200 300 400 500

Gastech 1314 Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup

Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

DATUM TBM - Mag nail in utility pole, along southeast property line. Geodetic elevation = 67.30m.

REMARKS

BORINGS BY CME 55 Power Auger **DATE** 9 Nov 10

FILE NO. PE2144

HOLE NO. BH 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.43
Asphaltic concrete 0.05		AU	1				
FILL; Brown silty sand with gravel 0.60							
FILL: Light brown silty sand, some gravel, trace clay 0.97		SS	2	0	50+	1	65.43
		RC	1	88	63		
		RC	2	97	35	2	64.43
BEDROCK: Grey limestone						3	63.43
- black shaley limestone from 1.5m to 1.7m depth		RC	3	100	75	4	62.43
		RC	4	98	87	5	61.43
						6	60.43
		RC	5	98	85	7	59.43
		RC	6	100	89	8	58.43
		RC	7	96	96	9	57.43
9.40							
End of Borehole							
(BH dry - Nov. 23/10)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Lower Explosive Limit %

20 40 60 80

Monitoring Well Construction

100 200 300 400 500

Gastech 1314 Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup

Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

DATUM TBM - Mag nail in utility pole, along southeast property line. Geodetic elevation = 67.30m.

REMARKS

FILE NO. **PE2144**

HOLE NO. **BH 4**

BORINGS BY CME 55 Power Auger **DATE** 10 Nov 10

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.64
Asphaltic concrete 0.04		AU	1				
Crushed stone 0.15							
FILL: Brown silty sand, some gravel 0.91		SS	2	90	10	1	65.64
Grey-brown **SILT** 1.17							
BEDROCK: Shaley limestone		RC	1	92	36	2	64.64
3.00						3	63.64
		RC	2	100	55	4	62.64
		RC	3	100	60	5	61.64
BEDROCK: Grey limestone						6	60.64
		RC	4	100	93	7	59.64
		RC	5	100	92	8	58.64
		RC	6	100	100	9	57.64
9.37							
End of Borehole							
(GWL @ 3.84m-Nov. 16/10)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Lower Explosive Limit %

20 40 60 80

Piezometer Construction

100 200 300 400 500

Gastech 1314 Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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Consulting Engineers

28 Concourse Gate, Unit 1, Ottawa, ON K2E 7T7

SOIL PROFILE AND TEST DATA

Phase I - II Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

DATUM TBM - Mag nail in utility pole, along southeast property line. Geodetic elevation = 67.30m.

REMARKS

BORINGS BY CME 55 Power Auger **DATE** 10 Nov 10

FILE NO. PE2144

HOLE NO. BH 5

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.50
FILL: Dark brown silty sand with gravel, trace metals, brick and asphalt		SS	1	50	8		
0.76							
FILL: Black silty sand		SS	2	78	50+	1	65.50
0.94							
Light brown **SILT**		RC	1	86	0		
0.99							
		RC	2	97	45	2	64.50
						3	63.50
		RC	3	98	85		
BEDROCK: Grey limestone						4	62.50
- shaley limestone from 1.9m to 2.0m depth		RC	4	100	77	5	61.50
						6	60.50
		RC	5	100	95		
						7	59.50
		RC	6	100	82	8	58.50
		RC	7	100	83	9	57.50
9.40							
End of Borehole							
(GWL @ 3.28m-Nov. 23/10)							

Pen. Resist. Blows/0.3m
● 50 mm Dia. Cone

○ Lower Explosive Limit %

20 40 60 80

Monitoring Well Construction

100 200 300 400 500

Gastech 1314 Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Phase II - Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE2144

REMARKS

HOLE NO. BH 1-20

BORINGS BY CME-55 Low Clearance Drill **DATE** May 25, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.56
Asphaltic concrete 0.08							
FILL: Brown silty sand with crushed stone 0.60		AU	1				
Dense, brown **SILTY SAND** with gravel 1.09		SS	2	50	50+	1	65.56
		RC	1	100	100		
						2	64.56
		RC	2	95	56		
BEDROCK: Good to excellent quality, grey limestone						3	63.56
		RC	3	100	100		
						4	62.56
		RC	4	83	83		
						5	61.56
5.89							
End of Borehole							
(GWL @ 3.32m - June 16, 2020)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Phase II - Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE2144

REMARKS

HOLE NO. BH 2-20

BORINGS BY CME-55 Low Clearance Drill **DATE** May 25, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.61
Asphaltic concrete 0.05		AU	1				
FILL: Brown silty sand with crushed stone 0.60		SS	2	67	50+	1	65.61
Dense, brown **SILTY SAND,** some gravel 0.99		RC	1	100	0		
		RC	2	100	24	2	64.61
		RC	32	100	98	3	63.61
GLACIAL TILL: Very poor to excellent quality, grey limestone		RC	4	100	80	4	62.61
		RC	5	100	92	5	61.61
		RC	6	100	100	6	60.61
9.17						7	59.61
End of Borehole						8	58.61
(GWL @ 3.66m - June 16, 2020)						9	57.61

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Phase II - Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE2144

REMARKS

HOLE NO. BH 3-20

BORINGS BY CME-55 Low Clearance Drill **DATE** May 25, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: ● Volatile Organic Rdg. (ppm) / ○ Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.08						0	66.76		
FILL: Grey clayey silt with asphalt fragments 0.56		AU	1						
Dense, brown **SILTY SAND** with gravel 1.19		SS	2	20	50+	1	65.76		
End of Borehole									
Practical refusal to augering at 1.19m depth									

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)
○ Lower Explosive Limit %
20 40 60 80
100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Phase II - Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE2144

REMARKS

HOLE NO. BH 4-20

BORINGS BY CME-55 Low Clearance Drill **DATE** May 25, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: ● Volatile Organic Rdg. (ppm) / ○ Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	66.44		
Asphaltic concrete 0.08 **FILL:** Grey clayey silt, occasional asphalt fragments 0.74		AU	1						
End of Borehole Practical refusal to augering at 0.74m depth.									

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)
○ Lower Explosive Limit %
20 40 60 80
100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Phase II - Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE2144

REMARKS

HOLE NO. BH 5-20

BORINGS BY CME-55 Low Clearance Drill **DATE** June 12, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	66.50
FILL: Browns ilty sand with crushed stone, trace cobbles and brick		AU	1				
0.60							
Dense, brown **SILTY SAND**		SS	2	33	50+	1	65.50
0.94		RC	1	100	0		
		RC	2	100	57	2	64.50
BEDROCK: Very poor to good quality, grey limestone		RC	3	100	82	3	63.50
						4	62.50
		RC	4	97	39	5	61.50
6.04						6	60.50
End of Borehole							
(GWL @ 2.67m - June 16, 2020)							

Photo Ionization Detector

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

Monitoring Well Construction

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Supplemental Phase II - Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE2144

REMARKS

HOLE NO. BH 6-20

BORINGS BY CME-55 Low Clearance Drill **DATE** June 12, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.08						0	66.54
FILL: Brown silty sand with crushed stone 0.51		AU	1				
Dense, brown **SILTY SAND,** some gravel 1.17		SS	2	53	50+	1	65.54
End of Borehole							
Practical refusal to augering at 1.17m depth							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

△

△

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Supplemental Phase II - Environmental Site Assessment
335 Roosevelt Avenue
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE2144

REMARKS

HOLE NO. BH 7-20

BORINGS BY CME-55 Low Clearance Drill **DATE** June 12, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: ● Volatile Organic Rdg. (ppm) / ○ Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	66.52		
Asphaltic concrete 0.05									
FILL: Brown silty sand with gravel and crushed stone		AU	1						
0.94		SS	2	50	50+				
End of Borehole									
Practical refusal to augering at 0.94m depth.									

Photo Ionization Detector: ○ Lower Explosive Limit % — 20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

The standard terminology to describe the strength of cohesionless soils is the relative density, usually inferred from the results of the Standard Penetration Test (SPT) 'N' value. The SPT N value is the number of blows of a 63.5 kg hammer, falling 760 mm, required to drive a 51 mm O.D. split spoon sampler 300 mm into the soil after an initial penetration of 150 mm.

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

The standard terminology to describe the strength of cohesive soils is the consistency, which is based on the undisturbed undrained shear strength as measured by the in situ or laboratory vane tests, penetrometer tests, unconfined compression tests, or occasionally by Standard Penetration Tests.

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

Cohesive soils can also be classified according to their “sensitivity”. The sensitivity is the ratio between the undisturbed undrained shear strength and the remoulded undrained shear strength of the soil.

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

SS	-	Split spoon sample (obtained in conjunction with the performing of the Standard Penetration Test (SPT))
TW	-	Thin wall tube or Shelby tube
PS	-	Piston sample
AU	-	Auger sample or bulk sample
WS	-	Wash sample
RC	-	Rock core sample (Core bit size AXT, BXL, etc.). Rock core samples are obtained with the use of standard diamond drilling bits.

SYMBOLS AND TERMS (continued)

GRAIN SIZE DISTRIBUTION

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

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

CONSOLIDATION TEST

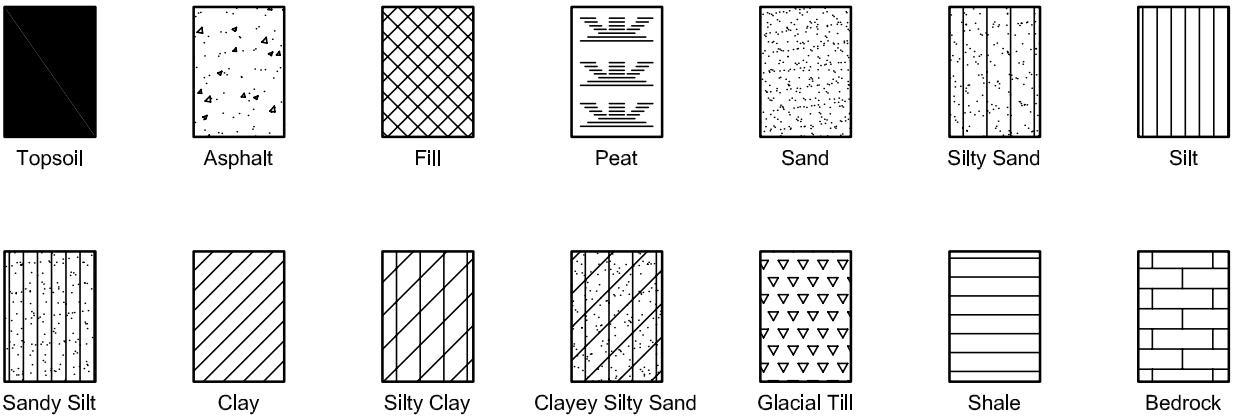
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

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

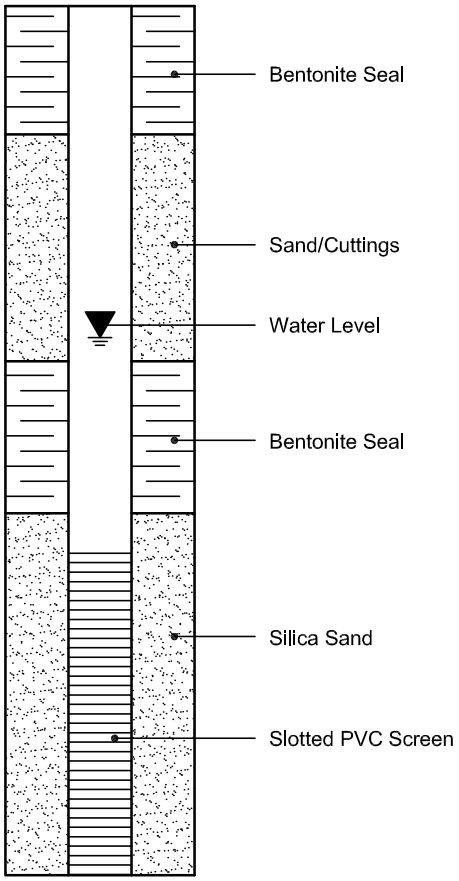
SYMBOLS AND TERMS (continued)

STRATA PLOT

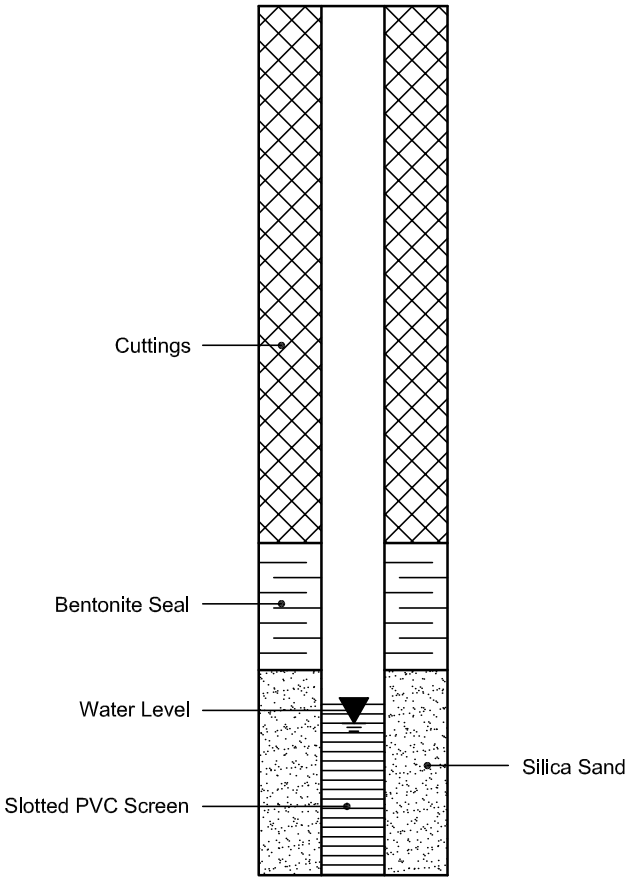


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers
28 Concourse Gate, Unit 1
Nepean, ON K2E 7T7
Attn: Mark D'Arcy

Phone: (613) 226-7381
Fax: (613) 226-6344

Client PO: 10132
Project: PE2144
Custody: 79072

Report Date: 18-Nov-2010
Order Date: 11-Nov-2010
Order #: 1046174

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

Paracel ID	Client ID
1046174-01	BH5A-G4

Approved By: Mark Foto

Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 18-Nov-2010

Client: **Paterson Group Consulting Engineers**

Order Date:11-Nov-2010

Client PO: 10132 Project Description: PE2144

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.8 - ICP-MS	15-Nov-10	16-Nov-10
Chromium, hexavalent	MOE E3056 - Extraction, colourimetric	17-Nov-10	17-Nov-10
Mercury	EPA 7471A - CVAA, digestion	17-Nov-10	17-Nov-10
Metals	EPA 6020 - Digestion - ICP-MS	16-Nov-10	16-Nov-10
Solids, %	Gravimetric, calculation	15-Nov-10	15-Nov-10

Certificate of Analysis

Report Date: 18-Nov-2010

Client: **Paterson Group Consulting Engineers**

Order Date:11-Nov-2010

Client PO: 10132

Project Description: PE2144

	Client ID:	BH5A-G4	-	-	-
	Sample Date:	10-Nov-10	-	-	-
	Sample ID:	1046174-01	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	89.5	-	-	-
Metals					
Antimony	1 ug/g dry	3	-	-	-
Arsenic	1 ug/g dry	110	-	-	-
Barium	10 ug/g dry	402	-	-	-
Beryllium	0.5 ug/g dry	<0.5	-	-	-
Boron, available	0.5 ug/g dry	1.2	-	-	-
Cadmium	0.5 ug/g dry	1.1	-	-	-
Chromium	5 ug/g dry	30	-	-	-
Chromium (VI)	0.4 ug/g dry	<0.4	-	-	-
Cobalt	1 ug/g dry	10	-	-	-
Copper	5 ug/g dry	64	-	-	-
Lead	1 ug/g dry	94	-	-	-
Mercury	0.1 ug/g dry	0.2	-	-	-
Molybdenum	1 ug/g dry	9	-	-	-
Nickel	5 ug/g dry	30	-	-	-
Selenium	1 ug/g dry	<1	-	-	-
Silver	0.3 ug/g dry	0.4	-	-	-
Thallium	1 ug/g dry	<1	-	-	-
Vanadium	10 ug/g dry	42	-	-	-
Zinc	20 ug/g dry	124	-	-	-

Certificate of Analysis

Report Date: 18-Nov-2010

Client: **Paterson Group Consulting Engineers**

Order Date:11-Nov-2010

Client PO: 10132 Project Description: PE2144

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g						
Arsenic	ND	1	ug/g						
Barium	ND	10	ug/g						
Beryllium	ND	0.5	ug/g						
Boron, available	ND	0.5	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.4	ug/g						
Chromium	ND	5	ug/g						
Cobalt	ND	1	ug/g						
Copper	ND	5	ug/g						
Lead	ND	1	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1	ug/g						
Nickel	ND	5	ug/g						
Selenium	ND	1	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1	ug/g						
Vanadium	ND	10	ug/g						
Zinc	ND	20	ug/g						

Certificate of Analysis

Report Date: 18-Nov-2010

Client: **Paterson Group Consulting Engineers**

Order Date:11-Nov-2010

Client PO: 10132 Project Description: PE2144

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	ND	1	ug/g dry	ND				26	
Arsenic	1.4	1	ug/g dry	1.5			10.9	35	
Barium	274	10	ug/g dry	280			2.0	34	
Beryllium	0.93	0.5	ug/g dry	0.98			6.0	25	
Boron, available	ND	0.5	ug/g dry	ND				35	
Cadmium	ND	0.5	ug/g dry	ND				33	
Chromium (VI)	ND	0.4	ug/g dry	ND				35	
Chromium	91.3	5	ug/g dry	96.9			6.0	32	
Cobalt	23.6	1	ug/g dry	25.1			6.1	32	
Copper	31.9	5	ug/g dry	33.5			4.9	32	
Lead	8.9	1	ug/g dry	9.5			6.2	44	
Mercury	ND	0.1	ug/g dry	ND				35	
Molybdenum	1.2	1	ug/g dry	1.7			40.8	29	QR-01
Nickel	50.9	5	ug/g dry	52.1			2.4	29	
Selenium	ND	1	ug/g dry	ND				28	
Silver	ND	0.3	ug/g dry	0.34			200.0	28	QR-01
Thallium	ND	1	ug/g dry	ND				27	
Vanadium	82.9	10	ug/g dry	89.3			7.4	27	
Zinc	75.5	20	ug/g dry	82.1			8.4	27	
Physical Characteristics									
% Solids	100	0.1	% by Wt.	67.8			38.4	25	

Certificate of Analysis

Report Date: 18-Nov-2010

Client: **Paterson Group Consulting Engineers**

Order Date:11-Nov-2010

Client PO: 10132 Project Description: PE2144

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Metals									
Antimony	59.2		ug/L	ND	118	80-120			
Arsenic	46.7		ug/L	ND	93.4	80-120			
Barium	50.7		ug/L	ND	101	80-120			
Beryllium	44.0		ug/L	ND	88.0	80-120			
Boron, available	3.97	0.5	ug/g	ND	79.4	70-122			
Cadmium	52.3		ug/L	ND	105	80-120			
Chromium (VI)	5.2	0.4	ug/g	ND	104	89-123			
Chromium	47.9		ug/L	ND	95.9	80-120			
Cobalt	46.2		ug/L	ND	92.3	80-120			
Copper	46.2		ug/L	ND	92.3	80-120			
Lead	50.6		ug/L	ND	101	80-120			
Mercury	1.76	0.1	ug/g	ND	117	72-128			
Molybdenum	53.4		ug/L	ND	107	80-120			
Nickel	45.3		ug/L	ND	90.5	80-120			
Selenium	48.7		ug/L	ND	97.4	80-120			
Silver	52.2		ug/L	ND	104	80-120			
Thallium	53.3		ug/L	ND	107	80-120			
Vanadium	47.3		ug/L	ND	94.5	80-120			
Zinc	41.7		ug/L	ND	83.5	80-120			

Sample and QC Qualifiers Notes

1- QR-01 : Duplicate RPD is high, however, the sample result is less than 10x the MDL.

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable
MDL: Method Detection Limit
Source Result: Data used as source for matrix and duplicate samples
%REC: Percent recovery.
RPD: Relative percent difference.
Soil results are reported on a dry weight basis when the units are denoted with 'dry'.
Where %Solids is reported, moisture loss includes the loss of volatile hydrocarbons.

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Certificate of Analysis

Paterson Group Consulting Engineers
28 Concourse Gate, Unit 1
Nepean, ON K2E 7T7
Attn: Mark D'Arcy

Phone: (613) 226-7381
Fax: (613) 226-6344

Client PO: 10134
Project: PE2144
Custody: 79409

Report Date: 29-Nov-2010
Order Date: 25-Nov-2010
Order #: 1048119

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

Paracel ID	Client ID
1048119-01	BH5-GW1

Approved By: Mark Foto

Mark Foto, M.Sc. For Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 29-Nov-2010

Client: **Paterson Group Consulting Engineers**

Order Date:25-Nov-2010

Client PO: 10134 Project Description: PE2144

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
CCME PHC F1	CWS Tier 1 - P&T GC-FID	26-Nov-10	27-Nov-10
CCME PHC F1 to F4 + VOC	[CALC]	26-Nov-10	27-Nov-10
CCME PHC F2 - F4	CWS Tier 1 - GC-FID, extraction	26-Nov-10	26-Nov-10
VOCs	EPA 624 - P&T GC-MS	26-Nov-10	27-Nov-10

Certificate of Analysis

Report Date: 29-Nov-2010

Client: **Paterson Group Consulting Engineers**

Order Date:25-Nov-2010

Client PO: 10134

Project Description: PE2144

	Client ID:	BH5-GW1	-	-	-
	Sample Date:	23-Nov-10	-	-	-
	Sample ID:	1048119-01	-	-	-
	MDL/Units	Water	-	-	-
Volatiles					
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.4 ug/L	<0.4	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.7 ug/L	<0.7	-	-	-
Carbon Tetrachloride	0.5 ug/L	<0.5	-	-	-
Chlorobenzene	0.4 ug/L	<0.4	-	-	-
Chloroethane	1.0 ug/L	<1.0	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-
Chloromethane	3.0 ug/L	<3.0	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
1,2-Dibromoethane	1.0 ug/L	<1.0	-	-	-
1,2-Dichlorobenzene	0.4 ug/L	<0.4	-	-	-
1,3-Dichlorobenzene	0.4 ug/L	<0.4	-	-	-
1,4-Dichlorobenzene	0.4 ug/L	<0.4	-	-	-
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	0.4 ug/L	<0.4	-	-	-
trans-1,2-Dichloroethylene	1.0 ug/L	<1.0	-	-	-
1,2-Dichloroethylene, total	1.4 ug/L	<1.4	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.4 ug/L	<0.4	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.9 ug/L	<0.9	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Methylene Chloride	4.0 ug/L	<4.0	-	-	-
Styrene	0.4 ug/L	<0.4	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.6 ug/L	<0.6	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-
1,1,1-Trichloroethane	0.4 ug/L	<0.4	-	-	-
1,1,2-Trichloroethane	0.6 ug/L	<0.6	-	-	-

Certificate of Analysis

Report Date: 29-Nov-2010

Client: **Paterson Group Consulting Engineers**

Order Date:25-Nov-2010

Client PO: 10134

Project Description: PE2144

	Client ID:	BH5-GW1	-	-	-
	Sample Date:	23-Nov-10	-	-	-
	Sample ID:	1048119-01	-	-	-
	MDL/Units	Water	-	-	-
Trichloroethylene	0.4 ug/L	<0.4	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
1,3,5-Trimethylbenzene	0.5 ug/L	<0.5	-	-	-
Vinyl chloride	0.4 ug/L	<0.4	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	1.0 ug/L	<1.0	-	-	-
4-Bromofluorobenzene	Surrogate	94.7%	-	-	-
Dibromofluoromethane	Surrogate	120%	-	-	-
Toluene-d8	Surrogate	109%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	200 ug/L	<200	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-
F1 + F2 PHCs	300 ug/L	<300	-	-	-
F3 + F4 PHCs	200 ug/L	<200	-	-	-

Certificate of Analysis

Report Date: 29-Nov-2010

Client: **Paterson Group Consulting Engineers**

Order Date:25-Nov-2010

Client PO: 10134

Project Description: PE2144

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	200	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.4	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.7	ug/L						
Carbon Tetrachloride	ND	0.5	ug/L						
Chlorobenzene	ND	0.4	ug/L						
Chloroethane	ND	1.0	ug/L						
Chloroform	ND	0.5	ug/L						
Chloromethane	ND	3.0	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
1,2-Dibromoethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.4	ug/L						
1,3-Dichlorobenzene	ND	0.4	ug/L						
1,4-Dichlorobenzene	ND	0.4	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	0.4	ug/L						
trans-1,2-Dichloroethylene	ND	1.0	ug/L						
1,2-Dichloroethylene, total	ND	1.4	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.4	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.9	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Methylene Chloride	ND	4.0	ug/L						
Styrene	ND	0.4	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.6	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.4	ug/L						
1,1,2-Trichloroethane	ND	0.6	ug/L						
Trichloroethylene	ND	0.4	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
1,3,5-Trimethylbenzene	ND	0.5	ug/L						
Vinyl chloride	ND	0.4	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	1.0	ug/L						
Surrogate: 4-Bromofluorobenzene	*70.0*		*ug/L*		*87.5*	*83-134*			
Surrogate: Dibromofluoromethane	*92.9*		*ug/L*		*116*	*78-124*			
Surrogate: Toluene-d8	*89.8*		*ug/L*		*112*	*76-118*			

Certificate of Analysis

Report Date: 29-Nov-2010

Client: **Paterson Group Consulting Engineers**

Order Date:25-Nov-2010

Client PO: 10134 Project Description: PE2144

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	200	ug/L	ND				32	
Volatiles									
Benzene	ND	0.5	ug/L	ND				20	
Bromodichloromethane	ND	0.4	ug/L	ND				25	
Bromoform	ND	0.5	ug/L	ND				25	
Bromomethane	ND	0.7	ug/L	ND				25	
Carbon Tetrachloride	ND	0.5	ug/L	ND				25	
Chlorobenzene	ND	0.4	ug/L	ND				25	
Chloroethane	ND	1.0	ug/L	ND				25	
Chloroform	ND	0.5	ug/L	ND				19	
Chloromethane	ND	3.0	ug/L	ND				25	
Dibromochloromethane	ND	0.5	ug/L	ND				25	
1,2-Dibromoethane	ND	1.0	ug/L	ND				25	
1,2-Dichlorobenzene	ND	0.4	ug/L	ND				25	
1,3-Dichlorobenzene	ND	0.4	ug/L	ND				25	
1,4-Dichlorobenzene	ND	0.4	ug/L	ND				25	
1,1-Dichloroethane	ND	0.5	ug/L	ND				21	
1,2-Dichloroethane	ND	0.5	ug/L	ND				25	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				21	
cis-1,2-Dichloroethylene	ND	0.4	ug/L	ND				20	
trans-1,2-Dichloroethylene	ND	1.0	ug/L	ND				25	
1,2-Dichloropropane	ND	0.5	ug/L	ND				25	
cis-1,3-Dichloropropylene	ND	0.4	ug/L	ND				25	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				25	
Ethylbenzene	ND	0.5	ug/L	ND				35	
Methylene Chloride	ND	4.0	ug/L	ND				25	
Styrene	ND	0.4	ug/L	ND				25	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				25	
1,1,2,2-Tetrachloroethane	ND	0.6	ug/L	ND				25	
Tetrachloroethylene	ND	0.5	ug/L	ND				31	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.4	ug/L	ND				25	
1,1,2-Trichloroethane	ND	0.6	ug/L	ND				25	
Trichloroethylene	ND	0.4	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				25	
1,3,5-Trimethylbenzene	ND	0.5	ug/L	ND				20	
Vinyl chloride	ND	0.4	ug/L	ND				25	
m,p-Xylenes	ND	0.5	ug/L	ND				34	
o-Xylene	ND	0.5	ug/L	ND				32	
Surrogate: 4-Bromofluorobenzene	*75.3*		*ug/L*	*ND*	*94.1*	*83-134*			
Surrogate: Dibromofluoromethane	*88.0*		*ug/L*	*ND*	*110*	*78-124*			
Surrogate: Toluene-d8	*87.2*		*ug/L*	*ND*	*109*	*76-118*			

Certificate of Analysis

Report Date: 29-Nov-2010

Client: **Paterson Group Consulting Engineers**

Order Date:25-Nov-2010

Client PO: 10134 Project Description: PE2144

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1660	200	ug/L	ND	83.0	68-117			
F2 PHCs (C10-C16)	1220	100	ug/L	ND	76.5	61-129			
F3 PHCs (C16-C34)	2920	100	ug/L	ND	73.1	61-129			
F4 PHCs (C34-C50)	1560	100	ug/L	ND	65.0	61-129			
Volatiles									
Benzene	41.7	0.5	ug/L	ND	104	55-141			
Bromodichloromethane	28.3	0.4	ug/L	ND	70.7	52-139			
Bromoform	37.9	0.5	ug/L	ND	94.7	52-170			
Bromomethane	18.4	0.7	ug/L	ND	45.9	32-138			
Carbon Tetrachloride	24.3	0.5	ug/L	ND	60.8	49-149			
Chlorobenzene	39.0	0.4	ug/L	ND	97.6	64-137			
Chloroethane	28.5	1.0	ug/L	ND	71.2	39-152			
Chloroform	28.5	0.5	ug/L	ND	71.3	58-138			
Chloromethane	36.3	3.0	ug/L	ND	90.6	24-163			
Dibromochloromethane	34.3	0.5	ug/L	ND	85.8	61-153			
1,2-Dibromoethane	44.7	1.0	ug/L	ND	112	61-145			
1,2-Dichlorobenzene	38.4	0.4	ug/L	ND	95.9	60-150			
1,3-Dichlorobenzene	48.4	0.4	ug/L	ND	121	62-149			
1,4-Dichlorobenzene	46.2	0.4	ug/L	ND	116	63-132			
1,1-Dichloroethane	33.1	0.5	ug/L	ND	82.8	51-156			
1,2-Dichloroethane	24.2	0.5	ug/L	ND	60.6	50-140			
1,1-Dichloroethylene	32.8	0.5	ug/L	ND	81.9	43-153			
cis-1,2-Dichloroethylene	40.2	0.4	ug/L	ND	101	58-145			
trans-1,2-Dichloroethylene	40.6	1.0	ug/L	ND	101	51-145			
1,2-Dichloropropane	40.0	0.5	ug/L	ND	100	56-136			
cis-1,3-Dichloropropylene	37.8	0.4	ug/L	ND	94.4	54-141			
trans-1,3-Dichloropropylene	40.5	0.5	ug/L	ND	101	61-140			
Ethylbenzene	44.5	0.5	ug/L	ND	111	61-139			
Methylene Chloride	30.5	4.0	ug/L	ND	76.3	58-149			
Styrene	49.3	0.4	ug/L	ND	123	63-143			
1,1,1,2-Tetrachloroethane	33.2	0.5	ug/L	ND	82.9	61-148			
1,1,2,2-Tetrachloroethane	41.2	0.6	ug/L	ND	103	50-157			
Tetrachloroethylene	35.8	0.5	ug/L	ND	89.4	51-145			
Toluene	44.0	0.5	ug/L	ND	110	54-136			
1,1,1-Trichloroethane	25.1	0.4	ug/L	ND	62.6	55-140			
1,1,2-Trichloroethane	41.3	0.6	ug/L	ND	103	63-144			
Trichloroethylene	34.2	0.4	ug/L	ND	85.6	52-135			
Trichlorofluoromethane	22.3	1.0	ug/L	ND	55.7	37-155			
1,3,5-Trimethylbenzene	36.8	0.5	ug/L	ND	91.9	61-151			
Vinyl chloride	23.9	0.4	ug/L	ND	59.7	31-159			
m,p-Xylenes	92.9	0.5	ug/L	ND	116	61-139			
o-Xylene	43.0	0.5	ug/L	ND	108	60-142			
Surrogate: 4-Bromofluorobenzene	*77.9*		*ug/L*		*97.4*	*83-134*			
Surrogate: Dibromofluoromethane	*83.0*		*ug/L*		*104*	*78-124*			
Surrogate: Toluene-d8	*77.5*		*ug/L*		*96.8*	*76-118*			

Sample and QC Qualifiers Notes

None

Sample Data Revisions

None

Work Order Revisions/Comments:

None

Other Report Notes:

n/a: not applicable

MDL: Method Detection Limit

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

%REC: Percent recovery.

RPD: Relative percent difference.

CCME PHC additional information:

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

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Chain of Custody

(lab use only)

№ 79409

Reg. Drinking Water

Client Name: PATERSON GROUP	Project Ref: PE2144	Waterworks Name:	Page 1 of 1
Contact Name: Mark D'Arcy	Quote #	Waterworks Number:	Sample Taken by:
Address: 28 Concourse Gate, Unit 1	PO # 10134	Address:	Print Name: Beau Doherty
	E-mail Address: mdarcy@patersongroup.ca	After hours Contact:	Signature: B. Dlh
Telephone: 613-226-7381	~~Fax:~~ cc: bdoherty@patersongroup.ca	Public Health Unit:	TAT: [ ] 1-day [ ] 2-day [ ] Reg.

Matrix Types: S–Soil/Sed. **GW**–Ground Water **SW**–Surface Water **SS**–Storm/Sanitary Sewer **DW**–Drinking Water **RDW**–Regulated Drinking Water **P**- Paint **A**-Air **O**-Other

Samples submitted under: (Indicate **ONLY** one)
☑ O. Reg 153 (511) Table 1 ☐ O. Reg 170/03 ☐ O. Reg 318/08 ☐ Private well
☐ CCME ____ ☐ O. Reg 243/07 ☐ O. Reg 319/08 ☐ Other: ____

Type of **DW** Sample: **R** = Raw; **T** = Treated; **D** = Distribution
Location Types: **S** = Surface Water; **G** = Ground Water

Paracel Order Number: 104819

	Sample ID / Location Name	Matrix	Air Volume	Type of Sample	# of Containers	Sample Taken: Date	Sample Taken: Time	Free / Combined Chlorine Residual mg/L	Required Analyses: VOC S	PHCs (F1-F4)	HOLD
1	BH5-GW1	GW			3	Nov. 23/2010			✓	✓	✓
2											
3											
4											
5											
6											
7	hold PHCs F1-F4 + VOCs on a 2-day TAT as per Beau Doherty Nov 25/10										
8											
9											
10											

Comments: JK.

Preservation Verification: pH _____ Temperature _____
Verified by: _____

Relinquished By (Print & Sign): Beau Doherty, B. Dlh

Date/Time: Nov. 23/2010 - 2:30

Lab Use Only:

Received By Driver/Depot:	Received at Lab:	Verified By:
Date/Time: 3:15 Nov 23/10	Date/Time: Nov 25, 10 9:00	Date/Time: Nov. 25, 10 9:22

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Certificate of Analysis

Paterson Group Consulting Engineers

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Attn: Mark D'Arcy

Client PO: 30156
Project: PE2144
Custody: 125515

Report Date: 1-Jun-2020
Order Date: 26-May-2020

Order #: 2022205

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

Paracel ID	Client ID
2022205-01	BH1-AU1
2022205-02	BH2-AU1
2022205-03	BH2-SS2
2022205-04	BH3-SS2

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 01-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 26-May-2020

Client PO: 30156

Project Description: PE2144

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	29-May-20	30-May-20
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	28-May-20	30-May-20
Mercury by CVAA	EPA 7471B - CVAA, digestion	29-May-20	1-Jun-20
PCBs, total	SW846 8082A - GC-ECD	28-May-20	29-May-20
PHC F1	CWS Tier 1 - P&T GC-FID	29-May-20	30-May-20
PHC F4G (gravimetric)	CWS Tier 1 - Extraction Gravimetric	28-May-20	29-May-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	28-May-20	29-May-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	29-May-20	29-May-20
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	29-May-20	30-May-20
Solids, %	Gravimetric, calculation	28-May-20	28-May-20

Certificate of Analysis

Report Date: 01-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 26-May-2020

Client PO: 30156

Project Description: PE2144

	Client ID:	BH1-AU1	BH2-AU1	BH2-SS2	BH3-SS2
	Sample Date:	25-May-20 09:00	25-May-20 09:00	25-May-20 09:00	25-May-20 09:00
	Sample ID:	2022205-01	2022205-02	2022205-03	2022205-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	97.3	89.6	87.5	87.5
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	-	<1.0
Arsenic	1.0 ug/g dry	2.4	2.7	-	3.4
Barium	1.0 ug/g dry	101	133	-	115
Beryllium	0.5 ug/g dry	<0.5	<0.5	-	0.5
Boron	5.0 ug/g dry	11.9	11.7	-	17.1
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	<0.5
Chromium	5.0 ug/g dry	12.8	12.8	-	18.6
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	-	<0.2
Cobalt	1.0 ug/g dry	4.5	4.3	-	5.5
Copper	5.0 ug/g dry	13.1	14.1	-	16.2
Lead	1.0 ug/g dry	34.5	20.3	-	19.4
Mercury	0.1 ug/g dry	<0.1	<0.1	-	0.1
Molybdenum	1.0 ug/g dry	<1.0	<1.0	-	<1.0
Nickel	5.0 ug/g dry	11.1	10.8	-	17.8
Selenium	1.0 ug/g dry	<1.0	<1.0	-	<1.0
Silver	0.3 ug/g dry	<0.3	<0.3	-	<0.3
Thallium	1.0 ug/g dry	<1.0	<1.0	-	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	-	<1.0
Vanadium	10.0 ug/g dry	24.7	17.6	-	19.1
Zinc	20.0 ug/g dry	36.7	36.8	-	48.9
Volatiles					
Acetone	0.50 ug/g dry	<0.50	-	-	-
Benzene	0.02 ug/g dry	<0.02	-	-	-
Bromodichloromethane	0.05 ug/g dry	<0.05	-	-	-
Bromoform	0.05 ug/g dry	<0.05	-	-	-
Bromomethane	0.05 ug/g dry	<0.05	-	-	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	-	-	-
Chlorobenzene	0.05 ug/g dry	<0.05	-	-	-
Chloroform	0.05 ug/g dry	<0.05	-	-	-
Dibromochloromethane	0.05 ug/g dry	<0.05	-	-	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-

Certificate of Analysis

Report Date: 01-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 26-May-2020

Client PO: 30156

Project Description: PE2144

	Client ID:	BH1-AU1	BH2-AU1	BH2-SS2	BH3-SS2
	Sample Date:	25-May-20 09:00	25-May-20 09:00	25-May-20 09:00	25-May-20 09:00
	Sample ID:	2022205-01	2022205-02	2022205-03	2022205-04
	MDL/Units	Soil	Soil	Soil	Soil
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	-	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	<0.05	-	-	-
Hexane	0.05 ug/g dry	<0.05	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	-	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	-	-	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	-	-	-
Methylene Chloride	0.05 ug/g dry	<0.05	-	-	-
Styrene	0.05 ug/g dry	<0.05	-	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	0.09	-	-	-
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	0.11	-	-	-
o-Xylene	0.05 ug/g dry	0.07	-	-	-
Xylenes, total	0.05 ug/g dry	0.18	-	-	-
4-Bromofluorobenzene	Surrogate	100%	-	-	-
Dibromofluoromethane	Surrogate	101%	-	-	-
Toluene-d8	Surrogate	108%	-	-	-
Benzene	0.02 ug/g dry	-	-	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	<0.05
Toluene	0.05 ug/g dry	-	-	<0.05	<0.05

Certificate of Analysis

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Order Date: 26-May-2020

Client PO: 30156

Project Description: PE2144

	Client ID:	BH1-AU1	BH2-AU1	BH2-SS2	BH3-SS2
	Sample Date:	25-May-20 09:00	25-May-20 09:00	25-May-20 09:00	25-May-20 09:00
	Sample ID:	2022205-01	2022205-02	2022205-03	2022205-04
	MDL/Units	Soil	Soil	Soil	Soil
m,p-Xylenes	0.05 ug/g dry	-	-	<0.05	<0.05
o-Xylene	0.05 ug/g dry	-	-	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	-	-	<0.05	<0.05
Toluene-d8	Surrogate	-	-	109%	109%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<40 [1]	-	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	285	-	80	40
F4 PHCs (C34-C50)	6 ug/g dry	1630 [2]	-	632 [2]	306 [2]
F4G PHCs (gravimetric)	50 ug/g dry	2470	-	1100	457
PCBs					
PCBs, total	0.05 ug/g dry	<0.50 [3]	-	-	-
Decachlorobiphenyl	Surrogate	121%	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
F4G PHCs (gravimetric)	ND	50	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
PCBs									
PCBs, total	ND	0.05	ug/g						
Surrogate: Decachlorobiphenyl	*0.0933*		*ug/g*		*93.3*	*60-140*			
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						
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						

Certificate of Analysis

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Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*8.51*		*ug/g*		*106*	*50-140*			
Surrogate: Dibromofluoromethane	*8.30*		*ug/g*		*104*	*50-140*			
Surrogate: Toluene-d8	*7.77*		*ug/g*		*97.1*	*50-140*			
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*7.77*		*ug/g*		*97.1*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	ND	40	ug/g dry	ND			NC	30	GEN09
F3 PHCs (C16-C34)	1160	80	ug/g dry	285			121.0	30	QR-04
F4 PHCs (C34-C50)	2040	60	ug/g dry	1630			22.5	30	
Metals									
Antimony	ND	1.0	ug/g dry	ND			NC	30	
Arsenic	5.2	1.0	ug/g dry	4.5			13.1	30	
Barium	181	1.0	ug/g dry	171			5.7	30	
Beryllium	ND	0.5	ug/g dry	ND			NC	30	
Boron	8.4	5.0	ug/g dry	8.9			6.2	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	11.6	5.0	ug/g dry	10.1			13.1	30	
Cobalt	5.1	1.0	ug/g dry	4.6			9.2	30	
Copper	11.4	5.0	ug/g dry	10.1			11.9	30	
Lead	20.8	1.0	ug/g dry	18.6			10.8	30	
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	3.0	1.0	ug/g dry	2.6			14.5	30	
Nickel	10.9	5.0	ug/g dry	9.8			9.9	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	11.4	10.0	ug/g dry	11.0			3.3	30	
Zinc	ND	20.0	ug/g dry	ND			NC	30	
PCBs									
PCBs, total	ND	0.05	ug/g dry	ND			NC	40	
Surrogate: Decachlorobiphenyl	*0.0872*		*ug/g dry*		*84.8*	*60-140*			
Physical Characteristics									
% Solids	91.3	0.1	% by Wt.	95.0			4.0	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	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*8.69*		*ug/g dry*		*101*	*50-140*			
Surrogate: Dibromofluoromethane	*8.77*		*ug/g dry*		*102*	*50-140*			
Surrogate: Toluene-d8	*9.35*		*ug/g dry*		*109*	*50-140*			
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	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: Toluene-d8	*9.35*		*ug/g dry*		*109*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	172	7	ug/g	ND	86.2	80-120			
F2 PHCs (C10-C16)	79	4	ug/g	ND	99.2	80-120			
F3 PHCs (C16-C34)	198	8	ug/g	ND	101	80-120			
F4 PHCs (C34-C50)	141	6	ug/g	ND	114	80-120			
F4G PHCs (gravimetric)	850	50	ug/g	ND	85.0	80-120			
Metals									
Antimony	44.9	1.0	ug/g	ND	89.4	70-130			
Arsenic	53.4	1.0	ug/g	1.8	103	70-130			
Barium	115	1.0	ug/g	68.4	92.4	70-130			
Beryllium	49.6	0.5	ug/g	ND	98.9	70-130			
Boron	46.1	5.0	ug/g	ND	85.0	70-130			
Cadmium	46.9	0.5	ug/g	ND	93.8	70-130			
Chromium (VI)	0.2	0.2	ug/g	ND	78.0	70-130			
Chromium	56.5	5.0	ug/g	ND	105	70-130			
Cobalt	51.3	1.0	ug/g	1.9	99.0	70-130			
Copper	52.1	5.0	ug/g	ND	96.1	70-130			
Lead	53.0	1.0	ug/g	7.5	91.0	70-130			
Mercury	1.68	0.1	ug/g	ND	112	70-130			
Molybdenum	50.1	1.0	ug/g	1.0	98.1	70-130			
Nickel	52.7	5.0	ug/g	ND	97.6	70-130			
Selenium	49.2	1.0	ug/g	ND	98.2	70-130			
Silver	43.9	0.3	ug/g	ND	87.8	70-130			
Thallium	46.6	1.0	ug/g	ND	93.1	70-130			
Uranium	50.2	1.0	ug/g	ND	99.9	70-130			
Vanadium	55.8	10.0	ug/g	ND	103	70-130			
Zinc	51.7	20.0	ug/g	ND	91.9	70-130			
PCBs									
PCBs, total	0.431	0.05	ug/g	ND	105	60-140			
Surrogate: Decachlorobiphenyl	*0.0839*		*ug/g*		*81.6*	*60-140*			
Volatiles									
Acetone	12.4	0.50	ug/g	ND	124	50-140			
Benzene	4.50	0.02	ug/g	ND	112	60-130			
Bromodichloromethane	4.27	0.05	ug/g	ND	107	60-130			
Bromoform	3.72	0.05	ug/g	ND	93.1	60-130			
Bromomethane	2.81	0.05	ug/g	ND	70.3	50-140			
Carbon Tetrachloride	3.75	0.05	ug/g	ND	93.7	60-130			
Chlorobenzene	3.95	0.05	ug/g	ND	98.7	60-130			
Chloroform	4.27	0.05	ug/g	ND	107	60-130			
Dibromochloromethane	3.38	0.05	ug/g	ND	84.6	60-130			
Dichlorodifluoromethane	2.56	0.05	ug/g	ND	64.0	50-140			
1,2-Dichlorobenzene	4.26	0.05	ug/g	ND	107	60-130			
1,3-Dichlorobenzene	4.21	0.05	ug/g	ND	105	60-130			
1,4-Dichlorobenzene	3.94	0.05	ug/g	ND	98.5	60-130			
1,1-Dichloroethane	4.02	0.05	ug/g	ND	101	60-130			
1,2-Dichloroethane	3.78	0.05	ug/g	ND	94.4	60-130			
1,1-Dichloroethylene	4.75	0.05	ug/g	ND	119	60-130			
cis-1,2-Dichloroethylene	4.65	0.05	ug/g	ND	116	60-130			
trans-1,2-Dichloroethylene	4.31	0.05	ug/g	ND	108	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichloropropane	4.18	0.05	ug/g	ND	105	60-130			
cis-1,3-Dichloropropylene	3.65	0.05	ug/g	ND	91.3	60-130			
trans-1,3-Dichloropropylene	3.69	0.05	ug/g	ND	92.3	60-130			
Ethylbenzene	4.14	0.05	ug/g	ND	103	60-130			
Ethylene dibromide (dibromoethane, 1,2-	3.79	0.05	ug/g	ND	94.7	60-130			
Hexane	4.54	0.05	ug/g	ND	113	60-130			
Methyl Ethyl Ketone (2-Butanone)	11.2	0.50	ug/g	ND	112	50-140			
Methyl Isobutyl Ketone	11.4	0.50	ug/g	ND	114	50-140			
Methyl tert-butyl ether	11.3	0.05	ug/g	ND	113	50-140			
Methylene Chloride	4.22	0.05	ug/g	ND	106	60-130			
Styrene	3.84	0.05	ug/g	ND	96.0	60-130			
1,1,1,2-Tetrachloroethane	3.63	0.05	ug/g	ND	90.7	60-130			
1,1,2,2-Tetrachloroethane	3.86	0.05	ug/g	ND	96.4	60-130			
Tetrachloroethylene	4.23	0.05	ug/g	ND	106	60-130			
Toluene	3.46	0.05	ug/g	ND	86.6	60-130			
1,1,1-Trichloroethane	4.09	0.05	ug/g	ND	102	60-130			
1,1,2-Trichloroethane	3.85	0.05	ug/g	ND	96.2	60-130			
Trichloroethylene	4.02	0.05	ug/g	ND	101	60-130			
Trichlorofluoromethane	4.13	0.05	ug/g	ND	103	50-140			
Vinyl chloride	2.65	0.02	ug/g	ND	66.2	50-140			
m,p-Xylenes	7.86	0.05	ug/g	ND	98.3	60-130			
o-Xylene	3.99	0.05	ug/g	ND	99.8	60-130			
Surrogate: 4-Bromofluorobenzene	*8.34*		*ug/g*		*104*	*50-140*			
Surrogate: Dibromofluoromethane	*9.30*		*ug/g*		*116*	*50-140*			
Surrogate: Toluene-d8	*7.03*		*ug/g*		*87.9*	*50-140*			
Benzene	4.50	0.02	ug/g	ND	112	60-130			
Ethylbenzene	4.14	0.05	ug/g	ND	103	60-130			
Toluene	3.46	0.05	ug/g	ND	86.6	60-130			
m,p-Xylenes	7.86	0.05	ug/g	ND	98.3	60-130			
o-Xylene	3.99	0.05	ug/g	ND	99.8	60-130			
Surrogate: Toluene-d8	*7.03*		*ug/g*		*87.9*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

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

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

3 : The PCB chromatogram contained many peaks, however, the fingerprint pattern was not consistent with any Aroclor patterns. Results reported with an elevated detection limit.

QC Qualifiers :

GEN09 : Elevated detection limits due to the nature of the sample matrix.

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

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

PARACE LABORATORIES LT

Paracel ID: 2022205

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2022205	Nº 125515

Client Name: Paterson Group
Contact Name: Mark D'Arcy
Address: 154 Colonnade Rd. S.
Telephone: 613-226-7381

Project Ref: PE2144
Quote #:
PO #: 30156
E-mail: mdarcy@patersongroup.ca

Page __ of __

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

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

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

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	PHCs F1-F4	PCBs
1	BH1-AU1	S		2	May 25/20			X		X	X	X		X	X
2	BH2-AU1	S		1	↓					X	X	X			
3	BH2-SS2	S		2			X								
4	BH3-SS2	S		2	↓		X			X	X	X			
5															
6															
7															
8															
9															
10															

Comments:

Method of Delivery: Paracel

Relinquished By (Sign): N. Sullivan
Relinquished By (Print): Nick Sullivan
Date/Time: May 26/20

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

Received at Lab:
Date/Time: 05-22-20 16:45
Temperature: 18.7 °C

Verified By:
Date/Time: 05-22-20 16:57
pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mark D'Arcy

Client PO: 27430
Project: PE2144
Custody: 125249

Report Date: 22-Jun-2020
Order Date: 16-Jun-2020

Order #: 2025184

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

Paracel ID	Client ID
2025184-01	BH5-AU1
2025184-02	BH5-SS2

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 22-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 16-Jun-2020

Client PO: 27430

Project Description: PE2144

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	18-Jun-20	19-Jun-20
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	18-Jun-20	18-Jun-20
Mercury by CVAA	EPA 7471B - CVAA, digestion	22-Jun-20	22-Jun-20
PHC F1	CWS Tier 1 - P&T GC-FID	18-Jun-20	19-Jun-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	18-Jun-20	20-Jun-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	22-Jun-20	22-Jun-20

Certificate of Analysis

Report Date: 22-Jun-2020

Client: **Paterson Group Consulting Engineers**

Order Date: 16-Jun-2020

Client PO: **27430**

Project Description: PE2144

	Client ID:	BH5-AU1	BH5-SS2	-	-
	Sample Date:	12-Jun-20 09:00	12-Jun-20 09:00	-	-
	Sample ID:	2025184-01	2025184-02	-	-
	MDL/Units	Soil	Soil	-	-
Metals					
Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	6.5	-	-	-
Barium	1.0 ug/g dry	79.0	-	-	-
Beryllium	0.5 ug/g dry	<0.5	-	-	-
Boron	5.0 ug/g dry	7.0	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	5.0 ug/g dry	20.3	-	-	-
Chromium (VI)	0.2 ug/g dry	<0.2	-	-	-
Cobalt	1.0 ug/g dry	7.4	-	-	-
Copper	5.0 ug/g dry	24.8	-	-	-
Lead	1.0 ug/g dry	25.7	-	-	-
Mercury	0.1 ug/g dry	<0.1	-	-	-
Molybdenum	1.0 ug/g dry	3.1	-	-	-
Nickel	5.0 ug/g dry	15.5	-	-	-
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	34.3	-	-	-
Zinc	20.0 ug/g dry	95.1	-	-	-
Volatiles					
Benzene	0.02 ug/g dry	-	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	-	<0.05	-	-
Toluene	0.05 ug/g dry	-	<0.05	-	-
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	-	-
Toluene-d8	Surrogate	-	105%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	-	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	-	20	-	-
F4 PHCs (C34-C50)	6 ug/g dry	-	30	-	-

Certificate of Analysis

Report Date: 22-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 16-Jun-2020

Client PO: 27430

Project Description: PE2144

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*7.01*		*ug/g*		*87.6*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Metals									
Antimony	1.3	1.0	ug/g dry	ND			NC	30	
Arsenic	4.3	1.0	ug/g dry	4.0			7.4	30	
Barium	84.5	1.0	ug/g dry	115			30.8	30	QR-05
Beryllium	0.7	0.5	ug/g dry	1.4			NC	30	
Boron	7.4	5.0	ug/g dry	5.5			29.7	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	31.4	5.0	ug/g dry	35.7			12.9	30	
Cobalt	6.4	1.0	ug/g dry	8.0			21.6	30	
Copper	13.2	5.0	ug/g dry	31.6			NC	30	
Lead	11.1	1.0	ug/g dry	84.7			154.0	30	QR-05
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	17.8	5.0	ug/g dry	21.7			20.2	30	
Selenium	ND	1.0	ug/g dry	1.3			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	30.8	10.0	ug/g dry	44.3			NC	30	
Zinc	52.9	20.0	ug/g dry	81.3			NC	30	
Physical Characteristics									
% Solids	100	0.1	% by Wt.	100			0.0	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	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: Toluene-d8	*8.07*		*ug/g dry*		*101*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	173	7	ug/g	ND	86.6	80-120			
F2 PHCs (C10-C16)	94	4	ug/g	ND	118	60-140			
F3 PHCs (C16-C34)	229	8	ug/g	ND	117	60-140			
F4 PHCs (C34-C50)	109	6	ug/g	ND	88.2	60-140			
Metals									
Antimony	48.2	1.0	ug/g	ND	96.1	70-130			
Arsenic	50.4	1.0	ug/g	1.6	97.5	70-130			
Barium	82.7	1.0	ug/g	46.1	73.2	70-130			
Beryllium	52.1	0.5	ug/g	0.6	103	70-130			
Boron	48.9	5.0	ug/g	ND	93.5	70-130			
Cadmium	49.2	0.5	ug/g	ND	98.1	70-130			
Chromium (VI)	0.1	0.2	ug/g	ND	50.5	70-130			QM-05
Chromium	64.6	5.0	ug/g	14.3	101	70-130			
Cobalt	49.5	1.0	ug/g	3.2	92.7	70-130			
Copper	53.6	5.0	ug/g	12.7	81.8	70-130			
Lead	48.9	1.0	ug/g	4.4	88.9	70-130			
Mercury	1.62	0.1	ug/g	ND	108	70-130			
Molybdenum	48.8	1.0	ug/g	ND	96.9	70-130			
Nickel	56.1	5.0	ug/g	8.7	94.8	70-130			
Selenium	49.0	1.0	ug/g	ND	96.9	70-130			
Silver	42.7	0.3	ug/g	ND	85.1	70-130			
Thallium	47.9	1.0	ug/g	ND	95.6	70-130			
Uranium	47.5	1.0	ug/g	ND	94.5	70-130			
Vanadium	64.0	10.0	ug/g	17.7	92.6	70-130			
Zinc	68.5	20.0	ug/g	32.5	71.9	70-130			
Volatiles									
Benzene	4.74	0.02	ug/g	ND	118	60-130			
Ethylbenzene	4.69	0.05	ug/g	ND	117	60-130			
Toluene	4.51	0.05	ug/g	ND	113	60-130			
m,p-Xylenes	9.64	0.05	ug/g	ND	121	60-130			
o-Xylene	4.33	0.05	ug/g	ND	108	60-130			
Surrogate: Toluene-d8	*7.75*		*ug/g*		*96.8*	*50-140*			

Qualifier Notes:

QC Qualifiers :

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

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

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

PARAC LABORATORIES

Paracel ID: 2025184

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K1G 4J8
7
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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2025184	Nº 125249

Page 1 of 1

Client Name: Paterson Group
Contact Name: Mark D'Arcy
Address: 154 Colonnade Rd. S.
Telephone:

Project Ref: PE2144
Quote #:
PO #: 27430
E-mail: mdarcy@patersongroup.ca

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

Regulation 153/04	Other Regulation
☐ Table 1 ☒ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO
☐ Table 2 ☐ Ind/Comm ☒ Coarse	☐ CCME ☐ MISA
☒ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm
☐ Table ___	Mun: ___
For RSC: ☐ Yes ☐ No	☐ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
1	BH5-AU1	S		1	June 12/20	AM				X	X	X	
2	BH5-SS2	S		2	↓	↓	X						
3													
4													
5													
6													
7													
8													
9													
10													

Required Analysis

Comments:

Method of Delivery: Paracel

Relinquished By (Sign): N. Sullivan
Relinquished By (Print): Nick Sullivan
Date/Time: June 12/20

Received By Driver/Depot: FEDEX
Date/Time: 16/06/20 1:15
Temperature: °C

Received at Lab: Dimeepan Dahmoli
Date/Time: JUN 16, 2020 02:52
Temperature: 11.0 °C

Verified By:
Date/Time: 16 Jun 2020
pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mark D'Arcy

Client PO: 30065
Project: PE2144
Custody: 125756

Report Date: 22-Jun-2020
Order Date: 17-Jun-2020

Order #: 2025338

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

Paracel ID	Client ID
2025338-01	BH1-20-GW1
2025338-02	BH2-20-GW1
2025338-03	BH5-20-GW1
2025338-04	Dup1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 22-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 17-Jun-2020

Client PO: 30065

Project Description: PE2144

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	19-Jun-20	19-Jun-20
Chromium, hexavalent - water	MOE E3056 - colourimetric	18-Jun-20	18-Jun-20
Mercury by CVAA	EPA 245.2 - Cold Vapour AA	18-Jun-20	18-Jun-20
Metals, ICP-MS	EPA 200.8 - ICP-MS	17-Jun-20	18-Jun-20
PCBs, total	EPA 608 - GC-ECD	18-Jun-20	18-Jun-20
PHC F1	CWS Tier 1 - P&T GC-FID	18-Jun-20	19-Jun-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	19-Jun-20	20-Jun-20
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	18-Jun-20	19-Jun-20

Certificate of Analysis

Report Date: 22-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 17-Jun-2020

Client PO: 30065

Project Description: PE2144

	Client ID:	BH1-20-GW1	BH2-20-GW1	BH5-20-GW1	Dup1
	Sample Date:	16-Jun-20 09:00	16-Jun-20 09:00	16-Jun-20 09:00	16-Jun-20 09:00
	Sample ID:	2025338-01	2025338-02	2025338-03	2025338-04
	MDL/Units	Water	Water	Water	Water
Metals					
Mercury	0.1 ug/L	<0.1	<0.1	-	-
Antimony	0.5 ug/L	<0.5	<0.5	-	-
Arsenic	1 ug/L	<1	<1	-	-
Barium	1 ug/L	51	69	-	-
Beryllium	0.5 ug/L	<0.5	<0.5	-	-
Boron	10 ug/L	58	156	-	-
Cadmium	0.1 ug/L	<0.1	<0.1	-	-
Chromium	1 ug/L	<1	<1	-	-
Chromium (VI)	10 ug/L	<10	<10	-	-
Cobalt	0.5 ug/L	<0.5	<0.5	-	-
Copper	0.5 ug/L	1.3	2.0	-	-
Lead	0.1 ug/L	<0.1	<0.1	-	-
Molybdenum	0.5 ug/L	16.3	30.1	-	-
Nickel	1 ug/L	<1	2	-	-
Selenium	1 ug/L	<1	<1	-	-
Silver	0.1 ug/L	<0.1	<0.1	-	-
Sodium	200 ug/L	30000	44600	-	-
Thallium	0.1 ug/L	<0.1	0.1	-	-
Uranium	0.1 ug/L	0.7	1.5	-	-
Vanadium	0.5 ug/L	0.5	<0.5	-	-
Zinc	5 ug/L	<5	7	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	-
Benzene	0.5 ug/L	<0.5	<0.5	0.7	-
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	2.8	6.6	9.9	-
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: 22-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 17-Jun-2020

Client PO: 30065

Project Description: PE2144

	Client ID:	BH1-20-GW1	BH2-20-GW1	BH5-20-GW1	Dup1
	Sample Date:	16-Jun-20 09:00	16-Jun-20 09:00	16-Jun-20 09:00	16-Jun-20 09:00
	Sample ID:	2025338-01	2025338-02	2025338-03	2025338-04
	MDL/Units	Water	Water	Water	Water
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	-
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L	<0.5	<0.5	2.7	-
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	1.4	0.7	0.5	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	1.4	0.7	0.5	-
4-Bromofluorobenzene	Surrogate	100%	101%	103%	-
Dibromofluoromethane	Surrogate	104%	102%	103%	-
Toluene-d8	Surrogate	101%	102%	102%	-
Benzene	0.5 ug/L	-	-	-	0.6
Ethylbenzene	0.5 ug/L	-	-	-	<0.5
Toluene	0.5 ug/L	-	-	-	2.6
m,p-Xylenes	0.5 ug/L	-	-	-	0.6

Certificate of Analysis

Report Date: 22-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 17-Jun-2020

Client PO: 30065

Project Description: PE2144

	Client ID:	BH1-20-GW1	BH2-20-GW1	BH5-20-GW1	Dup1
	Sample Date:	16-Jun-20 09:00	16-Jun-20 09:00	16-Jun-20 09:00	16-Jun-20 09:00
	Sample ID:	2025338-01	2025338-02	2025338-03	2025338-04
	MDL/Units	Water	Water	Water	Water
o-Xylene	0.5 ug/L	-	-	-	<0.5
Xylenes, total	0.5 ug/L	-	-	-	0.6
Toluene-d8	Surrogate	-	-	-	101%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	<100	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	-
PCBs					
PCBs, total	0.05 ug/L	<0.05	-	-	-
Decachlorobiphenyl	Surrogate	64.0%	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Metals									
Mercury	ND	0.1	ug/L						
Antimony	ND	0.5	ug/L						
Arsenic	ND	1	ug/L						
Barium	ND	1	ug/L						
Beryllium	ND	0.5	ug/L						
Boron	ND	10	ug/L						
Cadmium	ND	0.1	ug/L						
Chromium (VI)	ND	10	ug/L						
Chromium	ND	1	ug/L						
Cobalt	ND	0.5	ug/L						
Copper	ND	0.5	ug/L						
Lead	ND	0.1	ug/L						
Molybdenum	ND	0.5	ug/L						
Nickel	ND	1	ug/L						
Selenium	ND	1	ug/L						
Silver	ND	0.1	ug/L						
Sodium	ND	200	ug/L						
Thallium	ND	0.1	ug/L						
Uranium	ND	0.1	ug/L						
Vanadium	ND	0.5	ug/L						
Zinc	ND	5	ug/L						
PCBs									
PCBs, total	ND	0.05	ug/L						
Surrogate: Decachlorobiphenyl	*0.370*		*ug/L*		*74.0*	*60-140*			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
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						

Certificate of Analysis

Report Date: 22-Jun-2020

Client: Paterson Group Consulting Engineers

Order Date: 17-Jun-2020

Client PO: 30065

Project Description: PE2144

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	*82.2*		*ug/L*		*103*	*50-140*			
Surrogate: Dibromofluoromethane	*78.1*		*ug/L*		*97.6*	*50-140*			
Surrogate: Toluene-d8	*81.8*		*ug/L*		*102*	*50-140*			
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: Toluene-d8	*81.8*		*ug/L*		*102*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Metals									
Mercury	ND	0.1	ug/L	ND			NC	20	
Antimony	0.59	0.5	ug/L	ND			NC	20	
Arsenic	ND	1	ug/L	ND			NC	20	
Barium	33.9	1	ug/L	33.4			1.3	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	13.2	0.5	ug/L	13.2			0.4	20	
Lead	0.21	0.1	ug/L	0.24			14.3	20	
Molybdenum	1.81	0.5	ug/L	1.75			3.1	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	3980	200	ug/L	4130			3.8	20	
Thallium	ND	0.1	ug/L	ND			NC	20	
Uranium	ND	0.1	ug/L	ND			NC	20	
Vanadium	0.62	0.5	ug/L	0.58			7.2	20	
Zinc	12	5	ug/L	12			4.5	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	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*76.5*		*ug/L*		*95.6*	*50-140*			
Surrogate: Dibromofluoromethane	*80.6*		*ug/L*		*101*	*50-140*			
Surrogate: Toluene-d8	*82.3*		*ug/L*		*103*	*50-140*			
Benzene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Toluene	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: Toluene-d8	*82.3*		*ug/L*		*103*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1780	25	ug/L	ND	89.0	68-117			
F2 PHCs (C10-C16)	1880	100	ug/L	ND	117	60-140			
F3 PHCs (C16-C34)	4340	100	ug/L	ND	111	60-140			
F4 PHCs (C34-C50)	2210	100	ug/L	ND	89.2	60-140			
Metals									
Mercury	3.33	0.1	ug/L	ND	111	70-130			
Antimony	50.6	0.5	ug/L	ND	101	80-120			
Arsenic	50.6	1	ug/L	ND	101	80-120			
Barium	87.0	1	ug/L	33.4	107	80-120			
Beryllium	53.3	0.5	ug/L	ND	107	80-120			
Boron	55	10	ug/L	ND	92.7	80-120			
Cadmium	53.6	0.1	ug/L	ND	107	80-120			
Chromium (VI)	166	10	ug/L	ND	83.0	70-130			
Chromium	52.4	1	ug/L	ND	104	80-120			
Cobalt	50.2	0.5	ug/L	ND	100	80-120			
Copper	62.2	0.5	ug/L	13.2	98.0	80-120			
Lead	49.3	0.1	ug/L	0.24	98.2	80-120			
Molybdenum	48.8	0.5	ug/L	1.75	94.0	80-120			
Nickel	49.4	1	ug/L	ND	97.7	80-120			
Selenium	50.3	1	ug/L	ND	100	80-120			
Silver	53.1	0.1	ug/L	ND	106	80-120			
Sodium	12700	200	ug/L	4130	85.2	80-120			
Thallium	52.3	0.1	ug/L	ND	105	80-120			
Uranium	48.0	0.1	ug/L	ND	95.8	80-120			
Vanadium	51.5	0.5	ug/L	0.58	102	80-120			
Zinc	62	5	ug/L	12	98.7	80-120			
PCBs									
PCBs, total	0.896	0.05	ug/L	ND	89.6	60-140			
Surrogate: Decachlorobiphenyl	*0.431*		*ug/L*		*86.2*	*60-140*			
Volatiles									
Acetone	95.9	5.0	ug/L	ND	95.9	50-140			
Benzene	42.8	0.5	ug/L	ND	107	60-130			
Bromodichloromethane	28.1	0.5	ug/L	ND	70.3	60-130			
Bromoform	34.1	0.5	ug/L	ND	85.2	60-130			
Bromomethane	36.5	0.5	ug/L	ND	91.2	50-140			
Carbon Tetrachloride	30.6	0.2	ug/L	ND	76.6	60-130			
Chlorobenzene	39.9	0.5	ug/L	ND	99.8	60-130			
Chloroform	35.2	0.5	ug/L	ND	88.0	60-130			
Dibromochloromethane	26.1	0.5	ug/L	ND	65.2	60-130			
Dichlorodifluoromethane	36.1	1.0	ug/L	ND	90.3	50-140			
1,2-Dichlorobenzene	34.0	0.5	ug/L	ND	85.0	60-130			
1,3-Dichlorobenzene	32.2	0.5	ug/L	ND	80.4	60-130			
1,4-Dichlorobenzene	33.3	0.5	ug/L	ND	83.3	60-130			
1,1-Dichloroethane	31.4	0.5	ug/L	ND	78.5	60-130			
1,2-Dichloroethane	45.7	0.5	ug/L	ND	114	60-130			
1,1-Dichloroethylene	32.5	0.5	ug/L	ND	81.2	60-130			
cis-1,2-Dichloroethylene	32.3	0.5	ug/L	ND	80.8	60-130			
trans-1,2-Dichloroethylene	32.7	0.5	ug/L	ND	81.8	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,2-Dichloropropane	37.5	0.5	ug/L	ND	93.7	60-130			
cis-1,3-Dichloropropylene	32.8	0.5	ug/L	ND	81.9	60-130			
trans-1,3-Dichloropropylene	29.8	0.5	ug/L	ND	74.5	60-130			
Ethylbenzene	42.4	0.5	ug/L	ND	106	60-130			
Ethylene dibromide (dibromoethane, 1,2	32.7	0.2	ug/L	ND	81.7	60-130			
Hexane	35.6	1.0	ug/L	ND	88.9	60-130			
Methyl Ethyl Ketone (2-Butanone)	103	5.0	ug/L	ND	103	50-140			
Methyl Isobutyl Ketone	102	5.0	ug/L	ND	102	50-140			
Methyl tert-butyl ether	86.2	2.0	ug/L	ND	86.2	50-140			
Methylene Chloride	29.4	5.0	ug/L	ND	73.4	60-130			
Styrene	32.0	0.5	ug/L	ND	79.9	60-130			
1,1,1,2-Tetrachloroethane	33.8	0.5	ug/L	ND	84.4	60-130			
1,1,2,2-Tetrachloroethane	30.5	0.5	ug/L	ND	76.2	60-130			
Tetrachloroethylene	34.0	0.5	ug/L	ND	85.1	60-130			
Toluene	39.2	0.5	ug/L	ND	98.0	60-130			
1,1,1-Trichloroethane	29.8	0.5	ug/L	ND	74.5	60-130			
1,1,2-Trichloroethane	37.0	0.5	ug/L	ND	92.6	60-130			
Trichloroethylene	36.3	0.5	ug/L	ND	90.8	60-130			
Trichlorofluoromethane	31.6	1.0	ug/L	ND	78.9	60-130			
Vinyl chloride	38.1	0.5	ug/L	ND	95.2	50-140			
m,p-Xylenes	79.1	0.5	ug/L	ND	98.9	60-130			
o-Xylene	39.9	0.5	ug/L	ND	99.8	60-130			
Surrogate: 4-Bromofluorobenzene	*72.7*		*ug/L*		*90.9*	*50-140*			
Surrogate: Dibromofluoromethane	*81.7*		*ug/L*		*102*	*50-140*			
Surrogate: Toluene-d8	*79.5*		*ug/L*		*99.3*	*50-140*			
Benzene	42.8	0.5	ug/L	ND	107	60-130			
Ethylbenzene	42.4	0.5	ug/L	ND	106	60-130			
Toluene	39.2	0.5	ug/L	ND	98.0	60-130			
m,p-Xylenes	79.1	0.5	ug/L	ND	98.9	60-130			
o-Xylene	39.9	0.5	ug/L	ND	99.8	60-130			
Surrogate: Toluene-d8	*79.5*		*ug/L*		*99.3*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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

PARACEL LABORATORIES LTD

Paracel ID: 2025338

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2025338	Nº 125756

Page 1 of 1

Client Name: PATERSON	Project Ref: PE2144
Contact Name: MARK D'ARCY	Quote #:
Address: 154 Colonnade Road	PO #: 30065
Telephone: 613-226-7381	E-mail: mdarcy@patersongroup.ca

Turnaround Time

☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular

Date Required:

Regulation 153/04	Other Regulation
☐ Table 1 ☐ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO
☐ Table 2 ☐ Ind/Comm ☐ Coarse	☐ CCME ☐ MISA
☒ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm
☐ Table ___	Mun: ___
For RSC: ☐ Yes ☐ No	☐ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4+BTEX	VOCs / F1	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	PCB	BTEX / F1	F2-F4			
1	BH1-20-GW1	GW		7	June 16/20			X		X	X	X		X		X			
2	BH2-20-GW1	↓		6	↓			X		X	X	X				X			
3	BH5-20-GW1	↓		3	↓			X								X			
4	DUP1	GW		2	June 16/2020										X				
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Paracel

Relinquished By (Sign):	Received By Driver/Depot: M. Tousie	Received at Lab:	Verified By:
Relinquished By (Print): Joshua Rogers	Date/Time: 17/06/20 3:20	Date/Time: 06-17-20 17:48	Date/Time: 18 Jun 2020 9:52
Date/Time: June 17/2020	Temperature: °C	Temperature: 24.3 °C	pH Verified: ☐ / By: