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Phase II – Environmental Site Assessment Update

112 Nelson Street
Ottawa, Ontario

Prepared For

Smart Living Properties

June 17, 2021

Report: PE5236-1

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TABLE OF CONTENTS

PAGE

List of Figures

List of Appendices

EXECUTIVE SUMMARY

Assessment

A Phase II ESA Update was conducted for the property addressed 112 Nelson Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the potentially contaminating activities (PCAs) that were identified during the Phase I ESA and were considered to result in areas of potential environmental concern (APECs) on the subject site.

The subsurface investigation for this assessment was conducted on November 2, 2017 and consisted of drilling three boreholes (BH1-BH3) throughout the subject site. Upon completion, all three boreholes were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 7.47 m to 9.75 m below the existing ground surface and terminated within a layer of grey silty clay.

Six soil samples were submitted for laboratory analysis of VOCs, PHCs (F_1-F_4), PAHs, metals, and PCB parameters. Based on the analytical test results, all parameter concentrations in the soil samples analyzed comply with the selected MECP Table 3 residential standards.

Five groundwater samples were recovered from the monitoring wells installed in BH1-BH3 and submitted for laboratory analysis of VOCs, PHCs (F_1-F_4), PAHs, and PCB parameters. Based on the analytical test results, all parameter concentrations in the groundwater samples analyzed comply with the selected MECP Table 3 residential standards.

Recommendations

Monitoring Wells

If the groundwater monitoring wells installed on-site are not going to be used in the future, or will be destroyed during future construction activities, then they must be decommissioned according to Ontario Regulation 903 (Ontario Water Resources Act). The monitoring wells will be registered with the MECP under this regulation. Further information can be provided upon request in this regard.

1.0 INTRODUCTION

At the request of Smart Living Properties, Paterson Group (Paterson) conducted a Phase II – Environmental Site Assessment (Phase II ESA) Update for the property addressed 112 Nelson Street, in the City of Ottawa, Ontario. The purpose of this Phase II ESA Update has been to address the areas of potential environmental concern (APECs) identified on the subject site as a result the findings of the Phase I ESA Update, completed by Paterson in April 2021.

1.1 Site Description

Address:	112 Nelson Street, Ottawa, Ontario.
Legal Description:	Part of Lot B, Concession D (Rideau Front), Formerly the Township of Nepean, in the City of Ottawa.
Location:	The subject site is located on the west side of Nelson Street, between York Street and Rideau Street, in the City of Ottawa, Ontario. Refer to Figure 1 – Key Plan for the site location.
Latitude and Longitude:	45° 25' 49" N, 75° 41' 08" W.
Site Description:	
Configuration:	Irregular
Site Area:	2,949 m^2 (approximate)
Zoning:	R5B – Residential Fifth Density Zone
Current Uses:	The subject site is currently occupied with two storey commercial building, with one basement level, as well as a single storey slab-on-grade style addition on the north side.
Services:	The subject site is located within a municipally serviced area.

1.2 Property Ownership

The subject property is currently owned by Smart Living Properties. Paterson was retained to complete this Phase II ESA Update by Mr. Jeremy Silburt, of Smart Living Properties., whose offices are located at 226 Argyle Avenue, Ottawa, Ontario. Mr. Silburt can be contacted via telephone at 613-244-1551.

1.3 Current and Proposed Future Uses

The subject site is currently occupied with a two storey commercial building with one basement level, as well as a one storey slab-on-grade style addition on the north end. The remainder of the property consists predominantly of asphaltic concrete parking areas and laneways. It is our understanding that the subject site is to be redeveloped with a multi-storey residential building.

1.4 Applicable Site Condition Standard

The site condition standards for the subject property were obtained from Table 3 of the document entitled, *"Soil, Ground Water and Sediment Standards for Use Under Part XV.1 of the Environmental Protection Act"*, prepared by the Ministry of the Environment, Conservation and Parks (MECP), and dated April 15, 2011. The selected MECP standards are based on the following considerations:

- ❒ Full-depth soil conditions;
- ❒ Coarse-grained soil conditions;
- ❒ Non-potable groundwater conditions;
- ❒ Residential land use.

The residential standards were selected based on the future intended land use of the subject site.

Grain size analysis was not conducted as part of this assessment. The coarse-grained soil standards were selected as a conservative approach.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The subject site is currently occupied with a two storey commercial, located in the western portion of the property, while the remainder of the site consists of asphaltic concrete parking areas and laneways.

The site topography is relatively flat, whereas the regional topography appears to slope very gently down towards the north, in the general direction of the Ottawa River. The subject site is considered to be at grade with respect to Nelson Street as well as the neighbouring properties. Water drainage on the subject site occurs primarily via sheet flow towards catch basins situated within the parking lot.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation for this assessment was conducted on November 2, 2017 and consisted of drilling three boreholes (BH1-BH3) throughout the subject site. Upon completion, all three boreholes were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 7.47 m to 9.75 m below the existing ground surface and terminated within a layer of grey silty clay.

3.2 Media Investigated

During the subsurface investigation, soil and groundwater samples were obtained and submitted for laboratory analysis. The rationale for sampling and analyzing these media is based on the contaminants of potential concern identified in the Phase I ESA. The contaminants of potential concern for the soil and groundwater on the subject site include the following:

- Volatile Organic Compounds (VOCs);
- Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Polychlorinated Biphenyls (PCBs);
- Metals (including mercury and hexavalent chromium).

3.3 Phase I ESA Conceptual Site Model

Geological and Hydrogeological Setting

Based on the mapping information, the bedrock within the area of the subject site consists of interbedded limestone and shale of the Verulam Formation, whereas the surficial geology consists of offshore marine sediments (erosional terraces) with an overburden thickness ranging from approximately 5 m to 15 m.

Based on the regional topography, the groundwater is interpreted to be moving in a northwesterly direction towards the Ottawa River.

Existing Buildings and Structures

The subject site is currently occupied with a two storey commercial building with one basement level, as well as a one storey slab-on-grade style addition on the north end.

Water Bodies and Areas of Natural and Scientific Interest

No areas of natural and scientific interest are known to exist within the Phase I study area. The nearest named water body with respect to the subject site is the Rideau River, located approximately 630 m to the north.

Drinking Water Wells

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

Neighbouring Land Use

The neighbouring lands within the Phase I study area consist of residential and commercial properties, with the exception of a transformer substation adjacent to the west of the subject site.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

Based on the findings of this Phase I ESA Update, two on-site and five off-site potentially contaminating activities (PCAs), were deemed to result in areas of potential environmental concern (APECs) with respect to the subject site. These APECs include:

- ❒ An existing on-site pad-mounted transformer, located within the central portion of the subject site;
- ❒ Existing fill material of unknown quality, located beneath the asphaltic concrete parking lot on the subject site;
- ❒ An existing off-site transformer substation (Hydro Ottawa), located adjacent to the southwest of the subject site;
- ❒ A former off-site truck terminal and garage (Canadian National Railway), located adjacent to the southwest of the subject site;
- ❒ A former off-site transformer substation (Ottawa Electric Railway); located approximately 10 m to the south of the subject site;

- former off-site dry cleaners (Superior Cleaners and Dyers), located approximately 50 m to the south of the subject site;
- A former off-site printing facility (Le Droit Journal), located approximately 20 m to the southeast of the subject site.

Several other off-site PCAs were also identified within the Phase I study area, however, based on their significant distances and/or their cross-gradient or down-gradient orientation, these properties are not considered to pose an environmental concern to the subject site.

Contaminants of Potential Concern

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

- Volatile Organic Compounds (VOCs);
- Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Polychlorinated Biphenyls (PCBs);
- Metals (including mercury and hexavalent chromium).

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the subject site.

Assessment of Uncertainty and/or Absence of Information

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

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

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation for this assessment was conducted on November 2, 2017 and consisted of drilling three boreholes (BH1-BH3) throughout the subject site. Upon completion, all three boreholes were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 7.47 m to 9.75 m below the existing ground surface and terminated within a layer of grey silty clay.

Under the full-time supervision of Paterson personnel, the boreholes were drilled using a truck mounted drill rig provided by George Downing Estate Drilling of Hawkesbury, Ontario. The locations of the boreholes are illustrated on Drawing PE5236-3 – Test Hole Location Plan, appended to this report.

On April 14, 2021, Paterson conducted a supplemental sampling program at the subject site. The program included the collection of four shallow soil samples adjacent to the on-site transformer, as well as the collection of groundwater samples from all groundwater monitoring wells on-site.

4.2 Soil Sampling

Soil 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.

The samples were recovered using a stainless-steel split spoon while wearing protective gloves (changed after each sample), and immediately placed into plastic bags. If significant contamination was encountered, the samples were instead placed into glass jars. Sampling equipment was routinely washed in soapy water and rinsed with methylhydrate after each split spoon to prevent any cross contamination of the samples. The samples were also stored in coolers to reduce analyte volatilization during transportation.

In November 2017, 32 soil samples were obtained from the boreholes by means of auger and split spoon sampling. The depths at which auger and split spoon samples were obtained from the boreholes are shown as "**AU**" and "**SS**", respectively, on the Soil Profile and Test Data Sheets, appended to this report.

In April 2021, an additional four soil samples were obtained using a hand shovel. Due to the shallow nature of the samples (0.25 m), no soil profiles were created.

The soil profile encountered at the borehole locations generally consists of asphaltic concrete over granular fill material (brown silty sand with crushed stone), underlain by brown silty sand over top of grey silty clay with traces of gravel, cobbles, and boulders (glacial till).

4.3 Field Screening Measurements

All soil samples collected were subjected to a preliminary screening procedure, which included visual screening for colour and evidence of metals, as well as soil vapour screening with a Photo Ionization Detector.

The recovered soil samples were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to room temperature prior to conducting the vapour survey, ensuring consistency of readings between samples. To measure the soil vapours, the analyser probe was inserted into the nominal headspace above the sample. The sample was then agitated and manipulated gently by hand as the measurement was taken.

The peak reading registered within the first 15 seconds was recorded as the vapour measurement. The parts per million (ppm) scale was used to measure concentrations of organic vapours.

The results of the vapour survey are presented on the Soil Profile and Test Data Sheets, appended to this report.

4.4 Groundwater Monitoring Well Installation

Three groundwater monitoring wells were installed on the subject site as part of the 2017 Phase II ESA investigation. These monitoring wells were constructed using 50 mm diameter Schedule 40 threaded PVC risers and screens. A sand pack consisting of silica sand was placed around the screen and a bentonite seal was placed above the screen to minimize cross-contamination. A summary of the monitoring well construction details are listed below in Table 1 as well as on the Soil Profile and Test Data Sheets provided in Appendix 1.

Upon completion, the groundwater monitoring wells were developed using a dedicated inertial lift pump, with a minimum of three well volumes being removed from the wells at the time of installation. The wells were developed until the appearance of the water was noted to have stabilized. In addition, the ground surface elevations of each borehole were subsequently surveyed with respect to a known geodetic elevation.

Table 1
Monitoring Well Construction Details

Well ID	Ground Surface Elevation (m ASL)	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1	99.33	9.13	4.53 – 9.13	4.33 – 9.13	0.10 – 4.33	Flushmount
BH2	99.07	6.00	3.00 – 6.00	2.60 – 6.00	0.10 – 2.60	Flushmount
BH3	98.95	6.00	3.00 – 6.00	2.60 – 6.00	0.10 – 2.60	Flushmount

4.5 Field Measurement of Water Quality Parameters

Groundwater monitoring and sampling was conducted at BH1-BH3 on November 9, 2017 and April 14, 2021. Prior to sampling, the water quality parameters were measured at each monitoring well using a multi-parameter analyzer. Parameters measured in the field included temperature, electrical conductivity, and pH. Each well was purged prior to sampling until at least three well volumes had been removed or unit the well was purged dry. The field parameter values are summarized below in Table 2:

Table 2
Field Measurement of Water Quality Parameters
April 14, 2021

Borehole	Temperature (°C)	Electrical Conductivity (µS/cm)	pH (units)
BH1	10.9	7.01	7.14
BH2	12.9	8.33	7.88
BH3	12.6	7.03	7.01

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.

Standing water was purged from each monitoring well prior to the recovery of the groundwater samples using dedicated sampling equipment. The samples were then stored in coolers to reduce possible analyte volatilization during their transportation. Further details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan, appended to this report.

4.7 Analytical Testing

The following soil and groundwater samples were submitted for laboratory analysis:

Table 3
Testing Parameters for Submitted Soil Samples

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed					Rationale
		VOCs	PHCs (F_1-F_4)	PAHs	Metals[1]	PCBs	
November 2017							
BH1-AU1	0.10 m – 0.60 m Fill Material				X		To assess for potential impacts resulting from the presence of fill material of unknown quality.
BH1-SS6	3.80 m – 4.40 m Silty Clay			X			To assess for potential impacts resulting from an existing off-site transformer substation.
BH2-SS6	3.73 m – 4.40 m Silty Clay			X		X	To assess for potential impacts resulting from an existing off-site transformer substation.
BH2-SS7	4.50 m – 5.20 m Silty Clay	X	X				To assess for potential impacts resulting from a former off-site truck terminal and garage and a former off-site dry cleaners.
BH3-SS7	4.50 m – 5.20 m Silty Clay	X					To assess for potential impacts resulting from a former off-site printing facility.
April 2021							
G1	0.00 m – 0.25 m Topsoil					X	To assess for potential impacts resulting from an existing on-site pad-mounted transformer.

1 – Includes Mercury and Hexavalent Chromium

Table 4
Testing Parameters for Submitted Groundwater Samples

Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed				Rationale
		VOCs	PHCs (F_1-F_4)	PAHs	PCBs	
November 2017						
BH1-GW1	4.53 – 9.13 m Grey Silty Clay			X		To assess for potential impacts resulting from an existing off-site transformer substation and a former off-site truck garage.
BH2-GW1	3.00 m – 6.00 m Grey Silty Clay	X	X	X	X	To assess for potential impacts resulting from an existing off-site transformer substation, a former off-site truck terminal and garage, a former off-site transformer substation, and a former off-site dry cleaners.
DUP1[1]	3.00 m – 6.00 m Grey Silty Clay	X				For laboratory QA/QC purposes.
April 2021						
BH1-GW2	4.53 m – 9.13 m Grey Silty Clay			X	X	To assess for potential impacts resulting from an existing off-site transformer substation, a former off-site truck terminal and garage, a former off-site transformer substation, and a former off-site dry cleaners.
BH2-GW2	3.00 m – 6.00 m Grey Silty Clay	X	X	X	X	To assess for potential impacts resulting an existing off-site transformer substation, a former off-site truck terminal and garage, a former off-site transformer substation, and a former off-site dry cleaners.
BH3-GW2	3.00 m – 6.00 m Grey Silty Clay	X				To assess for potential impacts resulting from a former off-site printing facility.
DUP-1[2]	3.00 m – 6.00 m Grey Silty Clay	X				For laboratory QA/QC purposes.

1 – Duplicate sample of BH2-GW1
2 – Duplicate sample of BH2-GW2

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) and is accredited and certified by the SCC/CALA for specific tests registered with the association.

4.8 Residue Management

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

4.9 Elevation Surveying

The ground surface elevations at each borehole location were surveyed, using a laser level, relative to the top spindle of the fire hydrant located on the subject site. The elevation of the top of the spindle was given an assumed elevation of 100 m above sea level. The borehole elevations and the location of the benchmark are shown on Drawing PE5236-3 – Test Hole Location Plan.

4.10 Quality Assurance and Quality Control Measures

A summary of the quality assurance and quality control (QA/QC) measures, undertaken as part of this assessment, is provided in the Sampling and Analysis Plan in Appendix 1.

5.0 REVIEW AND EVALUATION

5.1 Geology

In general, the subsurface profile encountered at the borehole locations consists of asphaltic concrete over granular fill material (brown silty sand with crushed stone), underlain by brown silty sand over top of grey silty clay with traces of gravel, cobbles, and boulders (glacial till).

Bedrock was not encountered in any of the boreholes at the time of the field drilling program. A dynamic cone penetration test, conducted at BH1 and BH3, encountered practical refusal on inferred bedrock at a depth of approximately 11.73 m and 11.56 m, respectively.

Site geology details are provided in the Soil Profile and Test Data Sheets in Appendix 1.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured using an electronic water level meter at BH1-BH3 on April 14, 2021. The 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	Date of Measurement

			(m ASL)	
BH1	99.33	6.52	92.81	April 14, 2021
BH2	99.07	4.18	94.89	
BH3	98.95	3.42	95.53	

The groundwater at the subject site was generally encountered within the overburden at depths ranging from approximately 3.42 m to 6.52 m below the existing ground surface. No unusual visual or olfactory observations were noted within the recovered groundwater samples at the time of the sampling event.

Using the groundwater elevations recorded during the sampling event, groundwater contour mapping was completed as part of this assessment. According to the mapped contour data, illustrated on Drawing PE5236-3 – Test Hole Location Plan in the appendix, the groundwater flow on the subject site is interpreted to be in a northwesterly direction. A horizontal hydraulic gradient of approximately 0.05 m/m was also calculated as part of this assessment.

It should be noted that groundwater levels are expected to fluctuate throughout the year with seasonal variations.

5.3 Fine/Coarse Soil Texture

Grain size analysis was not completed as part of this investigation. As a result, the coarse-grained soil standards were chosen as a conservative approach.

5.4 Field Screening

Field screening of the soil samples collected during the drilling program resulted in organic vapour readings ranging from 0 ppm to 2.6 ppm. The organic vapour readings obtained from the field screening indicate that there is a negligible potential for the presence of volatile substances.

Field screening results of each individual soil sample are provided on the Soil Profile and Test Data Sheets appended to this report.

5.5 Soil Quality

Six soil samples were submitted for laboratory analysis of VOCs, PHCs (F_1-F_4), PAHs, Metals, and PCB parameters. The results of the analytical testing are presented below in Tables 6 to 10, and on the laboratory certificates of analysis included in Appendix 1.

Table 6
Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Samples (µg/g) November 2, 2017		MECP Table 3 Residential Soil Standards (µg/g)
		BH2-SS7	BH3-SS7	
Acetone	0.50	nd	nd	16
Benzene	0.02	nd	nd	0.21
Bromodichloromethane	0.05	nd	nd	13
Bromoform	0.05	nd	nd	0.27
Bromomethane	0.05	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	0.05
Chlorobenzene	0.05	nd	nd	2.4
Chloroform	0.05	nd	nd	0.05
Dibromochloromethane	0.05	nd	nd	9.4
Dichlorodifluoromethane	0.05	nd	nd	16
1,2-Dichlorobenzene	0.05	nd	nd	3.4
1,3-Dichlorobenzene	0.05	nd	nd	4.8
1,4-Dichlorobenzene	0.05	nd	nd	0.083
1,1-Dichloroethane	0.05	nd	nd	3.5
1,2-Dichloroethane	0.05	nd	nd	0.05
1,1-Dichloroethylene	0.05	nd	nd	0.05
cis-1,2-Dichloroethylene	0.05	nd	nd	3.4
trans-1,2-Dichloroethylene	0.05	nd	nd	0.084
1,2-Dichloropropane	0.05	nd	nd	0.05
1,3-Dichloropropene	0.05	nd	nd	0.05
Ethylbenzene	0.05	nd	nd	2
Ethylene Dibromide	0.05	nd	nd	0.05
Hexane	0.05	nd	nd	2.8
Methyl Ethyl Ketone	0.50	nd	nd	16
Methyl Isobutyl Ketone	0.50	nd	nd	1.7
Methyl tert-butyl ether	0.05	nd	nd	0.75
Methylene Chloride	0.05	nd	nd	0.1
Styrene	0.05	nd	nd	0.7
1,1,1,2-Tetrachloroethane	0.05	nd	nd	0.058
1,1,2,2-Tetrachloroethane	0.05	nd	nd	0.05
Tetrachloroethylene	0.05	nd	nd	0.28
Toluene	0.05	nd	nd	2.3
1,1,1-Trichloroethane	0.05	nd	nd	0.38
1,1,2-Trichloroethane	0.05	nd	nd	0.05
Trichloroethylene	0.05	nd	nd	0.061
Trichlorofluoromethane	0.05	nd	nd	4
Vinyl Chloride	0.02	nd	nd	0.02
Xylenes	0.05	nd	nd	3.1

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – value exceeds selected MECP standards

All VOC parameters were non-detect in the soil samples analyzed. The results are in compliance with the selected MECP Table 3 residential standards.

Table 7
Analytical Test Results – Soil
PHCs (F_1-F_4)

Parameter	MDL (µg/g)	Soil Samples (µg/g) November 2, 2017 BH2-SS7	MECP Table 3 Residential Soil Standards (µg/g)
PHCs F_1	7	nd	55
PHCs F_2	4	nd	98
PHCs F_3	8	nd	300
PHCs F_4	6	nd	2,800

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – value exceeds selected MECP standards

All PHC parameters were non-detect in the soil sample analyzed. The results are in compliance with the selected MECP Table 3 residential standards.

Table 8
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g) November 2, 2017		MECP Table 3 Residential Soil Standards (µg/g)
		BH1-SS6	BH2-SS6	
Acenaphthene	0.02	nd	nd	7.9
Acenaphthylene	0.02	nd	nd	0.15
Anthracene	0.02	nd	nd	0.67
Benzo[a]anthracene	0.02	nd	nd	0.5
Benzo[a]pyrene	0.02	nd	nd	0.3
Benzo[b]fluoranthene	0.02	nd	nd	0.78
Benzo[g,h,i]perylene	0.02	nd	nd	6.6
Benzo[k]fluoranthene	0.02	nd	nd	0.78
Chrysene	0.02	nd	nd	7
Dibenzo[a,h]anthracene	0.02	nd	nd	0.1
Fluoranthene	0.02	nd	nd	0.69
Fluorene	0.02	nd	nd	62
Indeno[1,2,3-cd]pyrene	0.02	nd	nd	0.38
1-Methylnaphthalene	0.02	nd	nd	0.99
2-Methylnaphthalene	0.02	nd	nd	0.99
Methylnaphthalene (1&2)	0.04	nd	nd	0.99
Naphthalene	0.01	nd	nd	0.6
Phenanthrene	0.02	nd	nd	6.2
Pyrene	0.02	nd	nd	78

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – value exceeds selected MECP standards

All PAH parameters were non-detect in the soil samples analyzed. The results are in compliance with the selected MECP Table 3 residential standards.

Table 9
Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g) November 2, 2017 BH1-AU1	MECP Table 3 Residential Soil Standards (µg/g)
Antimony	1.0	nd	7.5
Arsenic	1.0	nd	18
Barium	1.0	96.5	390
Beryllium	1.0	nd	4
Boron	1.0	22.7	120
Boron, Available	0.5	0.9	1.5
Cadmium	0.5	nd	1.2
Chromium	1.0	12.5	160
Chromium (VI)	0.2	nd	8
Cobalt	1.0	6.5	22
Copper	1.0	13.0	140
Lead	1.0	29.9	120
Mercury	0.1	nd	0.27
Molybdenum	1.0	nd	6.9
Nickel	1.0	12.5	100
Selenium	1.0	nd	2.4
Silver	0.5	nd	20
Thallium	1.0	nd	1
Uranium	1.0	nd	23
Vanadium	1.0	17.0	86
Zinc	1.0	18.0	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – value exceeds selected MECP standards

All detected metal parameters in the soil sample analyzed are in compliance with the MECP Table 3 residential standards.

Table 10
Analytical Test Results – Soil
PCBs

Parameter	MDL (µg/g)	Soil Samples (µg/g) November 2, 2017 BH2-SS6	Soil Samples (µg/g) April 14, 2021 G1	MECP Table 3 Residential Soil Standards (µg/g)
PCBs, Total	0.05	nd	nd	0.35

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – value exceeds selected MECP standards

All PCB parameters were non-detect in the soil samples analyzed. The results are in compliance with the selected MECP Table 3 residential standards.

Table 11
Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
Barium	96.5	BH1-AU1	0.10 – 0.60 m
Boron	22.7		
Boron, Available	0.9		
Chromium	12.5		
Cobalt	6.5		
Copper	13.0		
Lead	29.9		
Nickel	12.5		
Vanadium	17.0		
Zinc	18.0		

Notes:
- **Bold and Underlined** – value exceeds selected MECP standards

All other parameter concentrations analyzed were below the laboratory detection limits. The laboratory certificates of analysis are provided in Appendix 1.

5.6 Groundwater Quality

Groundwater samples were recovered from the monitoring wells installed in BH1-BH3 and submitted for laboratory analysis of VOC, PHC, PAH, and/or PCB parameters. The results of the analytical testing are presented below in Tables 12 to 15, as well as on the laboratory certificates of analysis included in Appendix 1.

Table 12
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 3 Residential Groundwater Standards (µg/L)
		November 9, 2017	April 14, 2021		
		BH2-GW1	BH2-GW2	BH3-GW2	
Acetone	5.0	nd	nd	nd	130,000
Benzene	0.5	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	85,000
Bromoform	0.5	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	630
Chloroform	0.5	nd	nd	nd	2.4
Dibromochloromethane	0.5	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	4,400
1,2-Dichlorobenzene	0.5	nd	nd	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	16
1,3-Dichloropropene	0.5	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	2,300
Ethylene Dibromide	0.2	nd	nd	nd	0.25
Hexane	1.0	nd	nd	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	140,000
Methyl tert-butyl ether	2.0	nd	nd	nd	190
Methylene Chloride	5.0	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	1.6
Toluene	0.5	nd	nd	nd	18,000
1,1,1-Trichloroethane	0.5	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	2,500
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	nd	4,200

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – value exceeds selected MECP standards

No VOC parameters were detected in the groundwater samples analyzed. The results are in compliance with the MECP Table 3 residential standards.

Table 13
Analytical Test Results – Groundwater
PHCs (F_1-F_4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)		MECP Table 3 Residential Groundwater Standards (µg/L)
		November 9, 2017	April 14, 2021	
		BH2-GW1	BH2-GW2	
PHC F_1	25	nd	nd	750
PHC F_2	100	nd	nd	150
PHC F_3	100	nd	nd	500
PHC F_4	100	nd	nd	500

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – value exceeds selected MECP standards

No PHC parameters were detected in the groundwater samples analyzed. The results are in compliance with the MECP Table 3 residential standards.

Table 14
Analytical Test Results – Groundwater
PAHs

Parameter	MDL (µg/L)	Groundwater Samples (ug/L)				MECP Table 3 Residential Groundwater Standards (µg/L)
		November 9, 2017		April 14, 2021		
		BH1-GW1	BH2-GW1	BH1-GW2	BH2-GW2	
Acenaphthene	0.05	nd	nd	nd	nd	600
Acenaphthylene	0.05	nd	nd	nd	nd	1.8
Anthracene	0.01	nd	nd	nd	nd	2.4
Benzo[a]anthracene	0.01	nd	nd	nd	nd	4.7
Benzo[a]pyrene	0.01	nd	nd	nd	nd	0.81
Benzo[b]fluoranthene	0.05	nd	nd	nd	nd	0.75
Benzo[g,h,i]perylene	0.05	nd	nd	nd	nd	0.2
Benzo[k]fluoranthene	0.05	nd	nd	nd	nd	0.4
Chrysene	0.05	nd	nd	nd	nd	1
Dibenzo[a,h]anthracene	0.05	nd	nd	nd	nd	0.52
Fluoranthene	0.01	nd	nd	nd	nd	130
Fluorene	0.05	nd	nd	nd	nd	400
Indeno[1,2,3-cd]pyrene	0.05	nd	nd	nd	nd	0.2
1-Methylnaphthalene	0.05	nd	nd	nd	nd	1,800
2-Methylnaphthalene	0.05	nd	nd	nd	nd	1,800
Methylnaphthalene (1&2)	0.1	nd	nd	nd	nd	1,800
Naphthalene	0.05	nd	nd	nd	nd	1,400
Phenanthrene	0.05	nd	nd	nd	nd	580
Pyrene	0.01	nd	nd	nd	nd	68

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – value exceeds selected MECP standards

No PAH parameters were detected in the groundwater samples analyzed. The results are in compliance with the MECP Table 3 residential standards.

Table 15
Analytical Test Results – Groundwater
PCBs

Parameter	MDL (µg/L)	Groundwater Samples (ug/L)			MECP Table 3 Residential Groundwater Standards (µg/L)
		November 9, 2017		April 14, 2021	
		BH2-GW1	BH1-GW2	BH2-GW2	
PCBs, Total	0.05	nd	nd	nd	7.8

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and Underlined** – value exceeds selected MECP standards

No PCB parameters were detected in the groundwater samples analyzed. The results are in compliance with the MECP Table 3 residential standards.

5.7 Quality Assurance and Quality Control Results

As per the Sampling and Analysis Plan, two duplicate groundwater samples were obtained from the monitoring well installed in BH2 and submitted for laboratory analysis of VOC parameters.

No VOC parameters were detected in either the original or the duplicate groundwater samples. As a result, the quality of the field data collected during this Phase II ESA is considered to be sufficient to meet the overall objectives of this assessment.

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

As per Subsection 47(3) of O.Reg. 153/04, as amended by the Environmental Protection Act, the certificates of analysis have been received for each sample submitted for laboratory analysis and have been appended to this report.

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 153/04 amended by the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

Based on the results of the Phase I and Phase II ESAs completed for the RSC Property, potentially contaminating activities (PCAs) resulting in areas of potential environmental concern (APECs) and the associated contaminants of potential concern (CPCs) are presented in Table 16 below. The rationale for identifying these PCAs is based on a review of city directories, fire insurance plans, aerial photographs, previous engineering reports, as well as field observations and personal interviews. The APECs are presented on Drawing PE5236-1, prepared as part of the Phase I ESA Update report.

Table 16
Areas of Potential Environmental Concern

APEC	Location of APEC	PCA (O. Reg. 153/04 – Table 2)	Location of PCA	Contaminants of Potential Concern	Media Potentially Impacted
APEC #1 Existing Pad-Mounted Transformer	Central Portion of Subject Site	*"Item 55: Transformer Manufacturing, Processing, and Use"*	On-Site	PCBs	Soil
APEC #2 Fill Material of Unknown Quality	Central & Eastern Portions of Subject Site	*"Item 30: Importation of Fill Material of Unknown Quality"*	On-Site	PHCs (F_1-F_4) PAHs Metals	Soil
APEC #3 Existing Transformer Substation	Southwest Corner of Subject Site	*"Item 55: Transformer Manufacturing, Processing, and Use"*	Off-Site	PHCs (F_1-F_4) PAHs PCBs	Soil and/or Groundwater
APEC #4 Former Truck Terminal and Garage	Southwest Corner of Subject Site	*"Item 52: Storage, Maintenance, Fuelling, and Repair of Equipment, Vehicles, and Material Used to Maintain Transportation Systems"*	Off-Site	VOCs PHCs (F_1-F_4) PAHs	Soil and/or Groundwater
APEC #5 Former Transformer Substation	South and South-Central Corner of Subject Site	*"Item 55: Transformer Manufacturing, Processing, and Use"*	Off-Site	PHCs (F_1-F_4) PAHs PCBs	Soil and/or Groundwater

Table 16
Areas of Potential Environmental Concern

APEC	Location of APEC	PCA (O. Reg. 153/04 – Table 2)	Location of PCA	Contaminants of Potential Concern	Media Potentially Impacted
APEC #6 Former Dry Cleaners	South and South-Central Corner of Subject Site	*"Item 38: Operation of Dry Cleaning Equipment (Where Chemicals are Used)"*	Off-Site	VOCs	Soil and/or Groundwater
APEC #7 Former Printing Facility	Eastern Corner of Subject Site	*"Item 31: Ink Manufacturing, Processing, and Bulk Storage"*	Off-Site	VOCs	Soil and/or Groundwater

Contaminants of Potential Concern

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

- Volatile Organic Compounds (VOCs);
- Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Polychlorinated Biphenyls (PCBs);
- Metals (including mercury and hexavalent chromium).

These CPCs have the potential to be present in the soil matrix and/or the groundwater situated beneath the subject site.

Subsurface Structures and Utilities

A single basement level is located below part of the subject building. A sump pit, connected to City services, is located centrally within the basement. No other subsurface structures were identified.

Underground service locates were completed prior to the subsurface investigation. Underground utilities on the subject site include electrical cables, telephone lines, natural gas pipelines, as well as municipal water and wastewater services.

Based on the findings of the Phase I ESA and Phase II ESAs, the subsurface structures and utilities were not considered to have impacted contaminant transport or distribution on the subject site.

Physical Setting

Site Stratigraphy

The stratigraphy of the subject site generally consists of:

- Pavement structure; consisting of a 0.08 m to 0.25 m thick layer of asphaltic concrete over top of engineered fill (consisting of brown silty sand with crushed stone), and extending to depths ranging from approximately 0.28 m to 0.41 m below ground surface;
- Fill material; consisting of brown silty sand with some gravel, cobbles, and trace boulders and extending to a depth of 2.23 m below ground surface (BH1);
- Brown silty sand; extending to a depth of approximately 2.06 m below ground surface (BH2 and BH3);
- Grey silty clay, extending to a depth of approximately 7.47 m below ground surface;
- Glacial till, consisting of grey silty clay and trace gravel, extending to a depth of approximately 9.75 m below ground surface (BH1 and BH3);

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is provided in the Soil Profile and Test Data Sheets in Appendix 1.

Hydrogeological Characteristics

The groundwater at the subject site was generally encountered within the overburden depths ranging from approximately 3.42 m to 6.52 m below the existing ground surface.

Based on the measured groundwater levels, the groundwater is interpreted to flow in a northwesterly direction.

Approximate Depth to Bedrock

Bedrock was not encountered in any of the boreholes at the time of the field drilling program. A dynamic cone penetration test, conducted at BH1 and BH3, encountered practical refusal on inferred bedrock at a depth of approximately 11.73 m and 11.56 m, respectively.

Approximate Depth to Water Table

The depth to the water table is approximately 3.42 m to 6.52 m below the existing ground surface.

Section 35 of Ontario Regulation 153/04

Section 35 of the Regulation applies to the subject site as follows:

- ❒ The property, and all other properties located, in whole or in part, within 250 metres of the boundaries of the property, are supplied by a municipal drinking water system, as defined in the Safe Drinking Water Act, 2002.

- ❒ The record of site condition does not specify agricultural or other use as the type of property use for which the record of site condition is filed.

- ❒ The subject site is not located in an area designated in the municipal official plan as a well-head protection area or other designation identified by the municipality for the protection of groundwater.

- ❒ Neither the subject site nor any of the properties in the phase one study area has a well used or intended for use as a source of water for human consumption or agriculture.

Sections 41 and 43.1 of Ontario Regulation 153/04

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

Section 43.1 of the Regulation does not apply to the subject site, since the bedrock is situated at depths greater than 2 m below ground surface, and thus is not considered to be a shallow soil property.

Existing Buildings and Structures

The subject site is currently occupied with a two storey commercial office/warehouse building, with one basement level below the western portion of the structure.

Proposed Buildings and Other Structures

It is our understanding that the subject site is to be redeveloped with a multi-storey residential building. Since the future use of the land is more sensitive than the current use, a record of site condition (RSC) will be required to be filed with the MECP.

Water Bodies and Areas of Natural and Scientific Interest

No areas of natural and scientific interest are known to exist within the Phase I study area. The nearest named water body with respect to the subject site is the Rideau River, located approximately 630 m to the north.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of this Phase II ESA Update, no contaminant concentrations exceeding the MECP Table 3 residential standards were identified in the soil or groundwater beneath the subject site.

Types of Contaminants

Based on the findings of this Phase II ESA Update, no contaminant concentrations exceeding the MECP Table 3 residential standards were identified in the soil or groundwater beneath the subject site.

Contaminated Media

Based on the findings of this Phase II ESA, the soil and groundwater conditions are in compliance with the selected MECP Table 3 residential standards.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of this Phase II ESA Update, no contaminant concentrations exceeding the MECP Table 3 residential standards were identified in the soil or groundwater beneath the subject site.

Distribution and Migration of Contaminants

Based on the findings of this Phase II ESA Update, no contaminant concentrations exceeding the MECP Table 3 residential standards were identified in the soil or groundwater beneath the subject site.

Discharge of Contaminants

Based on the findings of this Phase II ESA Update, no contaminants have been discharged on the subject site.

Climatic and Meteorological Conditions

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

Based on the findings of this Phase II ESA Update, no contaminant concentrations exceeding the MECP Table 3 residential standards were identified in the soil or groundwater beneath the subject site.

Potential for Vapour Intrusion

Based on the findings of this Phase II ESA Update, there is no potential for vapour intrusion on the subject site.

6.0 CONCLUSIONS

Assessment

A Phase II ESA Update was conducted for the property addressed 112 Nelson Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address the potentially contaminating activities (PCAs) that were identified during the Phase I ESA and were considered to result in areas of potential environmental concern (APECs) on the subject site.

The subsurface investigation for this assessment was conducted on November 2, 2017 and consisted of drilling three boreholes (BH1-BH3) throughout the subject site. Upon completion, all three boreholes were instrumented with groundwater monitoring wells. The boreholes were advanced to depths ranging from approximately 7.47 m to 9.75 m below the existing ground surface and terminated within a layer of grey silty clay. As part of this Update, four shallow soil samples were collected from the area immediately adjacent to the on-site transformer.

Six soil samples were submitted for laboratory analysis of VOCs, PHCs (F_1-F_4), PAHs, metals, and PCB parameters. Based on the analytical test results, all parameter concentrations in the soil samples analyzed comply with the selected MECP Table 3 residential standards.

Five groundwater samples were recovered from the monitoring wells installed in BH1-BH3 and submitted for laboratory analysis of VOCs, PHCs (F_1-F_4), PAHs, and PCB parameters. Based on the analytical test results, all parameter concentrations in the groundwater samples analyzed comply with the selected MECP Table 3 residential standards.

Recommendations

Excess Soil

Soil that complies with the applicable site standards, but requires off-site disposal as part of the proposed redevelopment project must be managed in accordance with Ontario Regulation 406/19 (On-Site and Excess Soil Management). It is recommended that all excess soil planning occurs prior to site redevelopment, including all excess soil testing, and confirmation of excess soil reuse sites.

Monitoring Wells

If the groundwater monitoring wells installed on-site are not going to be used in the future, or will be destroyed during future construction activities, then they must be decommissioned according to Ontario Regulation 903 (Ontario Water Resources Act). The monitoring wells will be registered with the MECP under this regulation. Further information can be provided upon request in this regard.

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 Smart Living Properties. Permission and notification from Smart Living Properties and Paterson Group will be required prior to the release of this report to any other party.

Paterson Group Inc.

Nick Sullivan, B.Sc.

Adrian Menyhart, P.Eng., ing., QP$_{ESA}$

Report Distribution:

- Smart Living Properties
- Paterson Group Inc.

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE5236-3 – TEST HOLE LOCATION PLAN

DRAWING PE5236-4 – ANALYTICAL TESTING PLAN – SOIL

DRAWING PE5236-4A – CROSS SECTION A-A' – SOIL

DRAWING PE5236-4B – CROSS SECTION B-B' – SOIL

DRAWING PE5236-5 – ANALYTICAL TESTING PLAN – GROUNDWATER

DRAWING PE5236-5A – CROSS SECTION A-A' – GROUNDWATER

DRAWING PE5236-5B – CROSS SECTION B-B' – GROUNDWATER

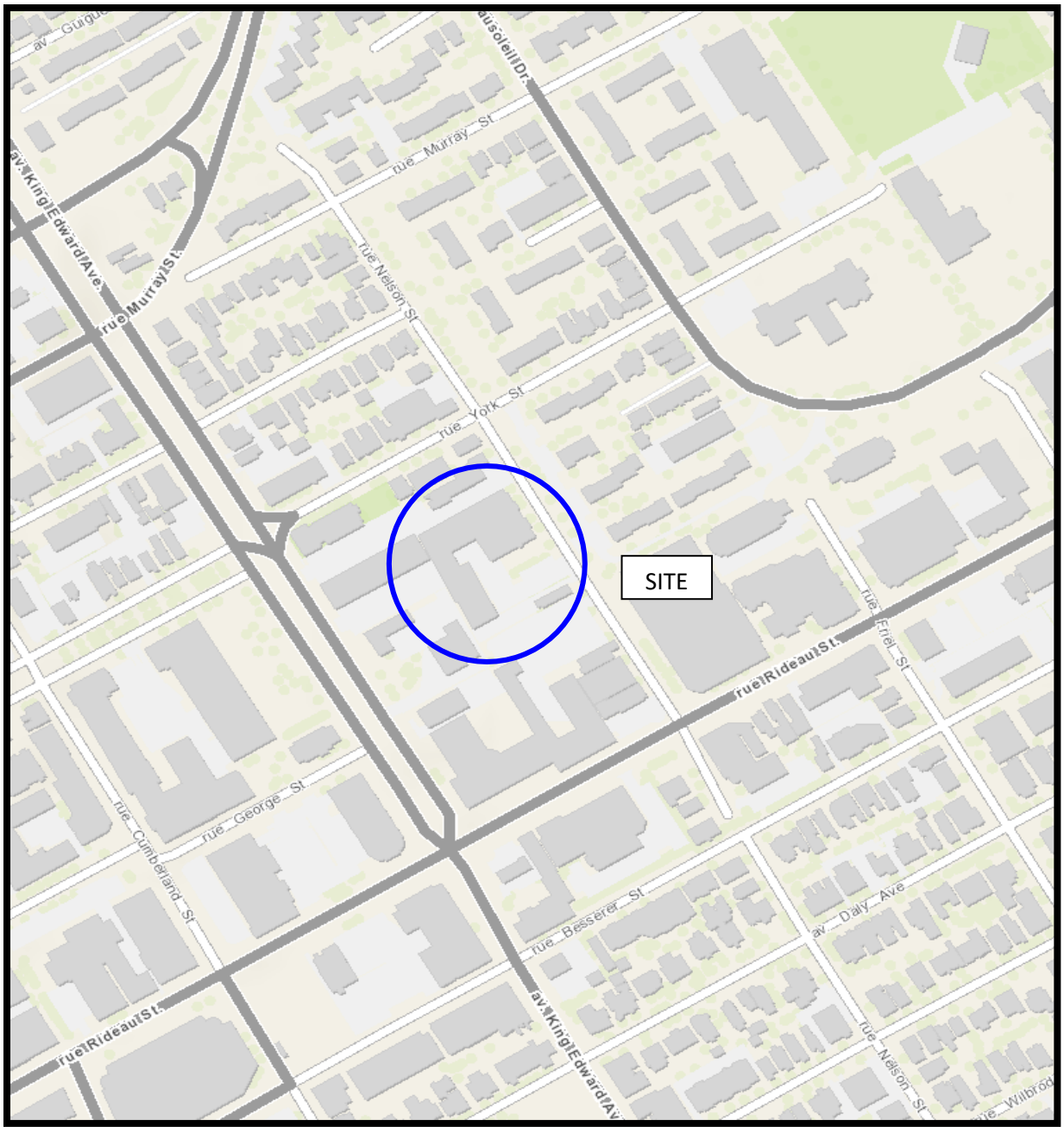

FIGURE 1

KEY PLAN

#260 YORK STREET
RESIDENTIAL TOWNHOUSES

#359 RIDEAU STREET
GROCERY STORE

NELSON STREET

YORK STREET

#86 NELSON ST.
RESIDENTIAL

#90 NELSON ST.
RESIDENTIAL

#110 NELSON STREET
RESIDENTIAL APPARTMENT BUILDING

#140 NELSON STREET
PARKING
(FORMER OTTAWA
ELECTRIC RAILWAY
TRANSFORMER
SUBSTATION)

#319 RIDEAU STREET
MOTEL
(FORMER DRY CLEANERS)

#240-248 YORK STREET
RESIDENTIAL

#96 NELSON ST.
AUTOMOTIVE
SERVICE
GARAGE
(SPARKS AUTO)

#100 NELSON ST.
PARKING

#236-238 YORK STREET
RESIDENTIAL

#321 KING EDWARD AVE.
COMMERCIAL
(GYM / RECREATION
CENTRE)

#327 KING EDWARD AVE.
COMMERCIAL
(PARKING)

#331 KING EDWARD AVE.
COMMERCIAL
(PERFORMING ARTS THEATRE)

#339 KING EDWARD AVE.
COMMERCIAL
(PARKING)

#351 KING EDWARD AVE.

HYDRO OTTAWA TRANSFORMER SUBSTATION

#365 K

#134 NELSON ST.
COMMERCIAL
(RESTAURANT)

#112 NELSON STREET
COMMERCIAL

B'
BH 3
98.95
(95.53)

ASPHALT PARKING

TG1
GRASSED

FH-TBM

CB

MH

(0.05m/m)

94.8
94.6
94.4
94.2
94
93.8
93.6
93.4
93.2

BH 2
99.07
(94.89)

A'
B

DUMPSTER
(CARDBOARD)

N/G CONNECTIONS

BH 1
99.33
(92.81)

A

UNIT 101A
VACANT

UNIT 101B
VACANT

UNIT 101C
VACANT

DUMPSTER
(WASTE)

LOADING
DOCKS

UNIT 102
VACANT

UNIT 103
VACANT

UNIT 104
VACANT

UNIT 105
VACANT

UNIT 106
VACANT

UNIT 107
VACANT

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION (PATERSON GROUP REPORT; PE4122, NOVEMBER 2017)
- TG1 — ANALYZED SOIL GRAB SAMPLE
- 99.33 — GROUND SURFACE ELEVATION (m)
- (92.81) — GROUNDWATER SURFACE ELEVATION (m) (APRIL 14, 2021)
- A — A' — GROUNDWATER CONTOUR(m)
- 94.4 — APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)
- (0.05m/m) — CROSS SECTION

TBM- TOP SPINDLE OF FIRE HYDRANT.
ASSUMED ELEVATION = 100.00 m

SCALE: 1:400

0 5 10 15 20 25m

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NO.	REVISIONS	DATE	INITIAL

SMART LIVING PROPERTIES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
112 NELSON STREET

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:400	Date: 04/2021
Drawn by: YA	Report No.: PE5326-1
Checked by: NS	Dwg. No.: PE5236-3
Approved by: AM	Revision No.:

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#260 YORK STREET
RESIDENTIAL TOWNHOUSES

#359 RIDEAU STREET
GROCERY STORE

NELSON STREET

BH3-SS7 4.50-5.20m November 2, 2017
VOCs comply with MECP Table 3 Standards

B'

BH 3
98.95
(95.53)

ASPHALT PARKING

G1 0.00-0.25m April 14, 2021
PCBs comply with MECP Table 3 Standards

#110 NELSON STREET
RESIDENTIAL APPARTMENT BUILDING

BH2-SS6 3.73-4.40m November 2, 2017
PAHs and PCBs comply with MECP Table 3 Standards

BH2-SS7 4.50-5.20m November 2, 2017
VOCs and PHCs comply with MECP Table 3 Standards

#86 NELSON ST.
RESIDENTIAL

#90 NELSON ST.
RESIDENTIAL

GRASSED

FH-TBM

CB

#134 NELSON ST.
COMMERCIAL
(RESTAURANT)

#140 NELSON STREET
PARKING
(FORMER OTTAWA
ELECTRIC RAILWAY
TRANSFORMER
SUBSTATION)

#319 RIDEAU STREET
MOTEL
(FORMER DRY CLEANERS)

YORK STREET

#96 NELSON ST.
AUTOMOTIVE
SERVICE
GARAGE
(SPARKS AUTO)

#100 NELSON ST.
PARKING

ASPHALT PARKING

N/G CONNECTIONS

UNIT 101A
VACANT

BH 1
99.33
(92.81)

CB

#112 NELSON STREET
COMMERCIAL

MH

BH 2
99.07
(94.89)

A'

B

DUMPSTER
(CARDBOARD)

#240-248 YORK STREET
RESIDENTIAL

A

ASPHALT PARKING

UNIT 101B
VACANT

N/G CONNECTIONS

DUMPSTER
(WASTE)

LOADING
DOCKS

N/G CONNECTIONS

BH1-AU1 0.10-0.60m November 2, 2017
Metals comply with MECP Table 3 Standards

BH1-SS6 3.80-4.40m November 2, 2017
PAHs comply with MECP Table 3 Standards

UNIT 102
VACANT

UNIT 103
VACANT

UNIT 104
VACANT

UNIT 105
VACANT

UNIT 106
VACANT

UNIT 107
VACANT

UNIT 101C
VACANT

#236-238 YORK STREET
RESIDENTIAL

#321 KING EDWARD AVE

#327 KING EDWARD AVE.

#331 KING EDWARD AVE.
COMMERCIAL
(PERFORMING ARTS THEATRE)

#339 KING EDWARD AVE.
COMMERCIAL
(PARKING)

#351 KING EDWARD AVE.

HYDRO OTTAWA TRANSFORMER SUBSTATION

#365 K

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION (PATERSON GROUP REPORT; PE4122, NOVEMBER 2017)
- G1 ANALYZED SOIL GRAB SAMPLE
- 99.33 GROUND SURFACE ELEVATION (m)
- (92.81) GROUNDWATER SURFACE ELEVATION (m) (APRIL 14, 2021)
- A — A' CROSS SECTION

TBM- TOP SPINDLE OF FIRE HYDRANT.
ASSUMED ELEVATION = 100.00 m

SCALE: 1:400

0 5 10 15 20 25m

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

SMART LIVING PROPERTIES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
112 NELSON STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL

Scale: 1:400	Date: 04/2021
Drawn by: YA	Report No.: PE5326-1
Checked by: NS	Dwg. No.: PE5236-4
Approved by: AM	Revision No.:

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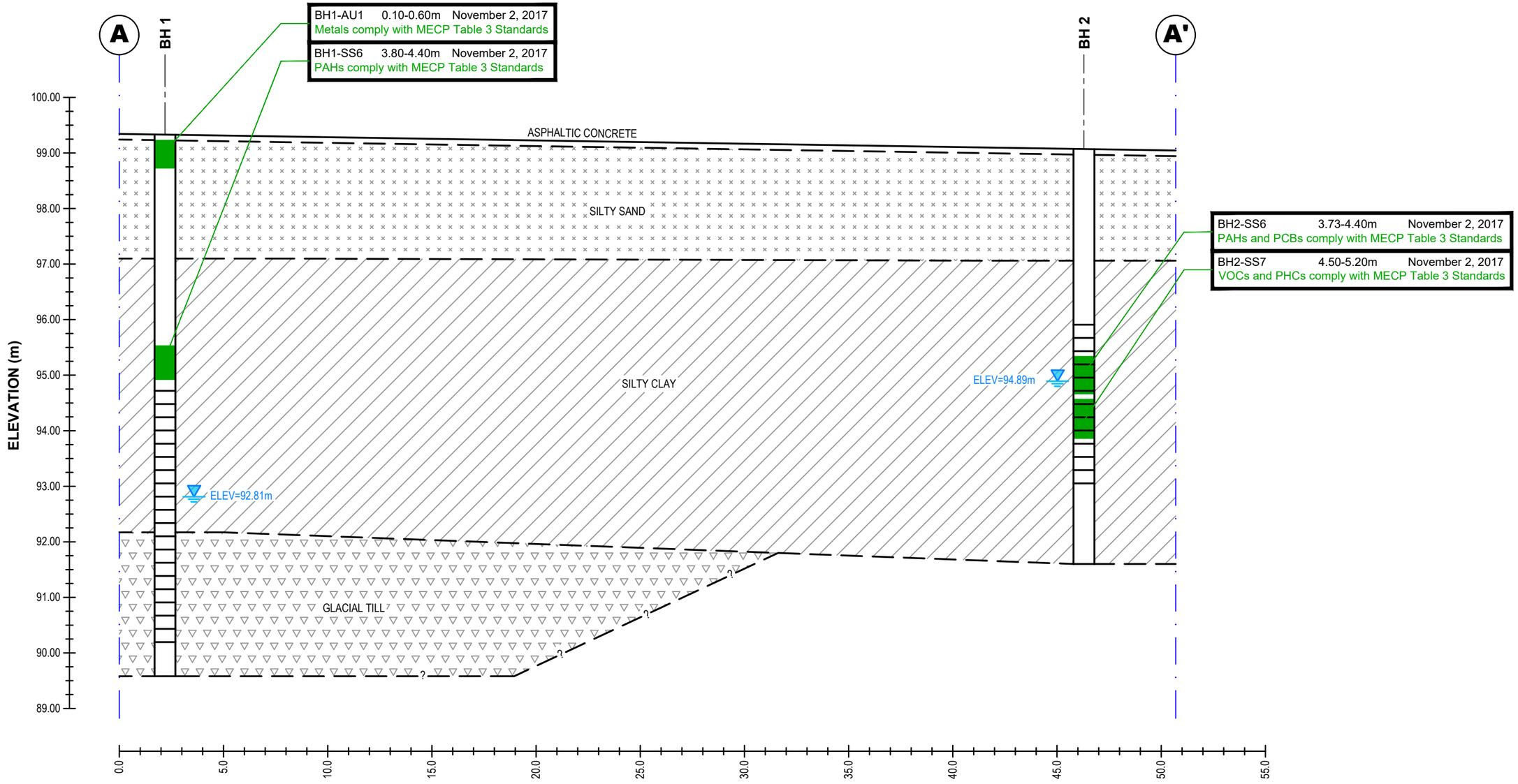

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL

SMART LIVING PROPERTIES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
112 NELSON STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL

Scale: AS SHOWN	Date: 04/2021
Drawn by: MPG	Report No.: PE5326-1
Checked by: NS	Dwg. No.: PE5236-4A
Approved by: AM	Revision No.:

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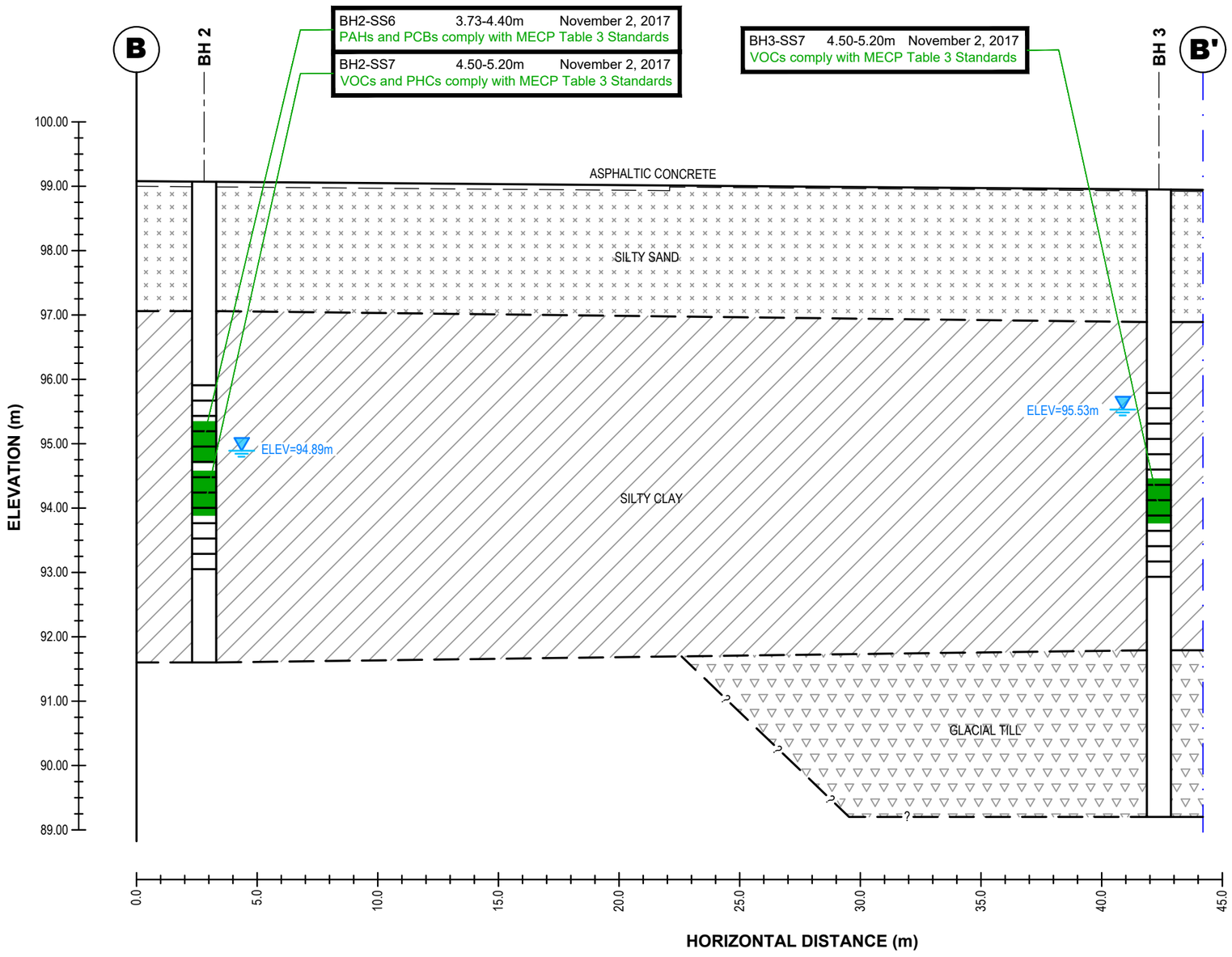

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SMART LIVING PROPERTIES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
112 NELSON STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL

Scale: AS SHOWN	Date: 04/2021
Drawn by: MPG	Report No.: PE5326-1
Checked by: NS	Dwg. No.: PE5236-4B
Approved by: AM	Revision No.:

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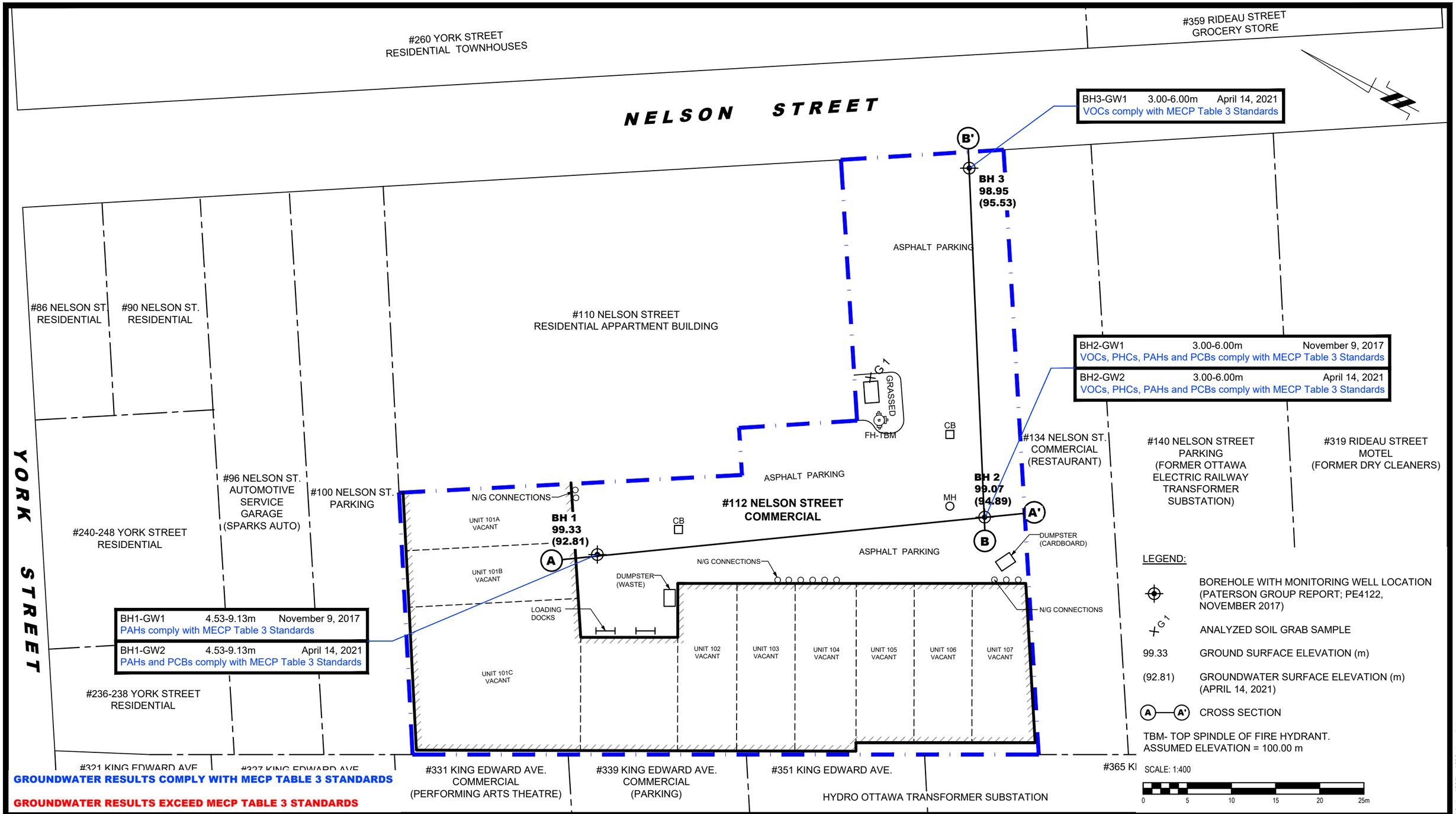

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

SMART LIVING PROPERTIES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
112 NELSON STREET

OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - GROUNDWATER

Scale: 1:400	**Date:** 04/2021
Drawn by: YA	**Report No.:** PE5326-1
Checked by: NS	**Dwg. No.:** PE5236-5
Approved by: AM	**Revision No.:**

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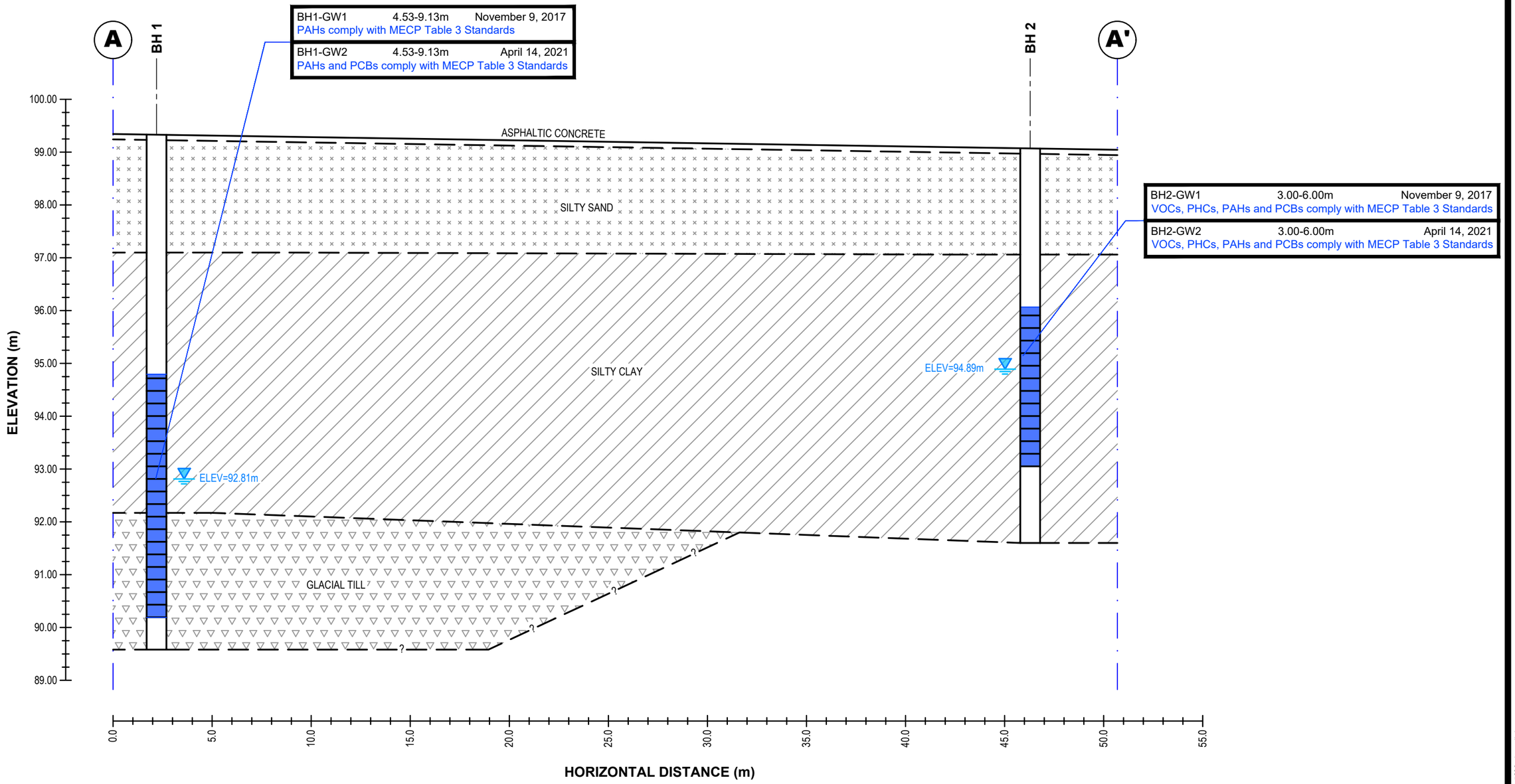

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

SMART LIVING PROPERTIES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
112 NELSON STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL

Scale: AS SHOWN	Date: 04/2021
Drawn by: MPG	Report No.: PE5326-1
Checked by: NS	Dwg. No.: PE5236-5A
Approved by: AM	Revision No.:

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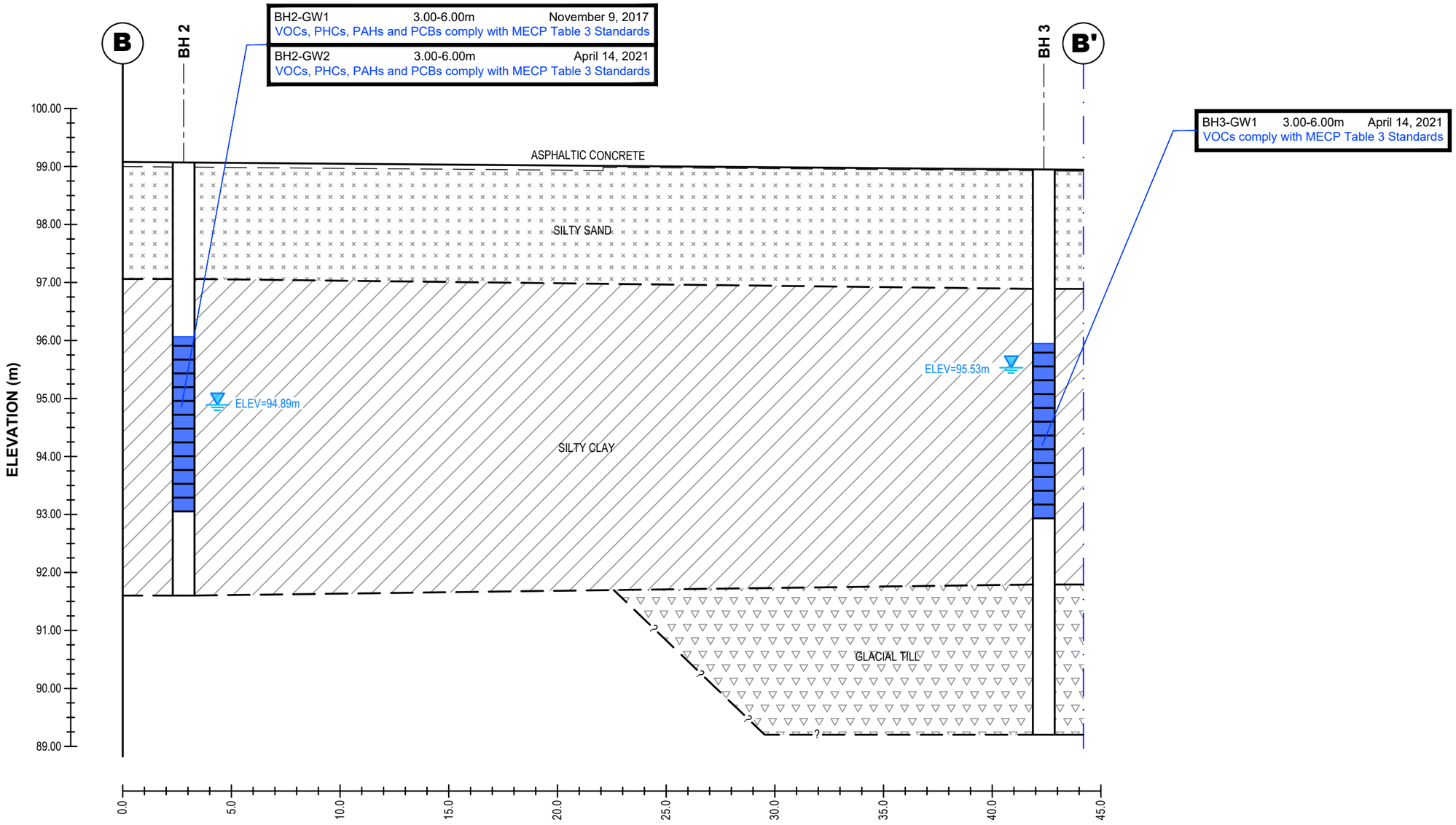

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

SMART LIVING PROPERTIES

PHASE II - ENVIRONMENTAL SITE ASSESSMENT UPDATE
112 NELSON STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL

Scale: AS SHOWN	Date: 04/2021
Drawn by: MPG	Report No.: PE5326-1
Checked by: NS	Dwg. No.: PE5236-5B
Approved by: AM	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

Paterson Group Inc.

Consulting Engineers
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patersongroup

Sampling & Analysis Plan

Phase II – Environmental Site Assessment Update
112 Nelson Street
Ottawa, Ontario

Prepared For

Smart Living Properties

April 1, 2021

Report: PE5236-SAP

TABLE OF CONTENTS

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was retained by Smart Living Properties to conduct a Phase II – Environmental Site Assessment (Phase II ESA) Update for the property addressed 112 Nelson Street in the City of Ottawa, Ontario. Based on the findings of the Phase I ESA, the following subsurface investigation program was developed.

Borehole/ Grab Sample	Location & Rationale	Proposed Depth & Rationale
BH1	Northwestern portion of subject site; potential impacts resulting from an existing off-site transformer substation, a former off-site truck terminal and garage, a former off-site transformer substation, and a former off-site dry cleaners.	7-10 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH2	Southern portion of subject site; potential impacts resulting an existing off-site transformer substation, a former off-site truck terminal and garage, a former off-site transformer substation, and a former off-site dry cleaners.	7-10 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH3	Eastern portion of subject site; to assess for potential impacts resulting from a former off-site printing facility.	7-10 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
G1-G4	North-central portion of subject site; to assess for potential impacts resulting from an existing on-site pad-mounted transformer.	0-0.25 m; for shallow soil sampling purposes.

Borehole locations are shown on Drawing PE5236-3 – Test Hole Location Plan, appended to the main report.

At each borehole, split-spoon samples of the 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 the borehole drilling, groundwater monitoring wells will be installed in BH1-BH3 for the collection of groundwater samples.

2.0 ANALYTICAL TESTING PROGRAM

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

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

The analytical testing program for soil 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 and orientations of boreholes with respect to site features (buildings, roadways, etc.) must be provided. Distances should be measured using a measuring tape or wheel rather than paced off. Ground surface elevations at each borehole should be surveyed relative to a geodetic benchmark, if one is available, or a temporary site benchmark which can be tied in at a later date if necessary.

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 F_1, 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” threaded sections of Schedule 40 PVC slotted well screen (5’ x 1 ¼” if installing in cored hole in bedrock)
- ❒ 5’ x 2” threaded sections of Schedule 40 PVC riser pipe (5’ x 1 ¼” 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 the laboratory detection limit.

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS

Physical impediments to the Sampling and Analysis plan may include:

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

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

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
112 Nelson Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant (refer to Test Hole Location Plan for location. Assumed elevation = 100.00m.

FILE NO. PE5236

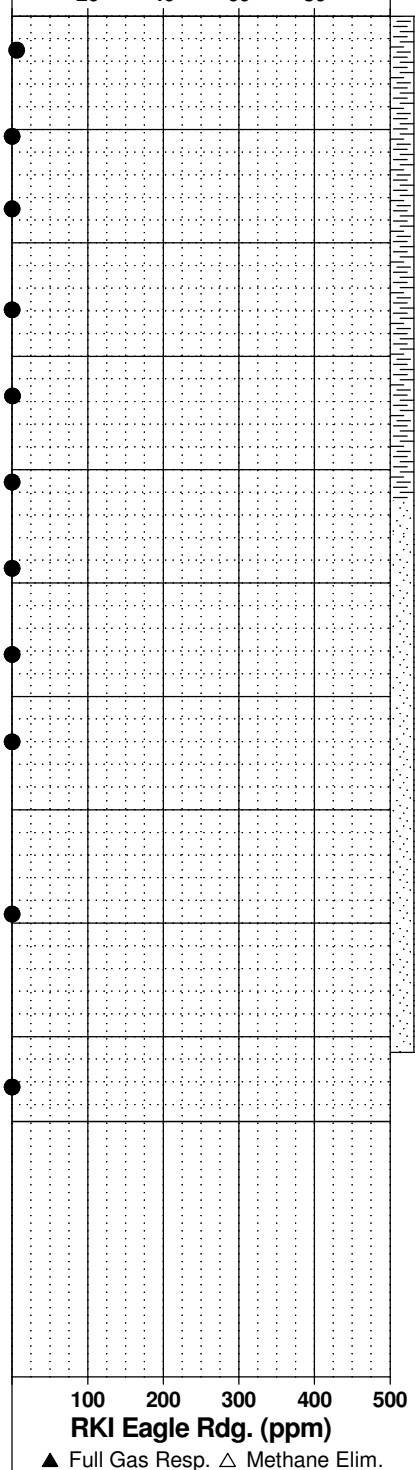
REMARKS

HOLE NO. BH 1

BORINGS BY CME 55 Power Auger **DATE** November 2, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.10						0	99.33
FILL: Crushed stone with silt and sand 0.41		AU	1				
FILL: Brown silty sand, some gravel and cobbles, trace boulders		SS	2	12	12	1	98.33
		SS	3	21	50+		
- concrete encountered at 1.8m depth 2.23						2	97.33
		SS	4	100	1		
Stiff, grey **SILTY CLAY,** trace sand		SS	5	100	P	3	96.33
		SS	6	83	P	4	95.33
- very stiff to stiff by 4.6m depth		SS	7	100	P	5	94.33
		SS	8	100	P		
		SS	9	83	P	6	93.33
7.16						7	92.33
GLACIAL TILL: Grey silty clay, trace gravel		SS	10	71	P	8	91.33
						9	90.33
9.75		SS	11	62	18		
Dynamic Cone Penetration commenced at 9.75m depth. Practical DCPT refusal at 11.73m depth							
(GWL @ 6.52m - April 14, 2021)							

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



Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
112 Nelson Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant (refer to Test Hole Location Plan for location. Assumed elevation = 100.00m.

FILE NO. PE5236

REMARKS

HOLE NO. BH 2

BORINGS BY CME 55 Power Auger **DATE** November 2, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.08		AU	1			0	99.07
FILL: Crushed stone with silt and sand 0.36							
Brown **SILTY SAND**, trace gravel and topsoil 1.07		SS	2	58	5	1	98.07
Loose, brown **SILTY SAND**		SS	3	42	7	2	97.07
2.01		SS	4	83	P		
		SS	5	100	P	3	96.07
		SS	6	75	P	4	95.07
Stiff, grey **SILTY CLAY,** trace sand		SS	7	83	P	5	94.07
		SS	8	83	P		
		SS	9	100	P	6	93.07
7.47		SS	10	100	P	7	92.07
End of Borehole							
(GWL @ 4.18m - April 14, 2021)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
112 Nelson Street
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant (refer to Test Hole Location Plan for location. Assumed elevation = 100.00m.

FILE NO. PE5236

REMARKS

HOLE NO. BH 3

BORINGS BY CME 55 Power Auger **DATE** November 2, 2017

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
25mm Asphaltic concrete over crushed stone with silt and sand 0.28		AU	1			0	98.95
Loose, brown **SILTY SAND**		SS	2	42	8	1	97.95
2.06		SS	3	33	4	2	96.95
		SS	4	83	2	3	95.95
Stiff, grey **SILTY CLAY,** trace sand		SS	5	79	P	4	94.95
		SS	6	100	P		
- very stiff to stiff by 4.6m depth		SS	7	100	P	5	93.95
		SS	8	100	P	6	92.95
		SS	9	100	P	7	91.95
7.16							
		SS	10	58	P	8	90.95
GLACIAL TILL: Grey silty clay, trace gravel, cobbles and boulders						9	89.95
9.75		SS	11	4	4		
Dynamic Cone Penetration commenced at 9.75m depth. Practical DCPT refusal at 11.56m depth							
(GWL @ 3.42m - April 14, 2021)							

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

20 40 60 80

100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

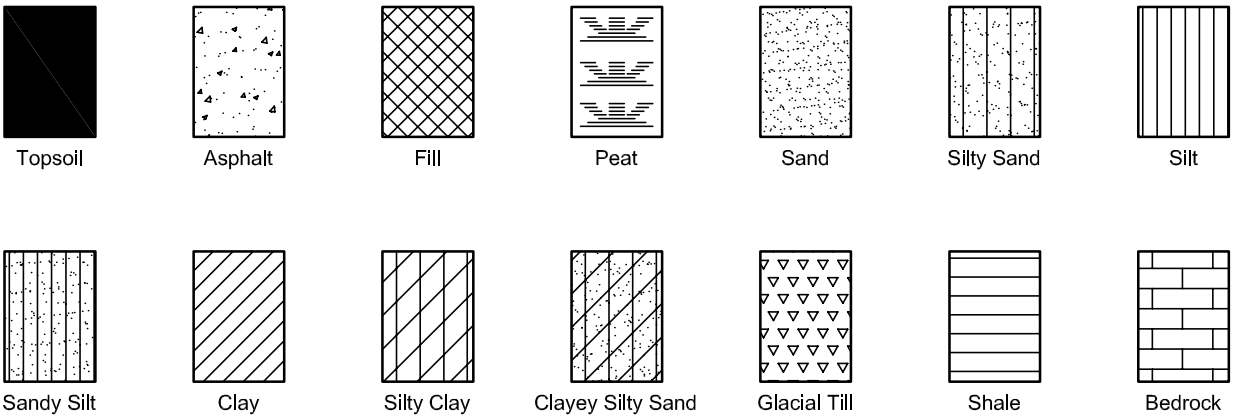
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

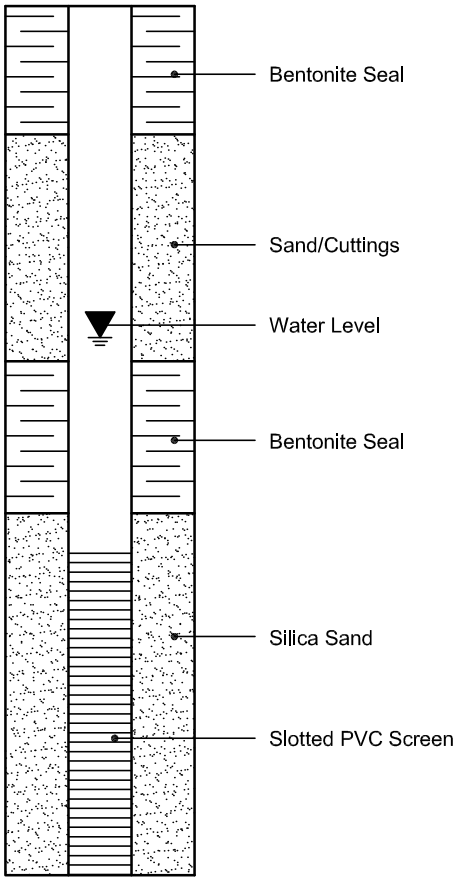
SYMBOLS AND TERMS (continued)

STRATA PLOT

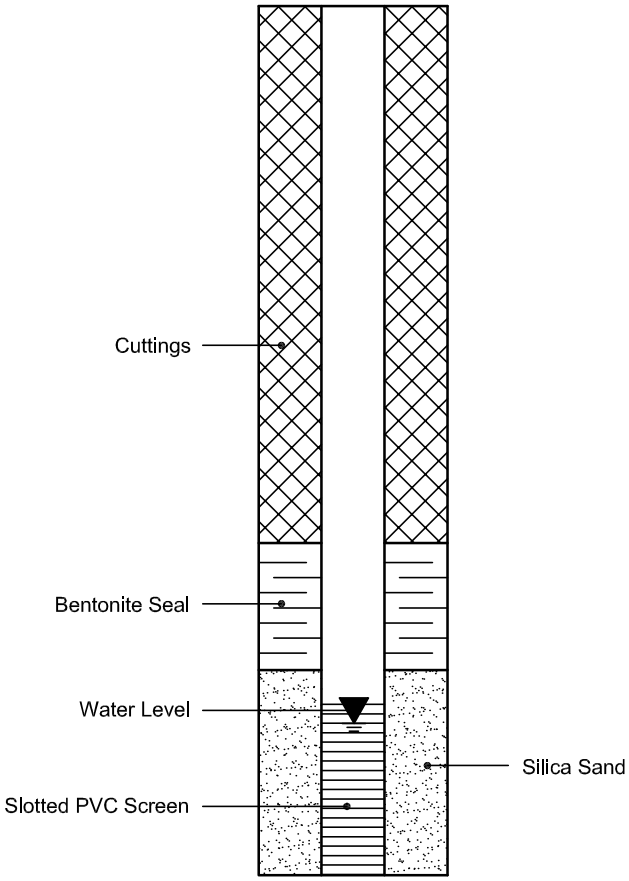


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Adrian Menyhart

Client PO: 23038
Project: PE4122
Custody: 114236

Report Date: 9-Nov-2017
Order Date: 3-Nov-2017

Order #: 1744538

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

Paracel ID	Client ID
1744538-01	BH1-AU1
1744538-02	BH1-SS6
1744538-03	BH2-SS6
1744538-04	BH2-SS7
1744538-05	BH3-SS7

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 23038

Report Date: 09-Nov-2017
Order Date: 3-Nov-2017
Project Description: PE4122

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Boron, available	MOE (HWE), EPA 200.7 - ICP-OES	9-Nov-17	9-Nov-17
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	6-Nov-17	7-Nov-17
Mercury by CVAA	EPA 7471B - CVAA, digestion	9-Nov-17	9-Nov-17
PCBs, total	SW846 8082A - GC-ECD	3-Nov-17	7-Nov-17
PHC F1	CWS Tier 1 - P&T GC-FID	7-Nov-17	8-Nov-17
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	3-Nov-17	7-Nov-17
REG 153: Metals by ICP/OES, soil	based on MOE E3470, ICP-OES	8-Nov-17	8-Nov-17
REG 153: PAHs by GC-MS	EPA 8270 - GC-MS, extraction	4-Nov-17	8-Nov-17
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	7-Nov-17	8-Nov-17
Solids, %	Gravimetric, calculation	8-Nov-17	8-Nov-17

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23038

Report Date: 09-Nov-2017

Order Date: 3-Nov-2017

Project Description: PE4122

	Client ID:	BH1-AU1	BH1-SS6	BH2-SS6	BH2-SS7
	Sample Date:	02-Nov-17	02-Nov-17	02-Nov-17	02-Nov-17
	Sample ID:	1744538-01	1744538-02	1744538-03	1744538-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	96.7	68.0	67.2	64.0
Metals					
Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	<1.0	-	-	-
Barium	1.0 ug/g dry	96.5	-	-	-
Beryllium	1.0 ug/g dry	<1.0	-	-	-
Boron	1.0 ug/g dry	22.7	-	-	-
Boron, available	0.5 ug/g dry	0.9	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	1.0 ug/g dry	12.5	-	-	-
Chromium (VI)	0.2 ug/g dry	<0.2	-	-	-
Cobalt	1.0 ug/g dry	6.5	-	-	-
Copper	1.0 ug/g dry	13.0	-	-	-
Lead	1.0 ug/g dry	29.9	-	-	-
Mercury	0.1 ug/g dry	<0.1	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	1.0 ug/g dry	12.5	-	-	-
Selenium	1.0 ug/g dry	<1.0	-	-	-
Silver	0.5 ug/g dry	<0.5	-	-	-
Thallium	1.0 ug/g dry	<1.0	-	-	-
Uranium	1.0 ug/g dry	<1.0	-	-	-
Vanadium	1.0 ug/g dry	17.0	-	-	-
Zinc	1.0 ug/g dry	18.0	-	-	-
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

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23038

Report Date: 09-Nov-2017

Order Date: 3-Nov-2017

Project Description: PE4122

	Client ID:	BH1-AU1	BH1-SS6	BH2-SS6	BH2-SS7
	Sample Date:	02-Nov-17	02-Nov-17	02-Nov-17	02-Nov-17
	Sample ID:	1744538-01	1744538-02	1744538-03	1744538-04
	MDL/Units	Soil	Soil	Soil	Soil
1,3-Dichlorobenzene	0.05 ug/g dry	-	-	-	<0.05
1,4-Dichlorobenzene	0.05 ug/g dry	-	-	-	<0.05
1,1-Dichloroethane	0.05 ug/g dry	-	-	-	<0.05
1,2-Dichloroethane	0.05 ug/g dry	-	-	-	<0.05
1,1-Dichloroethylene	0.05 ug/g dry	-	-	-	<0.05
cis-1,2-Dichloroethylene	0.05 ug/g dry	-	-	-	<0.05
trans-1,2-Dichloroethylene	0.05 ug/g dry	-	-	-	<0.05
1,2-Dichloropropane	0.05 ug/g dry	-	-	-	<0.05
cis-1,3-Dichloropropylene	0.05 ug/g dry	-	-	-	<0.05
trans-1,3-Dichloropropylene	0.05 ug/g dry	-	-	-	<0.05
1,3-Dichloropropene, total	0.05 ug/g dry	-	-	-	<0.05
Ethylbenzene	0.05 ug/g dry	-	-	-	<0.05
Ethylene dibromide (dibromoethan	0.05 ug/g dry	-	-	-	<0.05
Hexane	0.05 ug/g dry	-	-	-	<0.05
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	-	-	-	<0.50
Methyl Isobutyl Ketone	0.50 ug/g dry	-	-	-	<0.50
Methyl tert-butyl ether	0.05 ug/g dry	-	-	-	<0.05
Methylene Chloride	0.05 ug/g dry	-	-	-	<0.05
Styrene	0.05 ug/g dry	-	-	-	<0.05
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	-	-	-	<0.05
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	-	-	-	<0.05
Tetrachloroethylene	0.05 ug/g dry	-	-	-	<0.05
Toluene	0.05 ug/g dry	-	-	-	<0.05
1,1,1-Trichloroethane	0.05 ug/g dry	-	-	-	<0.05
1,1,2-Trichloroethane	0.05 ug/g dry	-	-	-	<0.05
Trichloroethylene	0.05 ug/g dry	-	-	-	<0.05
Trichlorofluoromethane	0.05 ug/g dry	-	-	-	<0.05
Vinyl chloride	0.02 ug/g dry	-	-	-	<0.02
m,p-Xylenes	0.05 ug/g dry	-	-	-	<0.05
o-Xylene	0.05 ug/g dry	-	-	-	<0.05
Xylenes, total	0.05 ug/g dry	-	-	-	<0.05
4-Bromofluorobenzene	Surrogate	-	-	-	96.3%
Dibromofluoromethane	Surrogate	-	-	-	93.4%
Toluene-d8	Surrogate	-	-	-	97.0%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	-	-	<7

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23038

Report Date: 09-Nov-2017

Order Date: 3-Nov-2017

Project Description: PE4122

	Client ID:	BH1-AU1	BH1-SS6	BH2-SS6	BH2-SS7
	Sample Date:	02-Nov-17	02-Nov-17	02-Nov-17	02-Nov-17
	Sample ID:	1744538-01	1744538-02	1744538-03	1744538-04
	MDL/Units	Soil	Soil	Soil	Soil
F2 PHCs (C10-C16)	4 ug/g dry	-	-	-	<4
F3 PHCs (C16-C34)	8 ug/g dry	-	-	-	<8
F4 PHCs (C34-C50)	6 ug/g dry	-	-	-	<6
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	<0.02	<0.02	-
Acenaphthylene	0.02 ug/g dry	-	<0.02	<0.02	-
Anthracene	0.02 ug/g dry	-	<0.02	<0.02	-
Benzo [a] anthracene	0.02 ug/g dry	-	<0.02	<0.02	-
Benzo [a] pyrene	0.02 ug/g dry	-	<0.02	<0.02	-
Benzo [b] fluoranthene	0.02 ug/g dry	-	<0.02	<0.02	-
Benzo [g,h,i] perylene	0.02 ug/g dry	-	<0.02	<0.02	-
Benzo [k] fluoranthene	0.02 ug/g dry	-	<0.02	<0.02	-
Chrysene	0.02 ug/g dry	-	<0.02	<0.02	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	<0.02	<0.02	-
Fluoranthene	0.02 ug/g dry	-	<0.02	<0.02	-
Fluorene	0.02 ug/g dry	-	<0.02	<0.02	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	<0.02	<0.02	-
1-Methylnaphthalene	0.02 ug/g dry	-	<0.02	<0.02	-
2-Methylnaphthalene	0.02 ug/g dry	-	<0.02	<0.02	-
Methylnaphthalene (1&2)	0.04 ug/g dry	-	<0.04	<0.04	-
Naphthalene	0.01 ug/g dry	-	<0.01	<0.01	-
Phenanthrene	0.02 ug/g dry	-	<0.02	<0.02	-
Pyrene	0.02 ug/g dry	-	<0.02	<0.02	-
2-Fluorobiphenyl	Surrogate	-	68.8%	69.6%	-
Terphenyl-d14	Surrogate	-	108%	112%	-
PCBs					
PCBs, total	0.05 ug/g dry	-	-	<0.05	-
Decachlorobiphenyl	Surrogate	-	-	134%	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 23038

Report Date: 09-Nov-2017
Order Date: 3-Nov-2017
Project Description: PE4122

	Client ID:	BH3-SS7	-	-	-
	Sample Date:	02-Nov-17	-	-	-
	Sample ID:	1744538-05	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	66.1	-	-	-
Volatiles					
Acetone	0.50 ug/g dry	<0.50	-	-	-
Benzene	0.02 ug/g dry	<0.02	-	-	-
Bromodichloromethane	0.05 ug/g dry	<0.05	-	-	-
Bromoform	0.05 ug/g dry	<0.05	-	-	-
Bromomethane	0.05 ug/g dry	<0.05	-	-	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	-	-	-
Chlorobenzene	0.05 ug/g dry	<0.05	-	-	-
Chloroform	0.05 ug/g dry	<0.05	-	-	-
Dibromochloromethane	0.05 ug/g dry	<0.05	-	-	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	-	-	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	-	-	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	-	-	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	-	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	-	-
Ethylene dibromide (dibromoethar	0.05 ug/g dry	<0.05	-	-	-
Hexane	0.05 ug/g dry	<0.05	-	-	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	-	-	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	-	-	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	-	-	-
Methylene Chloride	0.05 ug/g dry	<0.05	-	-	-
Styrene	0.05 ug/g dry	<0.05	-	-	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	-	-	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 23038

Report Date: 09-Nov-2017
Order Date: 3-Nov-2017
Project Description: PE4122

	Client ID:	BH3-SS7	-	-	-
	Sample Date:	02-Nov-17	-	-	-
	Sample ID:	1744538-05	-	-	-
	MDL/Units	Soil	-	-	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	-	-	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	-	-	-
Trichloroethylene	0.05 ug/g dry	<0.05	-	-	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	-	-	-
Vinyl chloride	0.02 ug/g dry	<0.02	-	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	<0.05	-	-	-
4-Bromofluorobenzene	Surrogate	116%	-	-	-
Dibromofluoromethane	Surrogate	94.9%	-	-	-
Toluene-d8	Surrogate	95.7%	-	-	-

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	1.0	ug/g						
Boron, available	ND	0.5	ug/g						
Boron	ND	1.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	1.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	1.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	1.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.5	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	1.0	ug/g						
Zinc	ND	1.0	ug/g						
PCBs									
PCBs, total	ND	0.05	ug/g						
Surrogate: Decachlorobiphenyl	*0.0720*		*ug/g*		*72.0*	*60-140*			
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	*1.12*		*ug/g*		*84.2*	*50-140*			
Surrogate: Terphenyl-d14	*1.63*		*ug/g*		*122*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
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	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*8.33*		*ug/g*		*104*	*50-140*			
Surrogate: Dibromofluoromethane	*6.64*		*ug/g*		*83.1*	*50-140*			
Surrogate: Toluene-d8	*7.57*		*ug/g*		*94.6*	*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				40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND				30	
F3 PHCs (C16-C34)	300	8	ug/g dry	269			10.6	30	
F4 PHCs (C34-C50)	348	6	ug/g dry	348			0.1	30	
Metals									
Antimony	2.35	1.0	ug/g dry	ND			0.0	30	
Arsenic	18.0	1.0	ug/g dry	17.7			1.5	30	
Barium	108	1.0	ug/g dry	108			0.2	30	
Beryllium	ND	1.0	ug/g dry	ND			0.0	30	
Boron, available	ND	0.5	ug/g dry	ND			0.0	35	
Boron	14.3	1.0	ug/g dry	14.3			0.2	30	
Cadmium	ND	0.5	ug/g dry	ND			0.0	30	
Chromium (VI)	ND	0.2	ug/g dry	ND				35	
Chromium	24.3	1.0	ug/g dry	24.5			1.0	30	
Cobalt	10.0	1.0	ug/g dry	10.2			1.8	30	
Copper	20.4	1.0	ug/g dry	20.3			0.5	30	
Lead	9.80	1.0	ug/g dry	10.3			5.1	30	
Mercury	ND	0.1	ug/g dry	ND			0.0	30	
Molybdenum	ND	1.0	ug/g dry	ND			0.0	30	
Nickel	17.2	1.0	ug/g dry	17.0			1.2	30	
Selenium	ND	1.0	ug/g dry	ND			0.0	30	
Silver	0.53	0.5	ug/g dry	0.55			3.4	30	
Thallium	1.52	1.0	ug/g dry	ND			0.0	30	
Uranium	ND	1.0	ug/g dry	ND				30	
Vanadium	37.0	1.0	ug/g dry	37.1			0.4	30	
Zinc	38.4	1.0	ug/g dry	39.6			3.1	30	
PCBs									
PCBs, total	ND	0.05	ug/g dry	ND				40	
Surrogate: Decachlorobiphenyl	*0.103*		*ug/g dry*		*74.0*	*60-140*			
Physical Characteristics									
% Solids	76.5	0.1	% by Wt.	76.2			0.4	25	
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g dry	ND				40	
Acenaphthylene	ND	0.02	ug/g dry	ND				40	
Anthracene	ND	0.02	ug/g dry	ND				40	
Benzo [a] anthracene	ND	0.02	ug/g dry	ND				40	
Benzo [a] pyrene	ND	0.02	ug/g dry	ND				40	
Benzo [b] fluoranthene	ND	0.02	ug/g dry	ND				40	
Benzo [g,h,i] perylene	ND	0.02	ug/g dry	ND				40	
Benzo [k] fluoranthene	ND	0.02	ug/g dry	ND				40	
Chrysene	ND	0.02	ug/g dry	ND			0.0	40	
Dibenzo [a,h] anthracene	ND	0.02	ug/g dry	ND				40	
Fluoranthene	ND	0.02	ug/g dry	ND				40	
Fluorene	ND	0.02	ug/g dry	ND				40	
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g dry	ND				40	
1-Methylnaphthalene	ND	0.02	ug/g dry	ND				40	
2-Methylnaphthalene	ND	0.02	ug/g dry	ND				40	
Naphthalene	ND	0.01	ug/g dry	ND			0.0	40	
Phenanthrene	ND	0.02	ug/g dry	ND				40	
Pyrene	ND	0.02	ug/g dry	ND				40	
Surrogate: 2-Fluorobiphenyl	*1.29*		*ug/g dry*		*76.5*	*50-140*			
Surrogate: Terphenyl-d14	*1.91*		*ug/g dry*		*113*	*50-140*			
Volatiles									
Acetone	ND	0.50	ug/g dry	ND				50	
Benzene	ND	0.02	ug/g dry	ND				50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Bromodichloromethane	ND	0.05	ug/g dry	ND				50	
Bromoform	ND	0.05	ug/g dry	ND				50	
Bromomethane	ND	0.05	ug/g dry	ND				50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND				50	
Chlorobenzene	ND	0.05	ug/g dry	ND				50	
Chloroform	ND	0.05	ug/g dry	ND				50	
Dibromochloromethane	ND	0.05	ug/g dry	ND				50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND				50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND				50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND				50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND				50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND				50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND				50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND				50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND				50	
Ethylbenzene	ND	0.05	ug/g dry	ND				50	
Ethylene dibromide (dibromoethane	ND	0.05	ug/g dry	ND				50	
Hexane	ND	0.05	ug/g dry	ND				50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND				50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND				50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND				50	
Methylene Chloride	ND	0.05	ug/g dry	ND				50	
Styrene	ND	0.05	ug/g dry	ND				50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND				50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND				50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND				50	
Toluene	ND	0.05	ug/g dry	ND				50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND				50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND				50	
Trichloroethylene	ND	0.05	ug/g dry	ND				50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND				50	
Vinyl chloride	ND	0.02	ug/g dry	ND				50	
m,p-Xylenes	ND	0.05	ug/g dry	ND				50	
o-Xylene	ND	0.05	ug/g dry	ND				50	
Surrogate: 4-Bromofluorobenzene	*8.98*		*ug/g dry*		*111*	*50-140*			
Surrogate: Dibromofluoromethane	*6.68*		*ug/g dry*		*82.3*	*50-140*			
Surrogate: Toluene-d8	*8.24*		*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)	166	7	ug/g		83.2	80-120			
F2 PHCs (C10-C16)	101	4	ug/g	ND	98.6	60-140			
F3 PHCs (C16-C34)	478	8	ug/g	269	98.7	60-140			
F4 PHCs (C34-C50)	506	6	ug/g	348	112	60-140			
Metals									
Antimony	320		ug/L	ND	128	70-130			
Arsenic	672		ug/L	355	127	70-130			
Barium	2410		ug/L	2160	101	70-130			
Beryllium	269		ug/L	5.69	105	70-130			
Boron, available	4.72	0.5	ug/g	ND	94.3	70-122			
Boron	557		ug/L	286	108	70-130			
Cadmium	258		ug/L	6.76	101	70-130			
Chromium (VI)	4.3	0.2	ug/g	ND	81.5	70-130			
Chromium	714		ug/L	490	89.5	70-130			
Cobalt	426		ug/L	205	88.5	70-130			
Copper	665		ug/L	407	103	70-130			
Lead	416		ug/L	206	83.8	70-130			
Mercury	1.42	0.1	ug/g	ND	94.8	70-130			
Molybdenum	233		ug/L	ND	93.3	70-130			
Nickel	574		ug/L	340	93.7	70-130			
Selenium	224		ug/L	7.33	86.7	70-130			
Silver	257		ug/L	11.0	98.4	70-130			
Thallium	195		ug/L	ND	78.0	70-130			
Uranium	309		ug/L	ND	124	70-130			
Vanadium	986		ug/L	742	97.4	70-130			
Zinc	1780		ug/L	1590	76.3	70-130			
PCBs									
PCBs, total	0.186	0.05	ug/g	ND	134	60-140			
Surrogate: Decachlorobiphenyl	*0.103*		*ug/g*		*74.0*	*60-140*			
Semi-Volatiles									
Acenaphthene	0.258	0.02	ug/g	ND	122	50-140			
Acenaphthylene	0.223	0.02	ug/g	ND	105	50-140			
Anthracene	0.128	0.02	ug/g	ND	60.6	50-140			
Benzo [a] anthracene	0.138	0.02	ug/g	ND	65.1	50-140			
Benzo [a] pyrene	0.168	0.02	ug/g	ND	79.6	50-140			
Benzo [b] fluoranthene	0.206	0.02	ug/g	ND	97.5	50-140			
Benzo [g,h,i] perylene	0.215	0.02	ug/g	ND	102	50-140			
Benzo [k] fluoranthene	0.205	0.02	ug/g	ND	96.9	50-140			
Chrysene	0.187	0.02	ug/g	ND	88.5	50-140			
Dibenzo [a,h] anthracene	0.234	0.02	ug/g	ND	111	50-140			
Fluoranthene	0.206	0.02	ug/g	ND	97.4	50-140			
Fluorene	0.202	0.02	ug/g	ND	95.7	50-140			
Indeno [1,2,3-cd] pyrene	0.226	0.02	ug/g	ND	107	50-140			
1-Methylnaphthalene	0.178	0.02	ug/g	ND	84.1	50-140			
2-Methylnaphthalene	0.201	0.02	ug/g	ND	95.2	50-140			
Naphthalene	0.240	0.01	ug/g	ND	113	50-140			
Phenanthrene	0.211	0.02	ug/g	ND	99.6	50-140			
Pyrene	0.211	0.02	ug/g	ND	99.9	50-140			
Volatiles									
Acetone	11.9	0.50	ug/g		119	50-140			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Benzene	3.63	0.02	ug/g		90.9	60-130			
Bromodichloromethane	3.12	0.05	ug/g		78.0	60-130			
Bromoform	3.62	0.05	ug/g		90.6	60-130			
Bromomethane	5.00	0.05	ug/g		125	50-140			
Carbon Tetrachloride	3.25	0.05	ug/g		81.2	60-130			
Chlorobenzene	3.90	0.05	ug/g		97.6	60-130			
Chloroform	3.38	0.05	ug/g		84.5	60-130			
Dibromochloromethane	3.85	0.05	ug/g		96.1	60-130			
Dichlorodifluoromethane	4.88	0.05	ug/g		122	50-140			
1,2-Dichlorobenzene	4.02	0.05	ug/g		100	60-130			
1,3-Dichlorobenzene	3.38	0.05	ug/g		84.5	60-130			
1,4-Dichlorobenzene	4.05	0.05	ug/g		101	60-130			
1,1-Dichloroethane	3.66	0.05	ug/g		91.6	60-130			
1,2-Dichloroethane	3.54	0.05	ug/g		88.4	60-130			
1,1-Dichloroethylene	3.06	0.05	ug/g		76.4	60-130			
cis-1,2-Dichloroethylene	3.12	0.05	ug/g		77.9	60-130			
trans-1,2-Dichloroethylene	3.08	0.05	ug/g		77.1	60-130			
1,2-Dichloropropane	3.75	0.05	ug/g		93.9	60-130			
cis-1,3-Dichloropropylene	3.51	0.05	ug/g		87.7	60-130			
trans-1,3-Dichloropropylene	3.34	0.05	ug/g		83.6	60-130			
Ethylbenzene	3.93	0.05	ug/g		98.1	60-130			
Ethylene dibromide (dibromoethane	3.67	0.05	ug/g		91.7	60-130			
Hexane	3.95	0.05	ug/g		98.8	60-130			
Methyl Ethyl Ketone (2-Butanone)	9.07	0.50	ug/g		90.7	50-140			
Methyl Isobutyl Ketone	13.9	0.50	ug/g		139	50-140			
Methyl tert-butyl ether	7.29	0.05	ug/g		72.9	50-140			
Methylene Chloride	3.73	0.05	ug/g		93.2	60-130			
Styrene	3.04	0.05	ug/g		76.1	60-130			
1,1,1,2-Tetrachloroethane	3.97	0.05	ug/g		99.3	60-130			
1,1,2,2-Tetrachloroethane	4.67	0.05	ug/g		117	60-130			
Tetrachloroethylene	3.82	0.05	ug/g		95.4	60-130			
Toluene	4.33	0.05	ug/g		108	60-130			
1,1,1-Trichloroethane	2.97	0.05	ug/g		74.4	60-130			
1,1,2-Trichloroethane	3.45	0.05	ug/g		86.4	60-130			
Trichloroethylene	3.05	0.05	ug/g		76.2	60-130			
Trichlorofluoromethane	3.90	0.05	ug/g		97.5	50-140			
Vinyl chloride	4.66	0.02	ug/g		116	50-140			
m,p-Xylenes	8.25	0.05	ug/g		103	60-130			
o-Xylene	4.04	0.05	ug/g		101	60-130			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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.

Paracel ID: 1744538

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Chain of Custody (Lab Use Only)
№ 114236

Page 1 of 1

Client Name:	PATERSON GROUP
Contact Name:	ADRIAN MENYHART
Address:	154 COLONNADE RD. S
Telephone:	613 - 226 - 7381
Project Reference:	PE4122
Quote #	
PO #	23038
Email Address:	amenyhart@patersongroup.ca

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

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

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

Paracel Order Number: 1744538.

Required Analyses

	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)	METALS (MOE)	PCB		
1	BH1 - AV1	S		1	Nov 2 '17									✓		-850mL-	✓
2	BH1 - SS6			1					✓							↓	✓
3	BH2 - SS6			1					✓						✓		✓
4	BH2 - SS7			2			✓	✓								-120mL + 1vial-	✓
5	BH3 - SS7			2				✓								↓	✓
6																	
7																	
8																	
9																	
10																	

Comments:

Method of Delivery: Paracel

Relinquished By (Sign): Adrian	Received by Driver/Depot: M. Jeouse	Received at Lab: Sunnybrn Dekmi	Verified By: Rachel Subject
Relinquished By (Print): Adrian	Date/Time: 03/11/17 3 30 PM	Date/Time: Nov 03, 2017 05.00	Date/Time: Nov 3 /17.
Date/Time: Nov 3 2017.	Temperature: °C	Temperature: 18.5 °C	pH Verified [X] By: N/A 5:18.

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Adrian Menyhart

Client PO: 23092
Project: PE4122
Custody: 114223

Report Date: 17-Nov-2017
Order Date: 10-Nov-2017

Order #: 1746023

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

Paracel ID	Client ID
1746023-01	BH1-GW1
1746023-02	BH2-GW1
1746023-03	DUP1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 23092

Report Date: 17-Nov-2017
Order Date: 10-Nov-2017
Project Description: PE4122

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PCBs, total	EPA 608 - GC-ECD	16-Nov-17	16-Nov-17
PHC F1	CWS Tier 1 - P&T GC-FID	16-Nov-17	16-Nov-17
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	13-Nov-17	14-Nov-17
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	15-Nov-17	15-Nov-17
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	16-Nov-17	16-Nov-17

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23092

Report Date: 17-Nov-2017

Order Date: 10-Nov-2017

Project Description: PE4122

	Client ID:	BH1-GW1	BH2-GW1	DUP1	-
	Sample Date:	09-Nov-17	09-Nov-17	09-Nov-17	-
	Sample ID:	1746023-01	1746023-02	1746023-03	-
	MDL/Units	Water	Water	Water	-
Volatiles					
Acetone	5.0 ug/L	-	<5.0	<5.0	-
Benzene	0.5 ug/L	-	<0.5	<0.5	-
Bromodichloromethane	0.5 ug/L	-	<0.5	<0.5	-
Bromoform	0.5 ug/L	-	<0.5	<0.5	-
Bromomethane	0.5 ug/L	-	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	-	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	-	<0.5	<0.5	-
Chloroform	0.5 ug/L	-	<0.5	<0.5	-
Dibromochloromethane	0.5 ug/L	-	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	-	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	-	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	-	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	-	<0.5	<0.5	-
1,1-Dichloroethane	0.5 ug/L	-	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	-	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	-	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	-	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	-	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	-	<0.5	<0.5	-
Ethylene dibromide (dibromoethan	0.2 ug/L	-	<0.2	<0.2	-
Hexane	1.0 ug/L	-	<1.0	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	-	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	-	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	-	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	-	<5.0	<5.0	-
Styrene	0.5 ug/L	-	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	-	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	-	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	-	<0.5	<0.5	-
Toluene	0.5 ug/L	-	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	-	<0.5	<0.5	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23092

Report Date: 17-Nov-2017

Order Date: 10-Nov-2017

Project Description: PE4122

	Client ID:	BH1-GW1	BH2-GW1	DUP1	-
	Sample Date:	09-Nov-17	09-Nov-17	09-Nov-17	-
	Sample ID:	1746023-01	1746023-02	1746023-03	-
	MDL/Units	Water	Water	Water	-
1,1,2-Trichloroethane	0.5 ug/L	-	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L	-	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L	-	<1.0	<1.0	-
Vinyl chloride	0.5 ug/L	-	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	-	<0.5	<0.5	-
o-Xylene	0.5 ug/L	-	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	-	<0.5	<0.5	-
4-Bromofluorobenzene	Surrogate	-	117%	116%	-
Dibromofluoromethane	Surrogate	-	124%	126%	-
Toluene-d8	Surrogate	-	90.1%	90.6%	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	-	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	-	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	-	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	-	<100	-	-
Semi-Volatiles					
Acenaphthene	0.05 ug/L	<0.05	<0.05	-	-
Acenaphthylene	0.05 ug/L	<0.05	<0.05	-	-
Anthracene	0.01 ug/L	<0.01	<0.01	-	-
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01	-	-
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	-	-
Chrysene	0.05 ug/L	<0.05	<0.05	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	-	-
Fluoranthene	0.01 ug/L	<0.01	<0.01	-	-
Fluorene	0.05 ug/L	<0.05	<0.05	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	-	-
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	-
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	-
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	-	-
Naphthalene	0.05 ug/L	<0.05	<0.05	-	-
Phenanthrene	0.05 ug/L	<0.05	<0.05	-	-
Pyrene	0.01 ug/L	<0.01	<0.01	-	-
2-Fluorobiphenyl	Surrogate	64.8%	69.6%	-	-
Terphenyl-d14	Surrogate	97.5%	100%	-	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 23092

Report Date: 17-Nov-2017

Order Date: 10-Nov-2017

Project Description: PE4122

	Client ID:	BH1-GW1	BH2-GW1	DUP1	-
	Sample Date:	09-Nov-17	09-Nov-17	09-Nov-17	-
	Sample ID:	1746023-01	1746023-02	1746023-03	-
	MDL/Units	Water	Water	Water	-
PCBs					
PCBs, total	0.05 ug/L	-	<0.05	-	-
Decachlorobiphenyl	Surrogate	-	107%	-	-

Certificate of Analysis
Client: Paterson Group Consulting Engineers
Client PO: 23092

Report Date: 17-Nov-2017
Order Date: 10-Nov-2017
Project Description: PE4122

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						
PCBs									
PCBs, total	ND	0.05	ug/L						
Surrogate: Decachlorobiphenyl	*0.505*		*ug/L*		*101*	*60-140*			
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	*13.9*		*ug/L*		*69.3*	*50-140*			
Surrogate: Terphenyl-d14	*21.5*		*ug/L*		*108*	*50-140*			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						

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	*94.8*		*ug/L*		*118*	*50-140*			
Surrogate: Dibromofluoromethane	*98.4*		*ug/L*		*123*	*50-140*			
Surrogate: Toluene-d8	*72.3*		*ug/L*		*90.4*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND				30	
Volatiles									
Acetone	ND	5.0	ug/L	ND				30	
Benzene	ND	0.5	ug/L	ND				30	
Bromodichloromethane	ND	0.5	ug/L	ND				30	
Bromoform	ND	0.5	ug/L	ND				30	
Bromomethane	ND	0.5	ug/L	ND				30	
Carbon Tetrachloride	ND	0.2	ug/L	ND				30	
Chlorobenzene	ND	0.5	ug/L	ND				30	
Chloroform	ND	0.5	ug/L	ND				30	
Dibromochloromethane	ND	0.5	ug/L	ND				30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND				30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND				30	
1,1-Dichloroethane	ND	0.5	ug/L	ND				30	
1,2-Dichloroethane	ND	0.5	ug/L	ND				30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND				30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND				30	
1,2-Dichloropropane	ND	0.5	ug/L	ND				30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND				30	
Ethylbenzene	ND	0.5	ug/L	ND				30	
Ethylene dibromide (dibromoethane	ND	0.2	ug/L	ND				30	
Hexane	ND	1.0	ug/L	ND				30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND				30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND				30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND				30	
Methylene Chloride	ND	5.0	ug/L	ND				30	
Styrene	ND	0.5	ug/L	ND				30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND				30	
Tetrachloroethylene	ND	0.5	ug/L	ND				30	
Toluene	ND	0.5	ug/L	ND				30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND				30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND				30	
Trichloroethylene	ND	0.5	ug/L	ND				30	
Trichlorofluoromethane	ND	1.0	ug/L	ND				30	
Vinyl chloride	ND	0.5	ug/L	ND				30	
m,p-Xylenes	ND	0.5	ug/L	ND				30	
o-Xylene	ND	0.5	ug/L	ND				30	
Surrogate: 4-Bromofluorobenzene	*93.0*		*ug/L*		*116*	*50-140*			
Surrogate: Dibromofluoromethane	*96.7*		*ug/L*		*121*	*50-140*			
Surrogate: Toluene-d8	*70.4*		*ug/L*		*88.0*	*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)	2020	25	ug/L		101	68-117			
F2 PHCs (C10-C16)	1680	100	ug/L		93.3	60-140			
F3 PHCs (C16-C34)	4220	100	ug/L		113	60-140			
F4 PHCs (C34-C50)	2860	100	ug/L		115	60-140			
PCBs									
PCBs, total	0.950	0.05	ug/L		95.0	60-140			
Surrogate: Decachlorobiphenyl	*0.504*		*ug/L*		*101*	*60-140*			
Semi-Volatiles									
Acenaphthene	6.09	0.05	ug/L		122	50-140			
Acenaphthylene	5.43	0.05	ug/L		109	50-140			
Anthracene	3.16	0.01	ug/L		63.2	50-140			
Benzo [a] anthracene	4.24	0.01	ug/L		84.8	50-140			
Benzo [a] pyrene	3.66	0.01	ug/L		73.2	50-140			
Benzo [b] fluoranthene	6.30	0.05	ug/L		126	50-140			
Benzo [g,h,i] perylene	4.64	0.05	ug/L		92.8	50-140			
Benzo [k] fluoranthene	6.39	0.05	ug/L		128	50-140			
Chrysene	5.33	0.05	ug/L		107	50-140			
Dibenzo [a,h] anthracene	4.95	0.05	ug/L		98.9	50-140			
Fluoranthene	5.36	0.01	ug/L		107	50-140			
Fluorene	5.34	0.05	ug/L		107	50-140			
Indeno [1,2,3-cd] pyrene	4.94	0.05	ug/L		98.9	50-140			
1-Methylnaphthalene	4.20	0.05	ug/L		84.1	50-140			
2-Methylnaphthalene	4.72	0.05	ug/L		94.5	50-140			
Naphthalene	5.29	0.05	ug/L		106	50-140			
Phenanthrene	5.11	0.05	ug/L		102	50-140			
Pyrene	5.44	0.01	ug/L		109	50-140			
Volatiles									
Acetone	73.7	5.0	ug/L		73.7	50-140			
Benzene	43.6	0.5	ug/L		109	60-130			
Bromodichloromethane	34.2	0.5	ug/L		85.5	60-130			
Bromoform	24.0	0.5	ug/L		60.0	60-130			
Bromomethane	23.9	0.5	ug/L		59.7	50-140			
Carbon Tetrachloride	32.7	0.2	ug/L		81.7	60-130			
Chlorobenzene	33.2	0.5	ug/L		83.1	60-130			
Chloroform	43.0	0.5	ug/L		107	60-130			
Dibromochloromethane	25.0	0.5	ug/L		62.5	60-130			
Dichlorodifluoromethane	36.0	1.0	ug/L		90.0	50-140			
1,2-Dichlorobenzene	36.1	0.5	ug/L		90.4	60-130			
1,3-Dichlorobenzene	34.0	0.5	ug/L		85.1	60-130			
1,4-Dichlorobenzene	35.7	0.5	ug/L		89.2	60-130			
1,1-Dichloroethane	41.0	0.5	ug/L		102	60-130			
1,2-Dichloroethane	42.9	0.5	ug/L		107	60-130			
1,1-Dichloroethylene	45.3	0.5	ug/L		113	60-130			
cis-1,2-Dichloroethylene	42.4	0.5	ug/L		106	60-130			
trans-1,2-Dichloroethylene	44.2	0.5	ug/L		111	60-130			
1,2-Dichloropropane	37.1	0.5	ug/L		92.8	60-130			
cis-1,3-Dichloropropylene	30.7	0.5	ug/L		76.7	60-130			
trans-1,3-Dichloropropylene	28.5	0.5	ug/L		71.2	60-130			
Ethylbenzene	31.1	0.5	ug/L		77.7	60-130			
Ethylene dibromide (dibromoethane	30.7	0.2	ug/L		76.8	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hexane	29.9	1.0	ug/L		74.6	60-130			
Methyl Ethyl Ketone (2-Butanone)	92.2	5.0	ug/L		92.2	50-140			
Methyl Isobutyl Ketone	64.6	5.0	ug/L		64.6	50-140			
Methyl tert-butyl ether	79.3	2.0	ug/L		79.3	50-140			
Methylene Chloride	41.0	5.0	ug/L		102	60-130			
Styrene	29.5	0.5	ug/L		73.7	60-130			
1,1,1,2-Tetrachloroethane	26.2	0.5	ug/L		65.4	60-130			
1,1,2,2-Tetrachloroethane	26.4	0.5	ug/L		65.9	60-130			
Tetrachloroethylene	31.0	0.5	ug/L		77.5	60-130			
Toluene	29.7	0.5	ug/L		74.2	60-130			
1,1,1-Trichloroethane	34.1	0.5	ug/L		85.2	60-130			
1,1,2-Trichloroethane	38.2	0.5	ug/L		95.6	60-130			
Trichloroethylene	41.0	0.5	ug/L		103	60-130			
Trichlorofluoromethane	37.7	1.0	ug/L		94.2	60-130			
Vinyl chloride	23.1	0.5	ug/L		57.8	50-140			
m,p-Xylenes	65.4	0.5	ug/L		81.7	60-130			
o-Xylene	30.3	0.5	ug/L		75.7	60-130			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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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Paracel ID: 1746023

Chain of Custody
(Lab Use Only)
№ 114223

Page 1 of 1

Client Name: Paterson Group	Project Reference: PE4122	**Turnaround Time:**	
Contact Name: ADRIAN MENYHART	Quote #	☐ 1 Day	☐ 3 Day
Address: 154 COLONNADE RD S	PO # 23092	☐ 2 Day	☑ Regular
Telephone: 613-226-7381	Email Address: amenyhart@patersongroup.ca	Date Required:	

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

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

Required Analyses

Paracel Order Number: 1746023

	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)	PCB
1	BH1-GW1	GW		1	Nov 9 '17	10			✓					
2	BH2-GW1 ✓	✓		5 ~~7~~	✓	1030	✓	✓	✓					✓
3	DUP1	✓		2	✓	1030		✓						
4														
5														
6														
7														
8														
9														
10														

Comments:

Method of Delivery: Paracel

Relinquished By (Sign):	Received by Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): ADRIAN	Date/Time: 10/11/17 3 00 pm	Date/Time: NOV 10 2017 04:35	Date/Time: 11/13/17 10:21
Date/Time: Nov 10 2017	Temperature: °C	Temperature: 16.1 °C	pH Verified [ ] By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Adrian Menyhart

Client PO: 33013
Project: PE5236
Custody: 131550

Report Date: 21-Apr-2021
Order Date: 14-Apr-2021

Order #: 2116455

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

Paracel ID	Client ID
2116455-01	BH1-GW2
2116455-02	BH2-GW2
2116455-03	BH3-GW2
2116455-04	Dup-1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 33013

Report Date: 21-Apr-2021

Order Date: 14-Apr-2021

Project Description: PE5236

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PCBs, total	EPA 608 - GC-ECD	16-Apr-21	16-Apr-21
PHC F1	CWS Tier 1 - P&T GC-FID	16-Apr-21	18-Apr-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	20-Apr-21	21-Apr-21
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	16-Apr-21	16-Apr-21
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	16-Apr-21	18-Apr-21

Certificate of Analysis

Report Date: 21-Apr-2021

Client: Paterson Group Consulting Engineers

Order Date: 14-Apr-2021

Client PO: 33013

Project Description: PE5236

	Client ID:	BH1-GW2	BH2-GW2	BH3-GW2	Dup-1
	Sample Date:	14-Apr-21 09:00	14-Apr-21 09:00	14-Apr-21 09:00	14-Apr-21 09:00
	Sample ID:	2116455-01	2116455-02	2116455-03	2116455-04
	MDL/Units	Water	Water	Water	Water
Volatiles					
Acetone	5.0 ug/L	-	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	-	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	-	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	-	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	-	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	-	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	-	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	-	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	-	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	-	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	-	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	-	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	-	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	-	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	-	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	-	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	-	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	-	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	-	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	-	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	-	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	-	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	-	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	-	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	-	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	-	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	-	<0.5	<0.5	<0.5

Certificate of Analysis

Report Date: 21-Apr-2021

Client: Paterson Group Consulting Engineers

Order Date: 14-Apr-2021

Client PO: 33013

Project Description: PE5236

	Client ID:	BH1-GW2	BH2-GW2	BH3-GW2	Dup-1
	Sample Date:	14-Apr-21 09:00	14-Apr-21 09:00	14-Apr-21 09:00	14-Apr-21 09:00
	Sample ID:	2116455-01	2116455-02	2116455-03	2116455-04
	MDL/Units	Water	Water	Water	Water
1,1,2-Trichloroethane	0.5 ug/L	-	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	-	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	-	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	-	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	-	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	-	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	-	<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	-	109%	109%	98.8%
Dibromofluoromethane	Surrogate	-	91.2%	91.9%	91.3%
Toluene-d8	Surrogate	-	108%	108%	93.8%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	-	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	-	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	-	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	-	<100	-	-
Semi-Volatiles					
Acenaphthene	0.05 ug/L	<0.05	<0.05	-	-
Acenaphthylene	0.05 ug/L	<0.05	<0.05	-	-
Anthracene	0.01 ug/L	<0.01	<0.01	-	-
Benzo [a] anthracene	0.01 ug/L	<0.01	<0.01	-	-
Benzo [a] pyrene	0.01 ug/L	<0.01	<0.01	-	-
Benzo [b] fluoranthene	0.05 ug/L	<0.05	<0.05	-	-
Benzo [g,h,i] perylene	0.05 ug/L	<0.05	<0.05	-	-
Benzo [k] fluoranthene	0.05 ug/L	<0.05	<0.05	-	-
Chrysene	0.05 ug/L	<0.05	<0.05	-	-
Dibenzo [a,h] anthracene	0.05 ug/L	<0.05	<0.05	-	-
Fluoranthene	0.01 ug/L	<0.01	<0.01	-	-
Fluorene	0.05 ug/L	<0.05	<0.05	-	-
Indeno [1,2,3-cd] pyrene	0.05 ug/L	<0.05	<0.05	-	-
1-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	-
2-Methylnaphthalene	0.05 ug/L	<0.05	<0.05	-	-
Methylnaphthalene (1&2)	0.10 ug/L	<0.10	<0.10	-	-
Naphthalene	0.05 ug/L	<0.05	<0.05	-	-
Phenanthrene	0.05 ug/L	<0.05	<0.05	-	-
Pyrene	0.01 ug/L	<0.01	<0.01	-	-
2-Fluorobiphenyl	Surrogate	119%	119%	-	-
Terphenyl-d14	Surrogate	119%	120%	-	-

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 33013

Report Date: 21-Apr-2021

Order Date: 14-Apr-2021

Project Description: PE5236

	Client ID:	BH1-GW2	BH2-GW2	BH3-GW2	Dup-1
	Sample Date:	14-Apr-21 09:00	14-Apr-21 09:00	14-Apr-21 09:00	14-Apr-21 09:00
	Sample ID:	2116455-01	2116455-02	2116455-03	2116455-04
	MDL/Units	Water	Water	Water	Water
PCBs					
PCBs, total	0.05 ug/L	<0.05	<0.05	-	-
Decachlorobiphenyl	Surrogate	100%	102%	-	-

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						
PCBs									
PCBs, total	ND	0.05	ug/L						
Surrogate: Decachlorobiphenyl	*0.434*		*ug/L*		*86.9*	*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						
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	*95.7*		*ug/L*		*120*	*50-140*			
Surrogate: Dibromofluoromethane	*78.9*		*ug/L*		*98.6*	*50-140*			
Surrogate: Toluene-d8	*98.9*		*ug/L*		*124*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
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	*109*		*ug/L*		*136*	*50-140*			
Surrogate: Dibromofluoromethane	*80.4*		*ug/L*		*101*	*50-140*			
Surrogate: Toluene-d8	*101*		*ug/L*		*127*	*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)	2010	25	ug/L	ND	101	68-117			
F2 PHCs (C10-C16)	1280	100	ug/L	ND	80.0	60-140			
F3 PHCs (C16-C34)	3520	100	ug/L	ND	89.8	60-140			
F4 PHCs (C34-C50)	2290	100	ug/L	ND	92.5	60-140			
PCBs									
PCBs, total	0.948	0.05	ug/L	ND	94.8	60-140			
Surrogate: Decachlorobiphenyl	*0.485*		*ug/L*		*97.0*	*60-140*			
Volatiles									
Acetone	96.8	5.0	ug/L	ND	96.8	50-140			
Benzene	42.4	0.5	ug/L	ND	106	60-130			
Bromodichloromethane	41.0	0.5	ug/L	ND	102	60-130			
Bromoform	42.5	0.5	ug/L	ND	106	60-130			
Bromomethane	39.9	0.5	ug/L	ND	99.8	50-140			
Carbon Tetrachloride	33.3	0.2	ug/L	ND	83.4	60-130			
Chlorobenzene	45.0	0.5	ug/L	ND	113	60-130			
Chloroform	41.7	0.5	ug/L	ND	104	60-130			
Dibromochloromethane	44.8	0.5	ug/L	ND	112	60-130			
Dichlorodifluoromethane	39.7	1.0	ug/L	ND	99.3	50-140			
1,2-Dichlorobenzene	42.7	0.5	ug/L	ND	107	60-130			
1,3-Dichlorobenzene	44.1	0.5	ug/L	ND	110	60-130			
1,4-Dichlorobenzene	44.4	0.5	ug/L	ND	111	60-130			
1,1-Dichloroethane	44.6	0.5	ug/L	ND	112	60-130			
1,2-Dichloroethane	43.7	0.5	ug/L	ND	109	60-130			
1,1-Dichloroethylene	40.6	0.5	ug/L	ND	102	60-130			
cis-1,2-Dichloroethylene	39.7	0.5	ug/L	ND	99.3	60-130			
trans-1,2-Dichloroethylene	40.7	0.5	ug/L	ND	102	60-130			
1,2-Dichloropropane	43.0	0.5	ug/L	ND	108	60-130			
cis-1,3-Dichloropropylene	37.8	0.5	ug/L	ND	94.6	60-130			
trans-1,3-Dichloropropylene	32.3	0.5	ug/L	ND	80.8	60-130			
Ethylbenzene	40.2	0.5	ug/L	ND	100	60-130			
Ethylene dibromide (dibromoethane, 1,2-	44.5	0.2	ug/L	ND	111	60-130			
Hexane	43.7	1.0	ug/L	ND	109	60-130			
Methyl Ethyl Ketone (2-Butanone)	83.5	5.0	ug/L	ND	83.5	50-140			
Methyl Isobutyl Ketone	92.4	5.0	ug/L	ND	92.4	50-140			
Methyl tert-butyl ether	99.9	2.0	ug/L	ND	99.9	50-140			
Methylene Chloride	41.7	5.0	ug/L	ND	104	60-130			
Styrene	41.0	0.5	ug/L	ND	103	60-130			
1,1,1,2-Tetrachloroethane	45.7	0.5	ug/L	ND	114	60-130			
1,1,2,2-Tetrachloroethane	40.1	0.5	ug/L	ND	100	60-130			
Tetrachloroethylene	42.4	0.5	ug/L	ND	106	60-130			
Toluene	43.9	0.5	ug/L	ND	110	60-130			
1,1,1-Trichloroethane	39.8	0.5	ug/L	ND	99.6	60-130			
1,1,2-Trichloroethane	37.6	0.5	ug/L	ND	94.1	60-130			
Trichloroethylene	42.1	0.5	ug/L	ND	105	60-130			
Trichlorofluoromethane	40.6	1.0	ug/L	ND	102	60-130			
Vinyl chloride	39.4	0.5	ug/L	ND	98.6	50-140			
m,p-Xylenes	91.6	0.5	ug/L	ND	114	60-130			
o-Xylene	45.1	0.5	ug/L	ND	113	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: 4-Bromofluorobenzene	*76.8*		*ug/L*		*96.0*	*50-140*			
Surrogate: Dibromofluoromethane	*77.7*		*ug/L*		*97.1*	*50-140*			
Surrogate: Toluene-d8	*87.2*		*ug/L*		*109*	*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: 2116455

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2116455 - water 2116460 - Soil	№ 131550

Paterson

Client Name: ~~Paracel Laboratories~~	Project Ref: PE5236	Page 1 of 1
Contact Name: Adrian Menghart, Nick Sullivan	Quote #:	Turnaround Time
Address: amenghart@patersongroup.ca nsullivan@patersongroup.ca 154 Colonnade Rd South	PO #: 33013	☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone:	E-mail: amenghart@patersongroup.ca sbembe@patersongroup.ca	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)	PCBs
1	BH1-GW2	GW		2	April 14/21				✓					✓
2	BH2-GW2			5			✓	✓	✓					✓
3	BH3-GW2			2				✓						
4	DUP-1			2				✓						
5	G1	S		1										✓
6														
7														
8														
9														
10														

Comments:

Method of Delivery: Drop Box

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Samuel Bérubé	Date/Time:	Date/Time: April 14, 2021 17:00	Date/Time: Apr 15/21 1:42p
Date/Time:	Temperature: °C	Temperature: 10.1 °C	pH Verified: ☐ By: N/A