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Phase II – Environmental Site Assessment

249 & 255 Richmond Road
and 372 Tweedsmuir Avenue
Ottawa, Ontario

Prepared For

2828727 Ontario Inc.

October 4, 2021

Report: PE5365-2

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the properties addressed 249 & 255 Richmond Road and 372 Tweedsmuir Avenue, 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 August 6, 2021, and consisted of drilling three boreholes (BH1-21–BH3-21) throughout the subject site. BH1-21 was advanced to a depth of 7.70 m below the existing ground surface and terminated within the bedrock. Upon completion, this borehole was equipped with a groundwater monitoring well. BH2-21 and BH3-21 were advanced to a depth of 2.23 m and terminated within the overburden on practical refusal to augering on inferred bedrock. Several groundwater monitoring wells (MW17-1–MW17-7), installed in 2017 as part of a previous subsurface investigation completed by EXP Services Inc., were located and utilized as part of this current investigation.

In general, the subsurface soil profile encountered at the borehole locations consists of a thin layer of asphaltic concrete over top of brown silty sand with crushed stone (engineered fill), followed by brown silty sand and/or silty clay fill material, underlain by native brown silty sand with gravel, cobbles, and boulders (glacial till).

Five soil samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), metals, EC, SAR, and pH parameters. Based on the analytical test results, all detected parameter concentrations are in compliance with the MECP Table 3 residential soil standards. Based on the analytical test results obtained from the previous 2017 Phase II ESA the concentration of PHCs F_1 in the soil beneath the southern portion of the subject site (MW17-1) is in excess of the MECP Table 3 residential soil standards.

Groundwater samples were recovered from the monitoring wells installed in BH1-21, MW17-2, MW17-3, MW17-4, MW17-6, and MW17-7 and submitted for laboratory analysis of PHCs (F_1-F_4) and/or VOCs. Based on the analytical results, the concentrations of benzene and PHCs (F_1 and/or F_2) detected in the groundwater at MW17-3 and MW17-4, are in excess of the selected MECP Table 3 non-potable groundwater standards.

Recommendations

Soil

Based on the findings of this assessment, PHC impacted soil was identified within the southern portion of the subject site (255 Richmond Road), requiring some remedial work. It is our understanding that the subject site is to be redeveloped for residential purposes in the future.

It is our recommendation that an environmental site remediation program be completed in conjunction with site redevelopment activities. This will require the segregation of clean soil from impacted soils, the latter of which will require disposal at an approved waste disposal facility.

The majority of the soil test data complies with Table 2.1 of the excess soil regulation (Ontario Regulation 406/19) for off-site disposal, with the exception of some EC and SAR levels. It is our opinion that these exceedances are the result of a substance (i.e. road salt) which was used for the purpose of keeping pedestrian and vehicular traffic areas safe under snow and/or ice conditions. According to Section 49.1 of O. Reg. 153/04, the applicable site condition standard is therefore not considered to have been exceeded, due to the application of salt for safety purposes. However, if the soil is to be removed from the subject site during future redevelopment activities, supplemental soil analysis and handling procedures may be required.

Prior to off-site disposal at a licensed landfill, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

It is recommended that Paterson personnel be present on-site during remediation activities to direct the excavation and segregation of impacted soil, as well as to conduct confirmatory sampling as required.

Groundwater

Based on the findings of this assessment, the groundwater beneath the southern portion of the subject site is impacted with benzene and petroleum hydrocarbons (PHCs F_1 and F_2). In order to assess the horizontal and vertical extent of the contaminated groundwater, further investigative work may be required. The delineation and identification of the source of the contamination would also be required to accurately establish potential remediation methodologies and associated costs, as well as to confirm that the impacted groundwater is not migrating off-site.

Regardless of methodology, it is expected that the groundwater would be remediated in conjunction with site redevelopment. The removal of impacted groundwater can be conducted by a licensed pumping contractor during site excavation (a feasible option for smaller volumes), while an on-site treatment system could be used for larger volumes over a longer period of time.

Any on-site treatment system would require discharging to the City of Ottawa sewer system. Prior to any discharging to the municipal system, a Sanitary Sewer Agreement will be required by the City of Ottawa's Sewer Use Program.

Prior to any assessment of potential remediation methodologies, it is recommended that the groundwater be retested in the near future to confirm the results obtained in this assessment.

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), however, we recommend that the wells be maintained for future sampling purposes. 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 2828727 Ontario Inc., Paterson Group (Paterson) conducted a Phase II – Environmental Site Assessment (Phase II ESA) for the properties addressed 249 & 255 Richmond Road and 372 Tweedsmuir Avenue, in the City of Ottawa, Ontario. The purpose of this Phase II ESA 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.

1.1 Site Description

Addresses:	249 Richmond Road, Ottawa, Ontario; 255 Richmond Road, Ottawa, Ontario; 372 Tweedsmuir Avenue, Ottawa, Ontario.
Legal Description:	Part of Lot 31, Concession 1 (Ottawa Front), Formerly the Township of Nepean, in the City of Ottawa, Ontario.
Location:	The subject site is located on the north side of Richmond Road, between Athlone Avenue and Tweedsmuir Avenue, in the City of Ottawa, Ontario. Refer to Figure 1 – Key Plan, appended to this report.
Latitude and Longitude:	45° 23' 38" N, 75° 45' 02" W

Site Description:

Configuration:	Irregular
Site Area:	0.22 hectares (approximate)
Zoning:	TM – Traditional Main Street Zone; R4 – Residential Fourth Density Zone.
Current Use:	The subject site is currently occupied with a restaurant building (249 Richmond Road), a multi-unit commercial retail building (255 Richmond Road), and a residential dwelling (372 Tweedsmuir Avenue).
Services:	The subject site is located within a municipally serviced area.

1.2 Property Ownership

All properties comprising the subject site are currently owned by 2828727 Ontario Inc. Paterson was retained to complete this Phase II ESA by Mr. Patrick Trahan of 2828727 Ontario Inc., whose offices are located at 4019 Carling Avenue, Ottawa, Ontario. Mr. Trahan can be contacted via telephone at 873-353-3584.

1.3 Current and Proposed Future Uses

The subject site is currently occupied with a restaurant building, a multi-unit commercial retail building, and a residential dwelling. 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:

- ❒ 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 restaurant building (249 Richmond Road), a multi-unit commercial retail building (255 Richmond Road), and a residential dwelling (372 Tweedsmuir Avenue). The remainder of the subject site is largely paved with asphaltic concrete, with the exception of some landscaped areas on 372 Tweedsmuir Avenue.

The site topography appears to slope gently downwards to the north, whereas the regional topography appears to slope down to the northwest, in the general direction of the Ottawa River. The subject site is considered to be at grade with respect to the adjacent streets and the neighbouring properties.

Water drainage on the subject site occurs primarily via infiltration within the landscaped areas, as well as via sheet flow towards catch basins located on the adjacent streets.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation for this assessment was conducted on August 6, 2021, and consisted of drilling three boreholes (BH1-21–BH3-21) throughout the subject site. BH1-21 was advanced to a depth of 7.70 m below the existing ground surface and terminated within the bedrock. Upon completion, this borehole was equipped with a groundwater monitoring well. BH2-21 and BH3-21 were advanced to a depth of 2.23 m and terminated within the overburden on practical refusal to augering on inferred bedrock.

Several groundwater monitoring wells (MW17-1–MW17-7), installed in 2017 as part of a previous subsurface investigation completed by EXP Services Inc., were located and utilized as part of this current investigation.

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:

- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4);
- Volatile Organic Compounds (VOCs);
- Metals (including Mercury and Hexavalent Chromium);
- Electrical Conductivity (EC);
- Sodium Adsorption Ratio (SAR).

3.3 Phase I ESA Conceptual Site Model

Geological and Hydrogeological Setting

Based on the available information, the bedrock in the area of the subject site consists of interbedded limestone and dolomite of the Gull River Formation. The surficial geology consists of glacial till plains, with an overburden thickness ranging from approximately 2 m to 3 m.

Groundwater is anticipated to be encountered within the bedrock and flow in a northwesterly direction towards the Ottawa River.

Water Bodies and Areas of Natural and Scientific Interest

No water bodies or areas of natural and scientific interest were identified within the Phase I study area. The nearest named water body with respect to the subject site is the Ottawa River, located approximately 800 m to the northwest.

Existing Buildings and Structures

The subject site is currently occupied with a commercial restaurant building (249 Richmond Road), a multi-unit commercial retail building (255 Richmond Road), and a residential dwelling (372 Tweedsmuir Avenue).

Neighbouring Land Use

The neighbouring lands within the Phase I study area consist of a combination of residential and commercial properties.

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.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.1 of this report, five potentially contaminating activities (PCAs), resulting in areas of potential environmental concern (APECs), were identified as pertaining to the subject site. These APECs include:

- A former on-site auto service garage, located in the western portion of the subject site (255 Richmond Road);
- A former underground fuel storage tank, located in the western portion of the subject site (255 Richmond Road);
- Fill material of unknown quality, located beneath the asphaltic concrete in the southern and eastern portions of the subject site (249 Richmond Road and 255 Richmond Road);
- An existing retail fuel outlet and former auto service garage, located approximately 20 m to the south of the subject site (256 Richmond Road);
- A former auto service garage and retail fuel outlet, located approximately 25 m to the southeast of the subject site (236 Richmond Road);

Other off-site PCAs were identified within the Phase I study area but were deemed not to pose a potential environmental concern to the subject site based on their separation distances, as well as their inferred down-gradient or cross-gradient orientation with respect to anticipated groundwater flow.

Contaminants of Potential Concern

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

- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4);
- Volatile Organic Compounds (VOCs);

- ❒ Metals (including Mercury and Hexavalent Chromium);
- ❒ Electrical Conductivity (EC);
- ❒ Sodium Adsorption Ratio (SAR).

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 the Phase I ESA is considered to be sufficient to conclude that there are PCAs and APECs associated with the subject site.

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

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation for this assessment was conducted on August 6, 2021, and consisted of drilling three boreholes (BH1-21–BH3-21) throughout the subject site. BH1-21 was advanced to a depth of 7.70 m below the existing ground surface and terminated within the bedrock. Upon completion, this borehole was equipped with a groundwater monitoring well. BH2-21 and BH3-21 were advanced to a depth of 2.23 m and terminated within the overburden on practical refusal to augering on inferred bedrock.

Several groundwater monitoring wells (MW17-1–MW17-7), installed in 2017 as part of a previous subsurface investigation completed by EXP Services Inc., were located and utilized as part of this current investigation.

Under the full-time supervision of Paterson personnel, the boreholes were drilled using a low-clearance drill rig provided by George Downing Estate Drilling of Hawkesbury, Ontario. The locations of the boreholes are illustrated on Drawing PE5365-3 – Test Hole Location Plan, appended to this report.

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.

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

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 an RKI Eagle GasTech 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

One groundwater monitoring well was installed on the subject site as part of this Phase II ESA investigation. The monitoring well was constructed using 32 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 well was 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 well was 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
BH1-21	66.76	7.70	4.70 - 7.70	4.12 - 7.70	2.13 - 7.70	Flushmount

4.5 Field Measurement of Water Quality Parameters

Groundwater monitoring and sampling was conducted at BH1-21, MW17-2, MW17-3, and MW17-4 on August 16, 2021, and at MW17-6 and MW17-7 on September 3, 2021. Following their development and stabilization, water quality parameters were measured at each well location using a multi-reader probe, the results of which are summarized below in Table 2.

Table 2
Measurement of Water Quality Parameters

Well ID	Temperature (˚C)	Conductivity (µS)	pH (Units)	Date of Measurement
BH1-21	18.3	328	7.82	August 16, 2021
MW17-2	18.7	1,872	7.46	
MW17-3	15.9	1,122	7.42	
MW17-4	17.6	761	7.51	
MW17-6	18.9	1,399	7.81	September 3, 2021
MW17-7	18.1	1,402	7.78	

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
		BTEX	PHCs (F_1-F_4)	Metals[1]	EC	SAR	pH	
BH1-21-SS4	2.29 m – 2.90 m Glacial Till	X	X				X	To assess for potential impacts resulting from a former on-site auto service garage and a former off-site auto service garage and retail fuel outlet.
BH2-21-SS2	0.76 m – 1.37 m Fill Material			X	X	X	X	To assess for potential impacts resulting from on-site fill material of unknown quality.
BH2-21-SS3	1.52 m – 2.13 m Glacial Till	X	X					To assess for potential impacts resulting from a former on-site auto service garage, a former underground fuel storage tank nest, a former off-site retail fuel outlet and auto service garage, and an existing off-site retail fuel outlet.
BH3-21-SS2	0.76 m – 1.37 m Fill Material			X	X	X		To assess for potential impacts resulting from on-site fill material of unknown quality.
BH3-21-SS3	1.52 m – 2.13 m Glacial Till	X	X					To assess for potential impacts resulting from a former on-site auto service garage and an existing off-site retail fuel outlet.
DUP-1[2]	2.29 m – 2.90 m Glacial Till	X	X					For laboratory QA/QC purposes.

1 – Includes Mercury (Hg^{+}) and Hexavalent Chromium (Cr^{6+})
2 – Duplicate sample of BH1-21-SS4

Table 4
Testing Parameters for Submitted Groundwater Samples

Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed			Rationale
		VOCs	BTEX	PHCs (F_1-F_4)	
BH1-21-GW1	4.70 m – 7.70 m Bedrock	X		X	To assess for potential impacts resulting from a former on-site auto service garage and a former off-site auto service garage and retail fuel outlet.
MW17-2-GW1	4.60 m – 7.60 m Glacial Till	X			To assess for potential impacts resulting from a former on-site auto service garage and an existing off-site retail fuel outlet.
MW17-3-GW1	6.80 m – 9.80 m Bedrock	X		X	To assess for potential impacts resulting from a former on-site auto service garage, a former underground fuel storage tank nest, a former off-site retail fuel outlet and auto service garage, and an existing off-site retail fuel outlet.
MW17-4-GW1	7.67 m – 10.67 m Bedrock	X		X	To assess for potential impacts resulting from a former on-site auto service garage and an existing off-site retail fuel outlet.
MW17-6-GW1	4.82 m – 7.82 m Bedrock		X	X	To assess for potential impacts resulting from a former on-site auto service garage.
MW17-7-GW1	4.62 m – 7.62 m Bedrock	X		X	To assess for potential impacts resulting from a former on-site auto service garage and a former off-site auto service garage and retail fuel outlet.
DUP-1[1]	4.70 m – 7.70 m Bedrock	X			For laboratory QA/QC purposes.

1 – Duplicate sample of BH1-21-GW1

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 GPS device by Paterson personnel and referenced to a geodetic datum.

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 soil profile encountered at the borehole locations consists of a thin layer of asphaltic concrete over top of brown silty sand with crushed stone (engineered fill material placed as part of the pavement structure), followed by brown silty sand and/or silty clay with trace gravel (fill material), underlain by native brown silty sand with gravel, cobbles, and boulders (glacial till).

The fill material encountered at the borehole locations generally extended to depths ranging from approximately 0.91 m to 1.68 m below the existing ground surface.

Bedrock, consisting of interbedded limestone and dolostone, was encountered in BH1-21 at a depth of approximately 2.92 m below the existing ground surface. Practical refusal to augering on inferred bedrock was encountered in BH2-21 and BH3-21 at a depth of approximately 2.23 m below the existing ground surface.

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 BH1-21, MW17-1, MW17-2, MW17-3, and MW17-4 on August 16, 2021 and at MW17-6 and MW17-7 on September 3, 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 (m ASL)	Date of Measurement
BH1-21	66.76	6.35	60.41	August 16, 2021
MW17-1	67.79	6.72	61.07	
MW17-2	67.62	6.17	61.45	
MW17-3	67.88	7.56	60.32	
MW17-4	67.35	8.42	58.93	
MW17-6	67.27	5.77	61.50	September 3, 2021
MW17-7	66.83	5.42	61.41	

The groundwater at the subject site was encountered within the bedrock at depths ranging from approximately 5.42 m to 8.42 m below the existing ground surface.

No unusual visual observations were identified within the recovered groundwater samples, however, faint petroleum hydrocarbon odours were noted in the groundwater obtained from MW17-3 and MW17-4.

Due to an insufficient volume of groundwater recovered from the monitoring well installed in MW17-7, a return visit to the subject site was conducted on September 10, 2021 to obtain a groundwater sample from this location.

Using the groundwater elevations recorded during the August 16, 2021 sampling event, groundwater contour mapping was completed as part of this assessment. According to the mapped contour data, illustrated on Drawing PE5365-3 – Test Hole Location Plan in the appendix, the groundwater flow on the subject site is interpreted to be in a northerly direction. A horizontal hydraulic gradient of approximately 0.19 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 vapour readings ranging from 0 ppm to 10 ppm, indicating that there is a negligible potential for the presence of petroleum hydrocarbons.

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

Five soil samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), metals, EC, SAR, and pH parameters. The results of the analytical testing are presented below in Tables 6 to 8, as well as on the laboratory certificates of analysis included in Appendix 1.

Table 6
Analytical Test Results – Soil
BTEX & PHCs (F_1-F_4)

Parameter	MDL (µg/g)	Soil Samples (µg/g) August 6, 2021			MECP Table 3 Residential Soil Standards (µg/g)
		BH1-21-SS4	BH2-21-SS3	BH3-21-SS3	
Benzene	0.02	nd	nd	nd	0.21
Ethylbenzene	0.05	nd	nd	nd	2
Toluene	0.05	nd	nd	nd	2.3
Xylenes	0.05	nd	nd	nd	3.1
PHCs F_1	7	nd	nd	nd	55
PHCs F_2	4	nd	nd	nd	98
PHCs F_3	8	nd	154	21	300
PHCs F_4	6	nd	279	22	2,800
PHCs $F_{4\ (gravimetric)}$	50	nt	705	nt	2,800

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

All detected BTEX and PHC concentrations are in compliance with the selected MECP Table 3 residential standards.

Table 7
Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g) August 6, 2021		MECP Table 3 Residential Soil Standards (µg/g)
		BH2-21-SS2	BH3-21-SS2	
Antimony	1.0	nd	2.0	7.5
Arsenic	1.0	3.6	6.1	18
Barium	1.0	94.2	143	390
Beryllium	0.5	nd	nd	4
Boron	5.0	7.8	6.4	120
Cadmium	0.5	nd	nd	1.2
Chromium	5.0	18.9	38.4	160
Chromium (VI)	0.2	nd	nd	8
Cobalt	1.0	6.1	8.5	22
Copper	5.0	17.7	19.4	140
Lead	1.0	29.4	47.8	120
Mercury	0.1	nd	nd	0.27
Molybdenum	1.0	nd	nd	6.9
Nickel	5.0	11.5	20.5	100
Selenium	1.0	nd	nd	2.4
Silver	0.3	nd	nd	20
Thallium	1.0	nd	nd	1
Uranium	1.0	nd	nd	23
Vanadium	10.0	30.3	39.8	86
Zinc	20.0	64.6	103	340

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

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

Table 8
Analytical Test Results – Soil
EC, SAR, & pH

Parameter	MDL	Soil Samples (µg/g)			MECP Table 3 Residential Soil Standards
		August 6, 2021			
		BH1-21-SS4	BH2-21-SS2	BH3-21-SS2	
Electrical Conductivity (EC)	5 µS/cm	nt	**1,060**	**1,740**	700 µS/cm
Sodium Adsorption Ratio (SAR)	0.01	nt	**8.80**	**9.14**	5.00
pH	0.05 units	7.95	7.56	nt	5.00 – 9.00 units

Notes:
- MDL – Method Detection Limit
- nt – not tested for this parameter
- **Bold and Underlined** – value exceeds selected MECP standards

The EC and SAR levels detected in soil/fill samples BH2-21-SS2 and BH3-21-SS2 are in excess of the selected MECP Table 3 residential soil standards.

It is our opinion that these exceedances are the result of a substance (i.e. road salt) which was used for the purpose of keeping pedestrian and vehicular traffic areas safe under snow and/or ice conditions. According to Section 49.1 of O. Reg. 153/04, the applicable site condition standard is therefore not considered to have been exceeded, due to the application of salt for safety purposes. However, if the soil is to be removed from the subject site during future redevelopment activities, supplemental soil analysis and handling procedures may be required.

Table 9
Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
PHCs F_3	154	BH2-21-SS3	1.52 m – 2.13 m
PHCs F_4	279	BH2-21-SS3	1.52 m – 2.13 m
PHCs $F_{4\ (gravimetric)}$	705	BH2-21-SS3	1.52 m – 2.13 m
Antimony	2.0	BH3-21-SS2	0.76 m – 1.37 m
Arsenic	6.1	BH3-21-SS2	0.76 m – 1.37 m
Barium	143	BH3-21-SS2	0.76 m – 1.37 m
Boron	7.8	BH2-21-SS2	0.76 m – 1.37 m
Chromium	38.4	BH3-21-SS2	0.76 m – 1.37 m
Cobalt	8.5	BH3-21-SS2	0.76 m – 1.37 m
Copper	19.4	BH3-21-SS2	0.76 m – 1.37 m
Lead	47.8	BH3-21-SS2	0.76 m – 1.37 m
Nickel	20.5	BH3-21-SS2	0.76 m – 1.37 m
Vanadium	39.8	BH3-21-SS2	0.76 m – 1.37 m
Zinc	103	BH3-21-SS2	0.76 m – 1.37 m
EC	**1,740**	BH3-21-SS2	0.76 m – 1.37 m
SAR	**9.14**	BH3-21-SS2	0.76 m – 1.37 m
pH	7.95	BH1-21-SS4	2.29 m – 2.90 m

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

All other parameter concentrations analyzed were below the laboratory detection limits. The elevated EC and SAR parameters are deemed to be in compliance with the selected MECP Table 3 residential soil standards based on our interpretation of Section 49.1 of O. Reg. 153/04. The laboratory certificates of analysis are provided in Appendix 1.

5.6 Groundwater Quality

Groundwater samples were recovered from the monitoring wells installed in BH1-21, MW17-2, MW17-3, MW17-4, MW17-6, and MW17-7 and submitted for laboratory analysis of PHCs (F_1-F_4) and VOCs. The results of the analytical testing are presented below in Table 10 and 11.

Table 10
Analytical Test Results – Groundwater
PHCs (F_1-F_4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)					MECP Table 3 Non-Potable Groundwater Standards (µg/L)
		August 16, 2021			Sept. 3, 2021	Sept. 10, 2021	
		BH1-21-GW1	MW17-3-GW1	MW17-4-GW1	MW17-6-GW1	MW17-7-GW1	
PHC F_1	25	nd	**3,980**	360	344	nd	750
PHC F_2	100	nd	**494**	**314**	nd	nd	150
PHC F_3	100	nd	188	nd	nd	nd	500
PHC F_4	100	nd	nd	nd	nd	nd	500

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

The concentration of PHCs F_1 and F_2 in sample MW17-3-GW1, as well as the concentration of PHCs F_2 in sample MW17-4-GW1 are in excess of the MECP Table 3 non-potable groundwater standards.

Table 11
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (ug/L)						MECP Table 3 Residential Groundwater Standards (µg/L)
		August 16, 2021				Sept. 3, 2021	Sept. 10, 2021	
		BH1-21-GW1	MW17-2-GW1	MW17-3-GW1	MW17-4-GW1	MW17-6-GW1	MW17-7-GW1	
Acetone	5.0	nd	nd	nd	nd	nt	nd	130,000
Benzene	0.5	nd	nd	**80**	**151**	24.1	nd	44
Bromodichloromethane	0.5	nd	nd	nd	nd	nt	nd	85,000
Bromoform	0.5	nd	nd	nd	nd	nt	nd	380
Bromomethane	0.5	nd	nd	nd	nd	nt	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	nd	nt	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	nd	nt	nd	630
Chloroform	0.5	nd	nd	nd	nd	nt	nd	2.4
Dibromochloromethane	0.5	nd	nd	nd	nd	nt	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	nd	nt	nd	4,400
1,2-Dichlorobenzene	0.5	nd	nd	nd	nd	nt	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	nd	nd	nt	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	nd	nt	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	nd	nt	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	nd	nt	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	nd	nt	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	nt	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	nt	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	nd	nt	nd	16
1,3-Dichloropropene	0.5	nd	nd	nd	nd	nt	nd	5.2
Ethylbenzene	0.5	nd	nd	294	169	320	nd	2,300
Ethylene Dibromide	0.2	nd	nd	nd	nd	nt	nd	0.25
Hexane	1.0	nd	nd	nd	nd	nt	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	nd	nt	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	nd	nt	nd	140,000
Methyl tert-butyl ether	2.0	nd	nd	nd	nd	nt	nd	190
Methylene Chloride	5.0	nd	nd	nd	nd	nt	nd	610
Styrene	0.5	nd	nd	nd	nd	nt	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	nd	nt	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	nd	nt	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	nd	nt	nd	1.6
Toluene	0.5	nd	nd	42.9	21.4	4.8	nd	18,000
1,1,1-Trichloroethane	0.5	nd	nd	nd	nd	nt	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	nd	nt	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	nd	nt	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	nd	nt	nd	2,500
Vinyl Chloride	0.5	nd	nd	nd	nd	nt	nd	0.5
Xylenes	0.5	nd	nd	26.5	45.2	nd	nd	4,200

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

The concentration of benzene in samples MW17-3-GW1 and MW17-4-GW1 is in excess of the MECP Table 3 non-potable groundwater standards.

Table 12
Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Sample ID	Depth Interval (m BGS)
PHC F_1	**3,980**	MW17-3-GW1	6.80 m – 9.80 m
PHC F_2	**494**	MW17-3-GW1	6.80 m – 9.80 m
PHC F_3	188	MW17-3-GW1	6.80 m – 9.80 m
Benzene	**151**	MW17-4-GW1	7.67 m – 10.67 m
Ethylbenzene	320	MW17-6-GW1	4.82 m – 7.82 m
Toluene	42.9	MW17-3-GW1	6.80 m – 9.80 m
Xylenes	26.5	MW17-4-GW1	7.67 m – 10.67 m

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.

5.7 Quality Assurance and Quality Control Results

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.

As per the Sampling and Analysis Plan, a duplicate soil sample was obtained from sample BH1-21-SS4 and submitted for laboratory analysis of BTEX and PHCs (F_1-F_4). The relative percent difference (RPD) calculations for the original and duplicate samples are provided below in Table 13.

Table 13
QA/QC Calculations – Soil

Parameter	MDL (µg/g)	BH1-21-SS4	DUP-1	RPD (%)	QA/QC Result (Target: <20% RPD)
Benzene	0.21	nd	nd	0	Meets Target
Ethylbenzene	2	nd	nd	0	Meets Target
Toluene	2.3	nd	nd	0	Meets Target
Xylenes	3.1	nd	nd	0	Meets Target
PHCs F_1	55	nd	nd	0	Meets Target
PHCs F_2	98	nd	nd	0	Meets Target
PHCs F_3	300	nd	nd	0	Meets Target
PHCs F_4	2,800	nd	nd	0	Meets Target

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

No parameter concentrations were detected in either the original or the duplicate sample, and as such, the results are considered to be acceptable.

Similarly, a duplicate groundwater sample was obtained from sample BH1-21-GW1 and submitted for laboratory analysis of VOC parameters. The relative percent difference (RPD) calculations for the original and duplicate samples are provided below in Table 14.

Table 14
QA/QC Calculations – Groundwater

Parameter	MDL (µg/L)	BH1-21-GW1	DUP-1	RPD (%)	QA/QC Result (Target: <20% RPD)
Acetone	5.0	nd	nd	0	Meets Target
Benzene	0.5	nd	nd	0	Meets Target
Bromodichloromethane	0.5	nd	nd	0	Meets Target
Bromoform	0.5	nd	nd	0	Meets Target
Bromomethane	0.5	nd	nd	0	Meets Target
Carbon Tetrachloride	0.2	nd	nd	0	Meets Target
Chlorobenzene	0.5	nd	nd	0	Meets Target
Chloroform	0.5	nd	nd	0	Meets Target
Dibromochloromethane	0.5	nd	nd	0	Meets Target
Dichlorodifluoromethane	1.0	nd	nd	0	Meets Target
1,2-Dichlorobenzene	0.5	nd	nd	0	Meets Target
1,3-Dichlorobenzene	0.5	nd	nd	0	Meets Target
1,4-Dichlorobenzene	0.5	nd	nd	0	Meets Target
1,1-Dichloroethane	0.5	nd	nd	0	Meets Target
1,2-Dichloroethane	0.5	nd	nd	0	Meets Target
1,1-Dichloroethylene	0.5	nd	nd	0	Meets Target
cis-1,2-Dichloroethylene	0.5	nd	nd	0	Meets Target
trans-1,2-Dichloroethylene	0.5	nd	nd	0	Meets Target
1,2-Dichloropropane	0.5	nd	nd	0	Meets Target
1,3-Dichloropropene	0.5	nd	nd	0	Meets Target
Ethylbenzene	0.5	nd	nd	0	Meets Target
Ethylene Dibromide	0.2	nd	nd	0	Meets Target
Hexane	1.0	nd	nd	0	Meets Target
Methyl Ethyl Ketone	5.0	nd	nd	0	Meets Target
Methyl Isobutyl Ketone	5.0	nd	nd	0	Meets Target
Methyl tert-butyl ether	2.0	nd	nd	0	Meets Target
Methylene Chloride	5.0	nd	nd	0	Meets Target
Styrene	0.5	nd	nd	0	Meets Target
1,1,1,2-Tetrachloroethane	0.5	nd	nd	0	Meets Target
1,1,2,2-Tetrachloroethane	0.5	nd	nd	0	Meets Target
Tetrachloroethylene	0.5	nd	nd	0	Meets Target
Toluene	0.5	nd	nd	0	Meets Target
1,1,1-Trichloroethane	0.5	nd	nd	0	Meets Target
1,1,2-Trichloroethane	0.5	nd	nd	0	Meets Target
Trichloroethylene	0.5	nd	nd	0	Meets Target
Trichlorofluoromethane	1.0	nd	nd	0	Meets Target
Vinyl Chloride	0.5	nd	nd	0	Meets Target
Xylenes	0.5	nd	nd	0	Meets Target

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

No parameter concentrations were detected in either the original or the duplicate sample, and as such, the results are considered to be acceptable.

Based on the results of the QA/QC analysis, 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.

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

As described in Section 7.1 of the Phase I ESA report, as well as Section 2.2 of this report, the following PCAs, as described by Table 2 of O. Reg. 153/04, are considered to result in a APECs on the subject site:

- *Item 28: "Gasoline and Associated Products Storage in Fixed Tanks"*

This PCA was identified as a result of the presence of a former on-site underground fuel storage tank nest in the southern portion of the subject site (255 Richmond Road), a former off-site retail fuel outlet and auto service garage to the southeast (236 Richmond Road), as well as an existing off-site retail fuel outlet and former auto service garage to the south (256 Richmond Road).

- *Item 30: "Importation of Fill Material of Unknown Quality"*

This PCA was identified as a result of the presence of fill material of unknown quality, situated beneath the asphaltic concrete parking lots throughout the southern (255 Richmond Road) and eastern (249 Richmond Road) portions of the subject site.

- *Item 52: "Storage, Maintenance, Fuelling, and Repair of Equipment, Vehicles, and Material Used to Maintain Transportation Systems"*

This PCA was identified as a result of the presence of a former on-site auto service garage, located in the western portion of the subject site (255 Richmond Road).

Contaminants of Potential Concern

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

- Benzene, Ethylbenzene, Toluene, and Xylenes (BTEX);
- Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4);

- Volatile Organic Compounds (VOCs);
- Metals (including Mercury and Hexavalent Chromium);
- Electrical Conductivity (EC);
- Sodium Adsorption Ratio (SAR).

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

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

Physical Setting

Site Stratigraphy

The stratigraphy of the subject site generally consists of:

- Pavement structure; generally consisting of a 0.10 m thick layer of asphaltic concrete laid over top of engineered fill material (brown silty sand with crushed stone) which extends to depths ranging from approximately 0.76 m to 0.91 m below ground surface;
- Fill material; generally consisting of fine brown sand and silt with some asphaltic concrete debris, and extending to depths ranging from approximately 1.52 m to 1.68 m below ground surface.
- Glacial till; generally consisting of dense brown silty sand and gravel with cobbles, boulders, and some clay, and extending to depths ranging from approximately 2.23 m to 2.92 m below ground surface
- Interbedded limestone and dolostone bedrock; encountered at a depth of approximately 2.92 m below ground surface.

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 encountered within the bedrock at depths ranging from approximately 6.17 m to 8.42 m below the existing ground surface. Based on the measured groundwater levels, the groundwater is interpreted to flow in a northerly direction.

Approximate Depth to Bedrock

Bedrock, consisting of interbedded limestone and dolostone, was encountered in BH1-21 at a depth of approximately 2.92 m below the existing ground surface. Practical refusal to augering on inferred bedrock was encountered in BH2-21 and BH3-21 at a depth of approximately 2.23 m below the existing ground surface.

According to the borehole data from the previous 2017 subsurface investigation, the bedrock was encountered in MW17-1–MW17-7 at depths ranging from approximately 2.13 m to 4.72 m below the existing ground surface.

Approximate Depth to Water Table

The depth to the water table is approximately 6.17 m to 8.42 m below the existing ground surface.

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.

Water Bodies and Areas of Natural and Scientific Interest

No water bodies or areas of natural and scientific interest were identified within the Phase I study area. The nearest named water body with respect to the subject site is the Ottawa River, located approximately 800 m to the northwest.

Existing Buildings and Structures

The subject site is currently occupied with a commercial restaurant building (249 Richmond Road), a multi-unit commercial retail building (255 Richmond Road), and a residential dwelling (372 Tweedsmuir Avenue).

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 will be more sensitive than the current use, a record of site condition (RSC) will be required to be filed with the MECP.

Environmental Condition

Areas Where Contaminants are Present

Based on the previous 2017 Phase II ESA, PHC F_1 impacted soil was identified in MW17-1, located in the southern portion of the subject site in the vicinity of the former underground fuel storage tank nest and fuel pump island.

Benzene and PHC F_1 and/or F_2 impacted groundwater was identified in MW17-3 and MW17-4, located in the southern portion of the subject site in the vicinity of the former on-site auto service garage as well as the former underground fuel storage tank nest. It should be noted that BTEX and PHC impacted groundwater was previously identified in MW17-1, MW17-3, MW17-4, and MW17-5 during the 2017 Phase II ESA.

Types of Contaminants

The soil in MW17-1-S5 contains the following contaminants of concern at concentrations exceeding the selected MECP Table 3 residential soil standards:

- *Petroleum Hydrocarbons:*
  - *Fraction 1 (MW17-1*).*

The groundwater in MW17-3 and MW17-4 contains the following contaminants of concern at concentrations exceeding the selected MECP Table 3 non-potable groundwater standards:

- *BTEX:*
  - *Benzene (MW17-1*, MW17-3, MW17-4).*
- *Petroleum Hydrocarbons:*
  - *Fraction 1 (MW17-3, MW17-5*);*
  - *Fraction 2 (MW17-1, MW17-3, MW17-4, MW17-5*).*

***It should be noted that these exceedances were measured during the initial 2017 Phase II ESA.**

Contaminated Media

The soil in the southern portion of the subject site (255 Richmond Road) is contaminated with petroleum hydrocarbons.

The groundwater beneath the southern portion of the subject site (255 Richmond Road) is contaminated with benzene and petroleum hydrocarbons.

What Is Known About Areas Where Contaminants Are Present

The soil in the vicinity of MW17-1 is impacted with petroleum hydrocarbons (fraction 1). This family of contaminants is commonly associated with light fuels such as gasoline and diesel. The contamination at this location was identified within a deeper soil sample, at a depth ranging from approximately 3.81 m to 4.73 m below ground surface. This borehole had been placed in close proximity to the former underground fuel storage tank nest, previously associated with the former on-site fuel pump island, as well as in close proximity to the southern property boundary of the subject site, located approximately 20 m from an existing retail fuel outlet situated across the street. It is suspected that this contamination is the result of a fuel leak from one of these possible sources.

The groundwater within the vicinity of MW17-1, MW17-3, MW17-4, and MW17-5 is impacted with benzene and petroleum hydrocarbons (fractions 1 and/or 2). These families of contaminants are commonly associated with light fuels such as gasoline and diesel. The contamination at these locations was identified in the groundwater situated within the bedrock, at depths ranging from approximately 7.56 m to 8.42 m below ground surface. Borehole MW17-3 had been placed in close proximity to the former underground fuel storage tank nest, previously associated with the former on-site fuel pump island, as well as in close proximity to the southern property boundary of the subject site, located approximately 20 m from an existing retail fuel outlet situated across the street. Borehole MW17-4 had been placed in close proximity to the former on-site auto service garage building and down-gradient of the former underground fuel storage tank nest and fuel pump island. Based on the clean soil results obtained from these two borehole locations, it is suspected that this contamination is the result of a fuel leak from either the former tank nest or the nearby retail fuel outlet.

Distribution and Migration of Contaminants

As previously noted, PHC impacted soil was identified within the southern portion of the subject site. Based on the detection of this contaminant within the groundwater in the nearby monitoring wells (MW17-1, MW17-3, MW17-4, and MW17-5), it is likely that the contamination has migrated into the underlying water table and flowed in a northward direction. It is suspected that this soil contamination is the result of a fuel leak from either the former tank nest, former fuel pump island, or the nearby retail fuel outlet.

Benzene and PHC impacted groundwater was identified within the southern portion of the subject site. Based on the consistency of the contaminants identified in the groundwater across multiple monitoring wells, there likely exists a small plume of groundwater contamination within the southern portion of the subject site. It is suspected that the contamination is the result of a fuel leak from either the former tank nest, former fuel pump island, or the nearby retail fuel outlet.

Discharge of Contaminants

The benzene and/or PHC impacted soil and groundwater identified within the southern portion of the subject site is suspected to have been the result of a fuel leak originating from either the former underground fuel storage tank nest, the former fuel pump island or the nearby retail fuel outlet located across the street to the south.

Climatic and Meteorological Conditions

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

Downward leaching is not considered to have affected contaminant distribution at the subject site, as the site is largely paved. Fluctuations in the groundwater level and groundwater flow are considered to have somewhat affected contaminant distribution based on detection of contaminants in the water table, down-gradient from the former underground fuel storage tank nest.

Potential for Vapour Intrusion

Given the slab-on-grade nature of the commercial buildings, as well as the relatively deep nature of the soil and groundwater contaminants, the potential for vapours to be present within the subject buildings is considered to be low and does not pose a safety hazard to the current occupants.

It should be noted that a sub-slab air sampling program was carried out for the building at 255 Richmond Road as part of the previous 2017 Phase II ESA. Based on the analytical test results, the air quality was deemed to be in compliance with the MECP (2016) Health Based Indoor Air Criteria (Industrial Land Use) as well as the 2016 Sub-Slab Vapour Screening Levels (Industrial Land Use).

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

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the properties addressed 249 & 255 Richmond Road and 372 Tweedsmuir Avenue, 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 August 6, 2021, and consisted of drilling three boreholes (BH1-21–BH3-21) throughout the subject site. BH1-21 was advanced to a depth of 7.70 m below the existing ground surface and terminated within the bedrock. Upon completion, this borehole was equipped with a groundwater monitoring well. BH2-21 and BH3-21 were advanced to a depth of 2.23 m and terminated within the overburden on practical refusal to augering on inferred bedrock. Several groundwater monitoring wells (MW17-1–MW17-7), installed in 2017 as part of a previous subsurface investigation completed by EXP Services Inc., were located and utilized as part of this current investigation.

In general, the subsurface soil profile encountered at the borehole locations consists of a thin layer of asphaltic concrete over top of brown silty sand with crushed stone (engineered fill), followed by brown silty sand and/or silty clay fill material, underlain by native brown silty sand with gravel, cobbles, and boulders (glacial till).

Five soil samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), metals, EC, SAR, and pH parameters. Based on the analytical test results, all detected parameter concentrations are in compliance with the MECP Table 3 residential soil standards. Based on the analytical test results obtained from the previous 2017 Phase II ESA the concentration of PHCs F_1 in the soil beneath the southern portion of the subject site (MW17-1) is in excess of the MECP Table 3 residential soil standards.

Groundwater samples were recovered from the monitoring wells installed in BH1-21, MW17-2, MW17-3, MW17-4, MW17-6, and MW17-7 and submitted for laboratory analysis of PHCs (F_1-F_4) and/or VOCs. Based on the analytical results, the concentrations of benzene and PHCs (F_1 and/or F_2) detected in the groundwater at MW17-3 and MW17-4, are in excess of the selected MECP Table 3 non-potable groundwater standards.

Recommendations

Soil

Based on the findings of this assessment, PHC impacted soil was identified within the southern portion of the subject site (255 Richmond Road), requiring some remedial work. It is our understanding that the subject site is to be redeveloped for residential purposes in the future.

It is our recommendation that an environmental site remediation program be completed in conjunction with site redevelopment activities. This will require the segregation of clean soil from impacted soils, the latter of which will require disposal at an approved waste disposal facility.

The majority of the soil test data complies with Table 2.1 of the excess soil regulation (Ontario Regulation 406/19) for off-site disposal, with the exception of some EC and SAR levels. It is our opinion that these exceedances are the result of a substance (i.e. road salt) which was used for the purpose of keeping pedestrian and vehicular traffic areas safe under snow and/or ice conditions. According to Section 49.1 of O. Reg. 153/04, the applicable site condition standard is therefore not considered to have been exceeded, due to the application of salt for safety purposes. However, if the soil is to be removed from the subject site during future redevelopment activities, supplemental soil analysis and handling procedures may be required.

Prior to off-site disposal at a licensed landfill, a leachate analysis of a representative sample of contaminated soil must be conducted in accordance with Ontario Regulation 347/558.

It is recommended that Paterson personnel be present on-site during remediation activities to direct the excavation and segregation of impacted soil, as well as to conduct confirmatory sampling as required.

Groundwater

Based on the findings of this assessment, the groundwater beneath the southern portion of the subject site is impacted with benzene and petroleum hydrocarbons (PHCs F_1 and F_2). In order to assess the horizontal and vertical extent of the contaminated groundwater, further investigative work may be required. The delineation and identification of the source of the contamination would also be required to accurately establish potential remediation methodologies and associated costs, as well as to confirm that the impacted groundwater is not migrating off-site.

Regardless of methodology, it is expected that the groundwater would be remediated in conjunction with site redevelopment. The removal of impacted groundwater can be conducted by a licensed pumping contractor during site excavation (a feasible option for smaller volumes), while an on-site treatment system could be used for larger volumes over a longer period of time.

Any on-site treatment system would require discharging to the City of Ottawa sewer system. Prior to any discharging to the municipal system, a Sanitary Sewer Agreement will be required by the City of Ottawa's Sewer Use Program.

Prior to any assessment of potential remediation methodologies, it is recommended that the groundwater be retested in the near future to confirm the results obtained in this assessment.

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), however, we recommend that the wells be maintained for future sampling purposes. 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 2828727 Ontario Inc. Permission and notification from 2828727 Ontario Inc. and Paterson Group will be required prior to the release of this report to any other party.

Paterson Group Inc.

Nick Sullivan, B.Sc.

Mark S. D'Arcy, P.Eng., QP$_{ESA}$

Report Distribution:

- 2828727 Ontario Inc.
- Paterson Group Inc.

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE5365-3 – TEST HOLE LOCATION PLAN

DRAWING PE5365-4 – ANALYTICAL TESTING PLAN – SOIL (PHCs)

DRAWING PE5365-4A – CROSS SECTION A-A' – SOIL (PHCs)

DRAWING PE5365-4B – CROSS SECTION B-B' – SOIL (PHCs)

DRAWING PE5365-5 – ANALYTICAL TESTING PLAN – SOIL (BTEX, METALS, EC, SAR, PH)

DRAWING PE5365-5A – CROSS SECTION A-A' – SOIL (BTEX, METALS, EC, SAR, PH)

DRAWING PE5365-5B – CROSS SECTION B-B' – SOIL (BTEX, METALS, EC, SAR, PH)

DRAWING PE5365-6 – ANALYTICAL TESTING PLAN – GROUNDWATER (PHCs)

DRAWING PE5365-6A – CROSS SECTION A-A' – GROUNDWATER (PHCs)

DRAWING PE5365-6B – CROSS SECTION B-B' – GROUNDWATER (PHCs)

DRAWING PE5365-7 – ANALYTICAL TESTING PLAN – GROUNDWATER (VOCs)

DRAWING PE5365-7A – CROSS SECTION A-A' – GROUNDWATER (VOCs)

DRAWING PE5365-7B – CROSS SECTION B-B' – GROUNDWATER (VOCs)

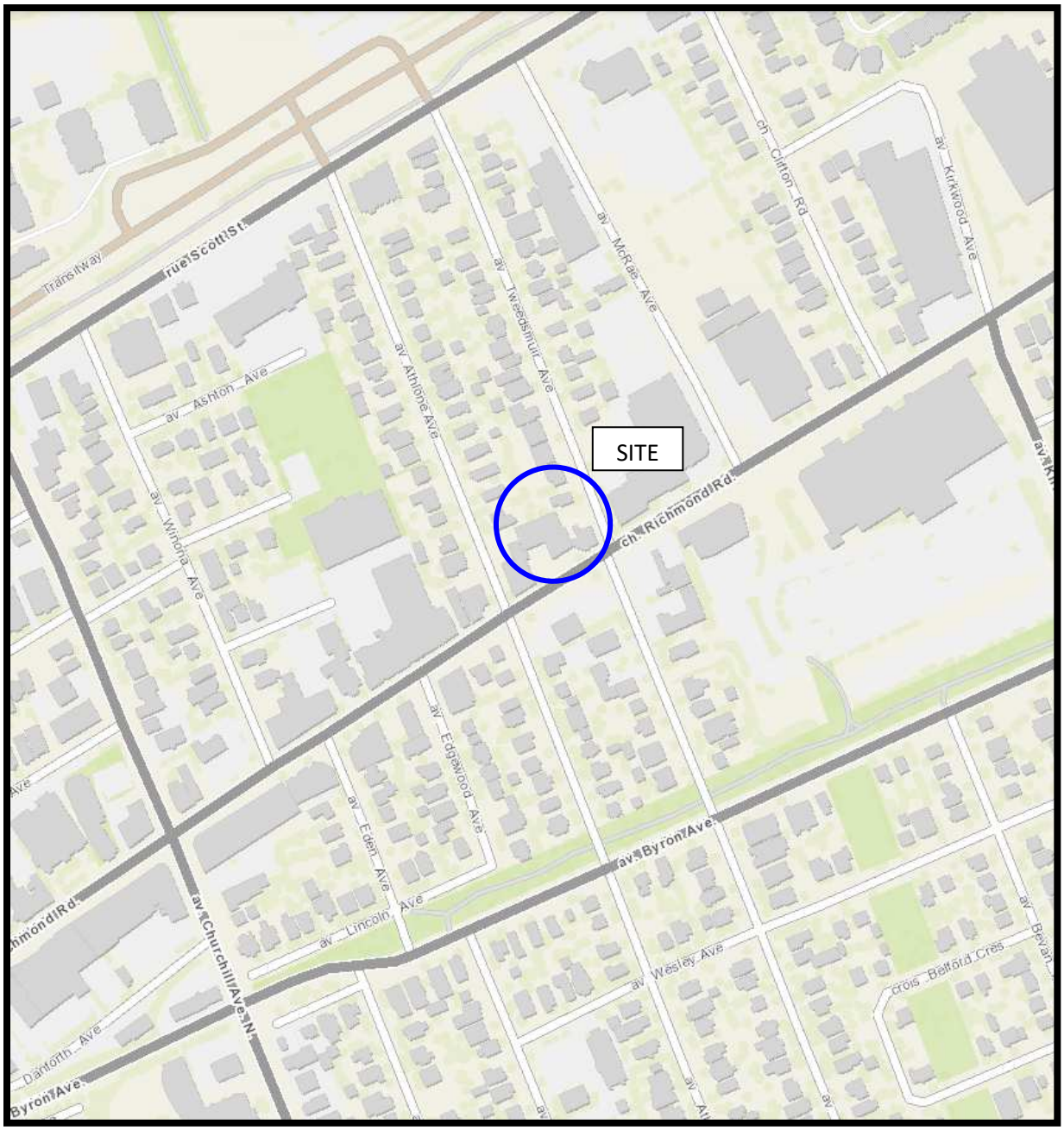
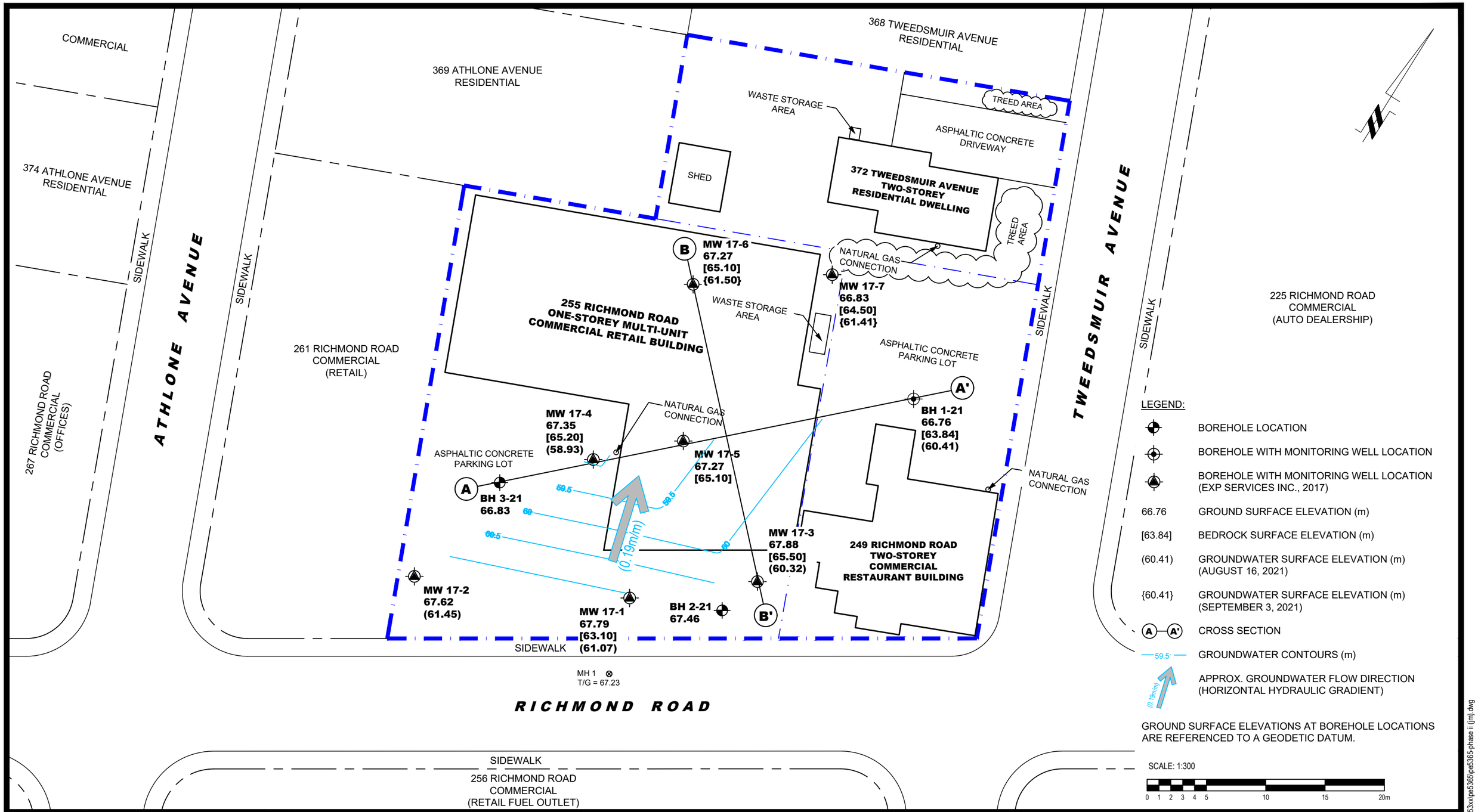


FIGURE 1

KEY PLAN



LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION (EXP SERVICES INC., 2017)
- 66.76 GROUND SURFACE ELEVATION (m)
- [63.84] BEDROCK SURFACE ELEVATION (m)
- (60.41) GROUNDWATER SURFACE ELEVATION (m) (AUGUST 16, 2021)
- {60.41} GROUNDWATER SURFACE ELEVATION (m) (SEPTEMBER 3, 2021)
- A—A' CROSS SECTION
- 59.5 GROUNDWATER CONTOURS (m)
- (0.19m/m) APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

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

SCALE: 1:300

0 1 2 3 4 5 10 15 20m

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NO.	REVISIONS	DATE	INITIAL

2828727 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
249 & 255 RICHMOND ROAD & 372 TWEEDSMUIR AVENUE
OTTAWA, ONTARIO

Title:
TEST HOLE LOCATION PLAN

Scale: 1:300	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-3
Approved by: MSD	Revision No.:

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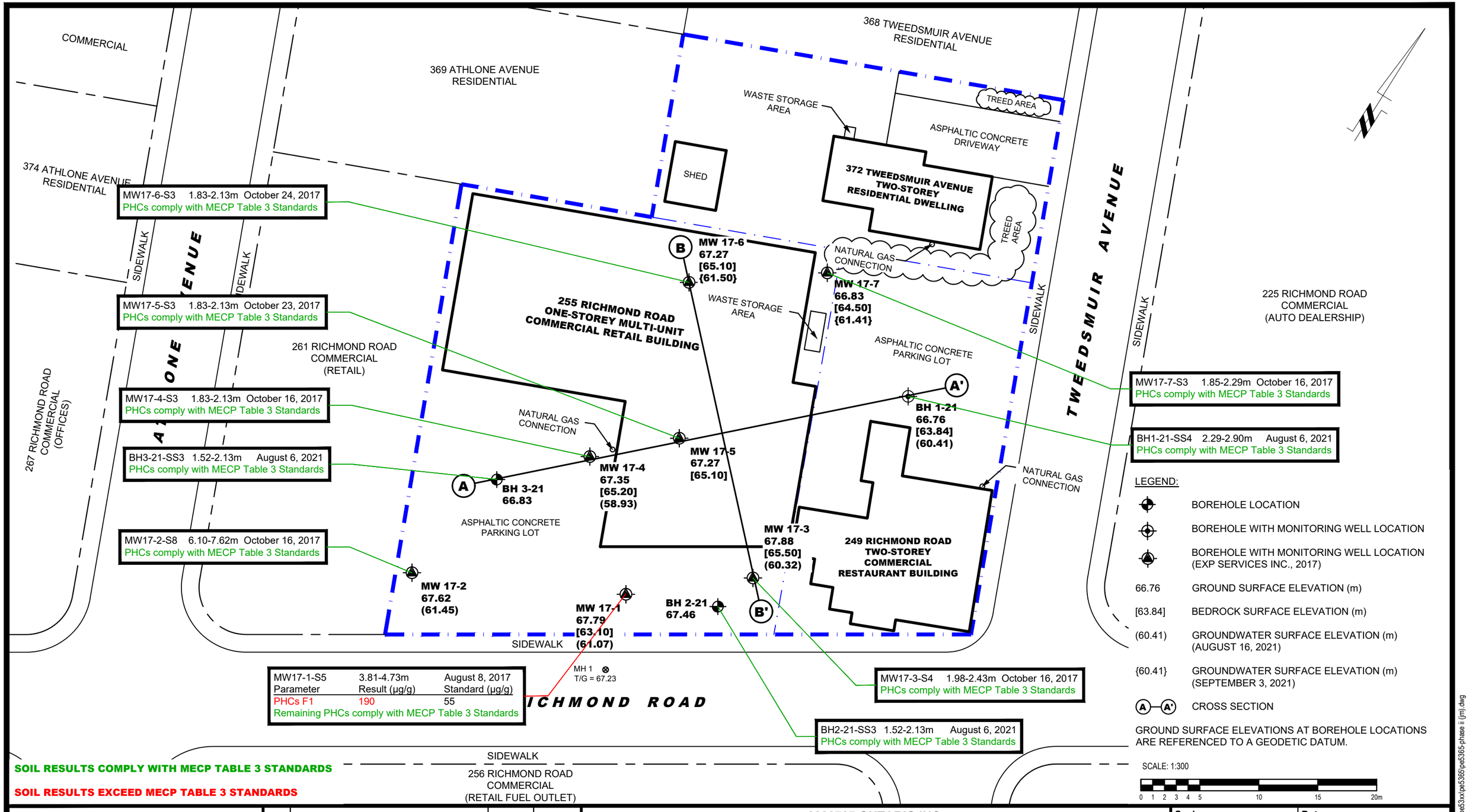
11x17



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NO.	REVISIONS	DATE	INITIAL

2828727 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
249 & 255 RICHMOND ROAD & 372 TWEEDSMUIR AVENUE

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (PHCs)

Scale: 1:300	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-4
Approved by: MSD	Revision No.:

11x17

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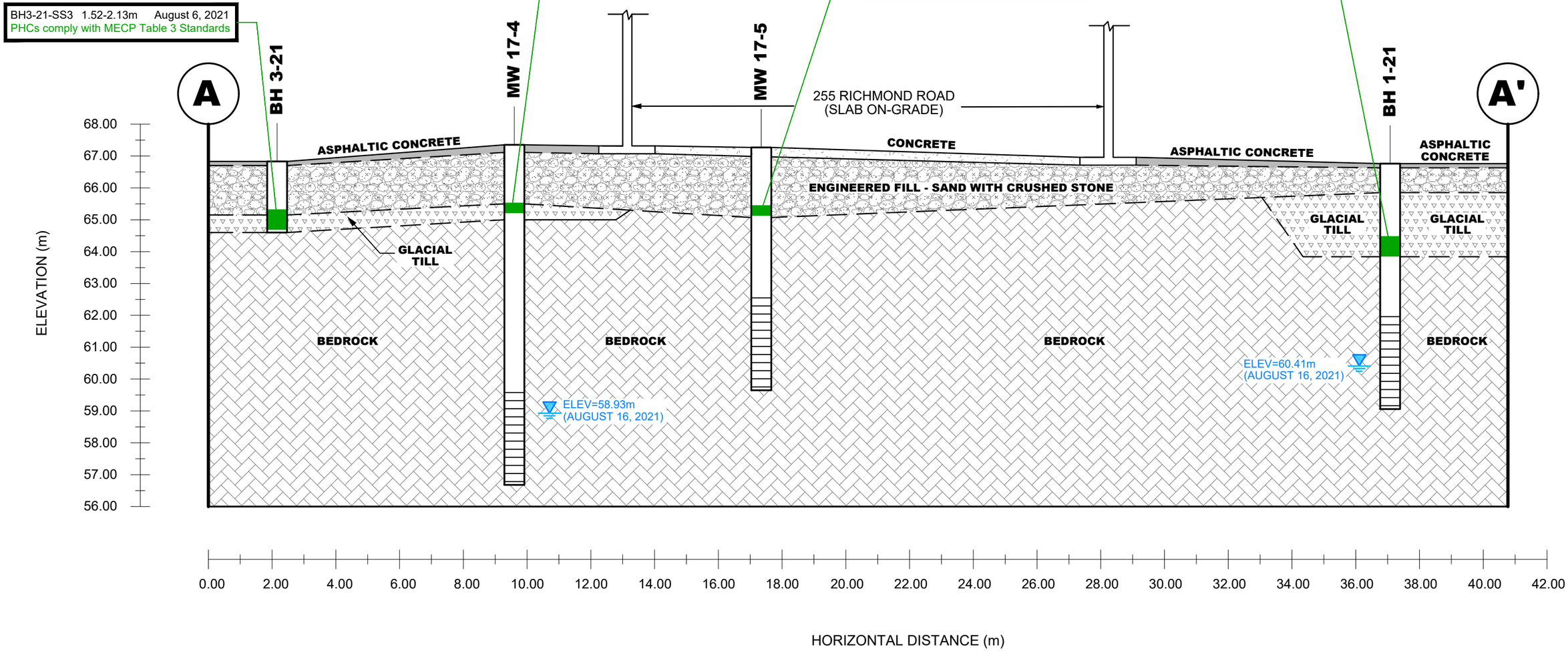
MW17-4-S3 1.83-2.13m October 16, 2017
PHCs comply with MECP Table 3 Standards

BH1-21-SS4 2.29-2.90m August 6, 2021
PHCs comply with MECP Table 3 Standards

MW17-5-S3 1.83-2.13m October 23, 2017
PHCs comply with MECP Table 3 Standards

BH3-21-SS3 1.52-2.13m August 6, 2021
PHCs comply with MECP Table 3 Standards



SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
249 & 255 RICHMOND ROAD & 372 TWEEDSMUIR AVENUE
OTTAWA, ONTARIO

Title:
CROSS SECTION A-A' - SOIL (PHCs)

Scale: AS SHOWN	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-4A
Approved by: MSD	Revision No.:

11x17

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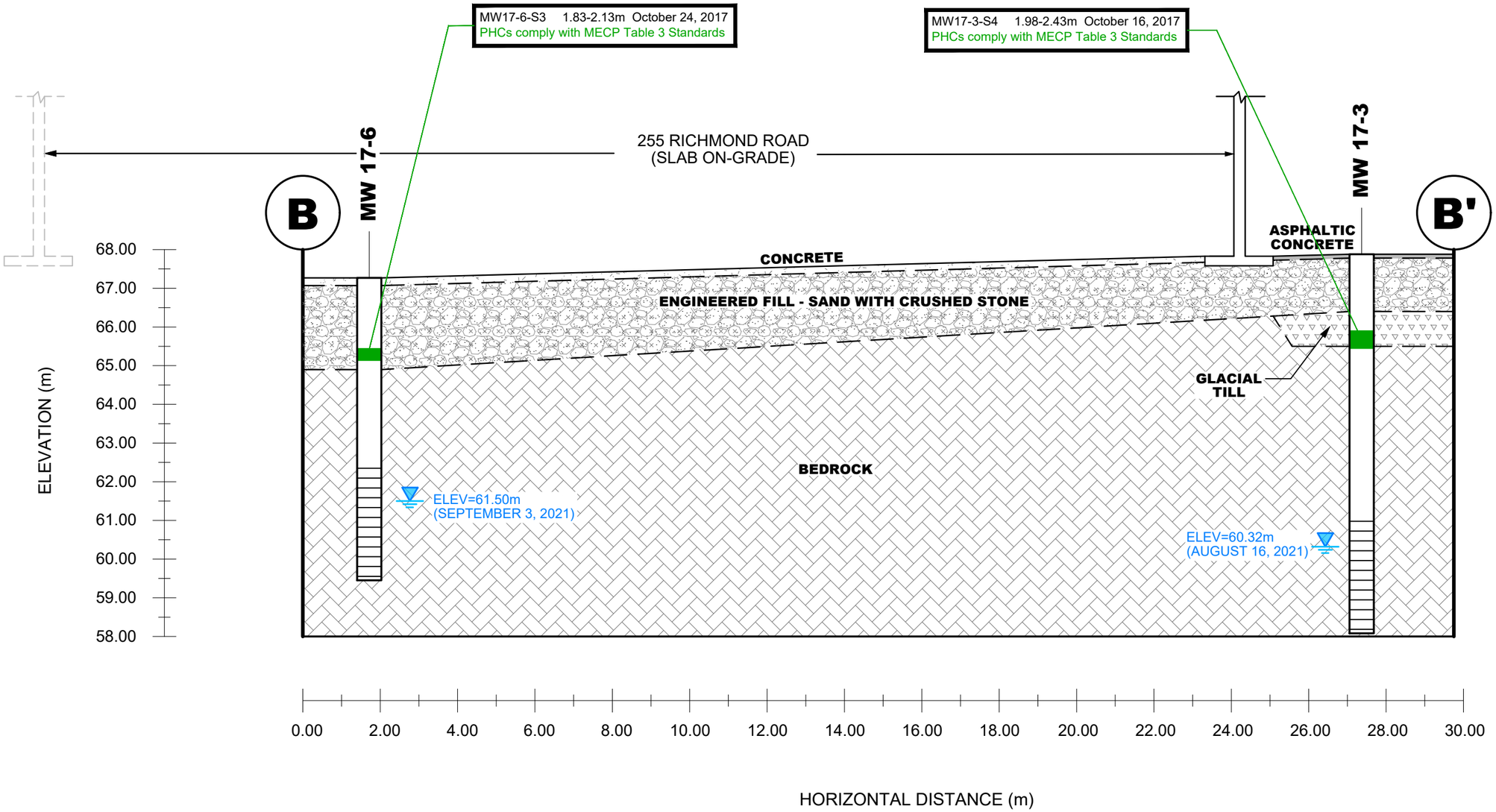

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-4B
Approved by: MSD	Revision No.:

11x17

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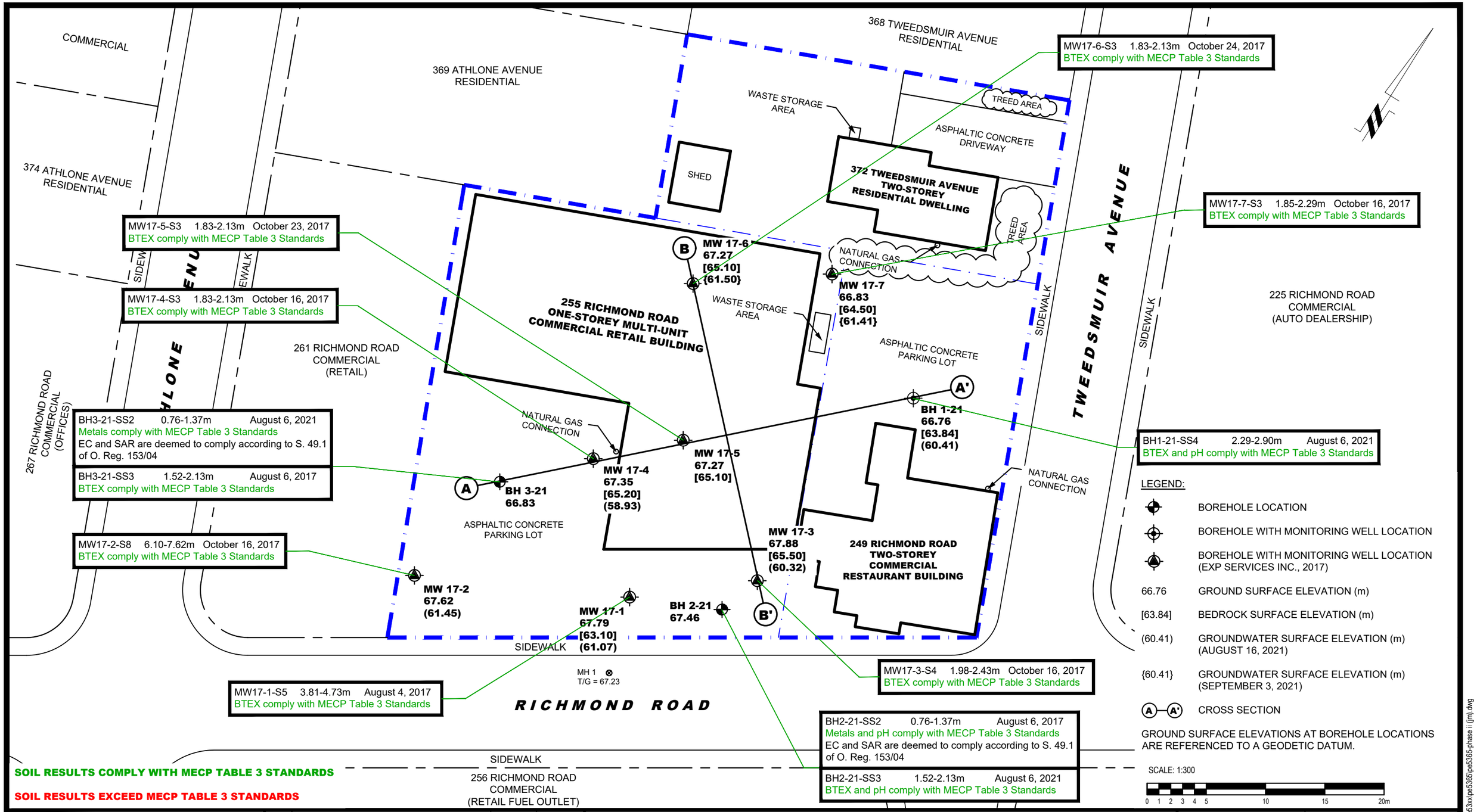

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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2828727 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
249 & 255 RICHMOND ROAD & 372 TWEEDSMUIR AVENUE

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (BTEX, METALS, EC, SAR, pH)

Scale: 1:300	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-5
Approved by: MSD	Revision No.:

11x17

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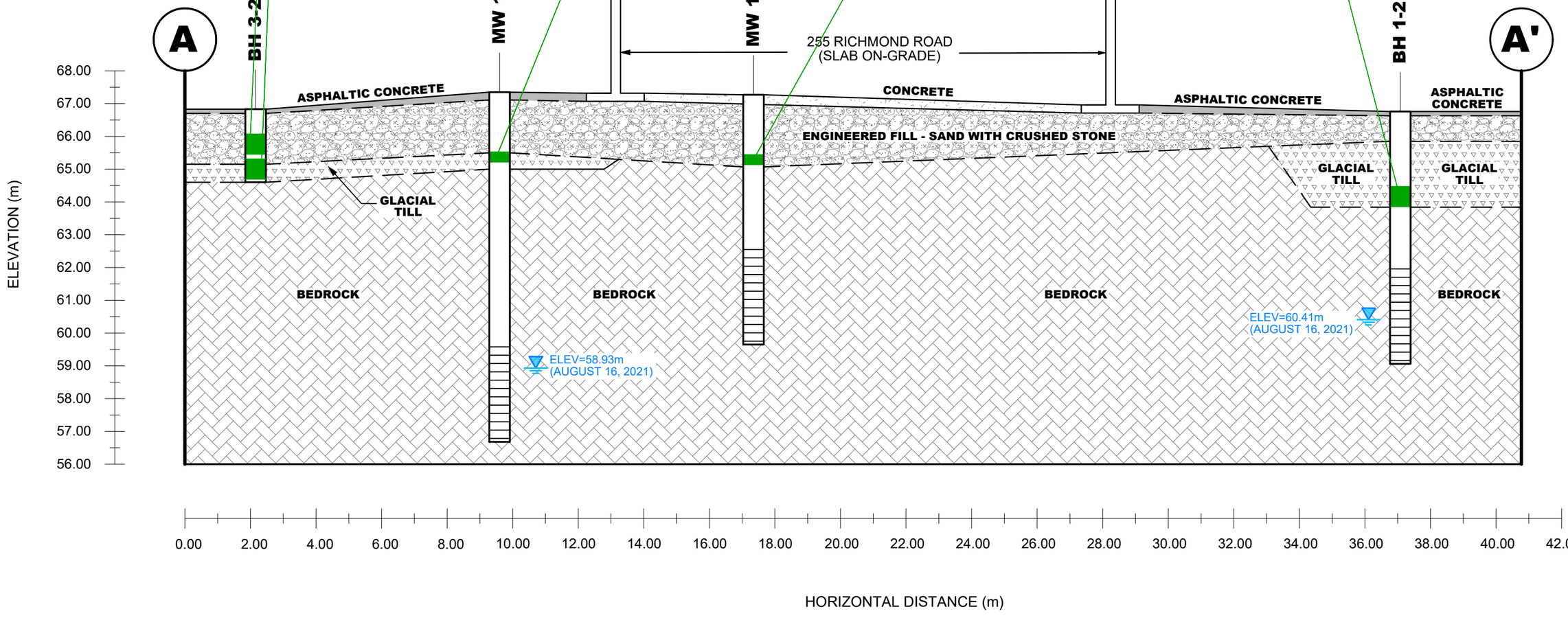
BH3-21-SS2 0.76-1.37m August 6, 2021
Metals comply with MECP Table 3 Standards
EC and SAR are deemed to comply according to S. 49.1 of O. Reg. 153/04

BH3-21-SS3 1.52-2.13m August 6, 2017
BTEX comply with MECP Table 3 Standards

MW17-4-S3 1.83-2.13m October 16, 2017
BTEX comply with MECP Table 3 Standards

MW17-5-S3 1.83-2.13m October 23, 2017
BTEX comply with MECP Table 3 Standards

BH1-21-SS4 2.29-2.90m August 6, 2021
BTEX and pH comply with MECP Table 3 Standards



SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
249 & 255 RICHMOND ROAD & 372 TWEEDSMUIR AVENUE
OTTAWA, ONTARIO

Title:
CROSS SECTION A-A' - SOIL (BTEX, METALS, EC, SAR, pH)

Scale: 1:300	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-5A
Approved by: MSD	Revision No.:

11x17

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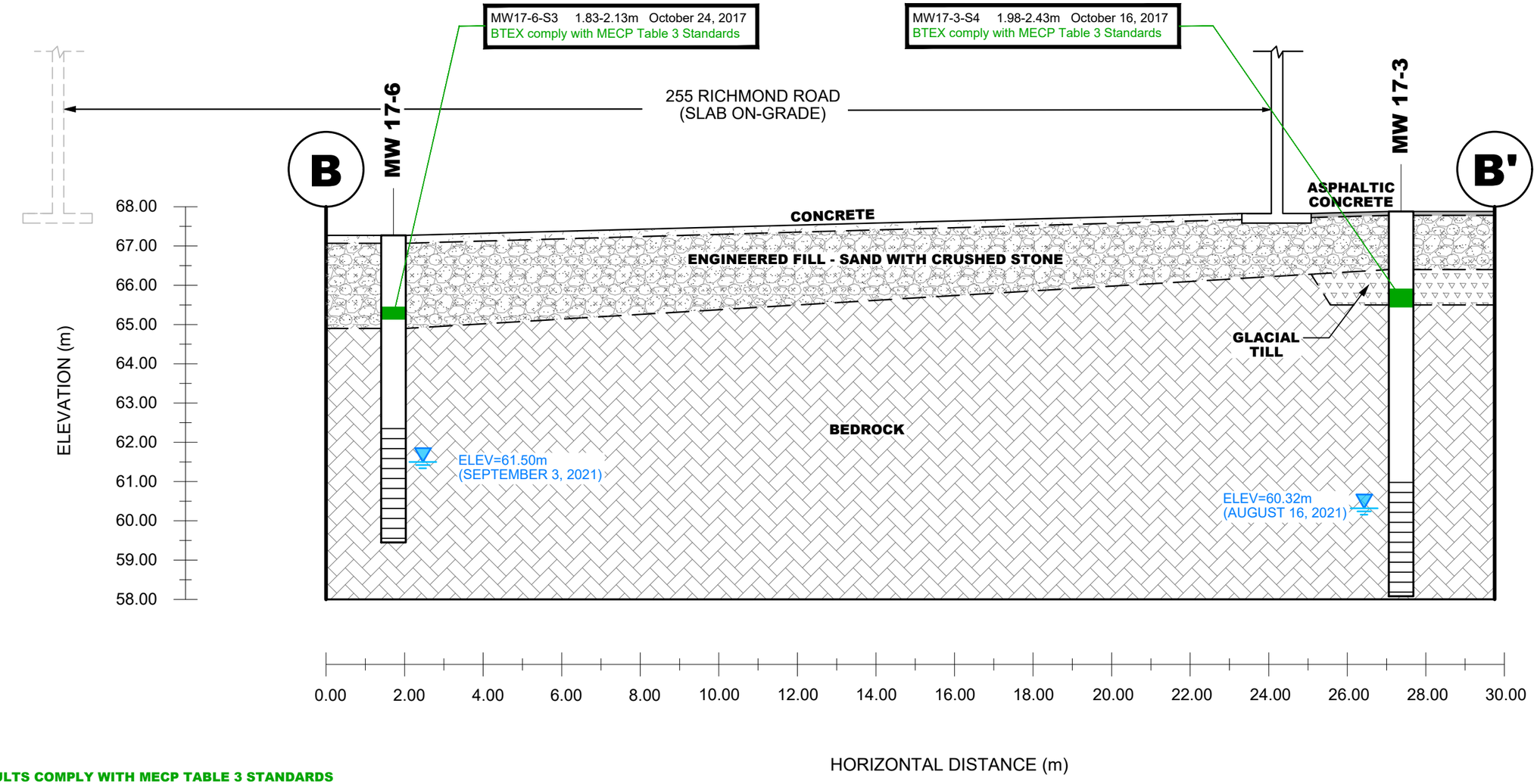

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
249 & 255 RICHMOND ROAD & 372 TWEEDSMUIR AVENUE
OTTAWA, ONTARIO

Title:
CROSS SECTION B-B' - SOIL (BTEX, METALS, EC, SAR, pH)

Scale: 1:300	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-5B
Approved by: MSD	Revision No.:

11x17

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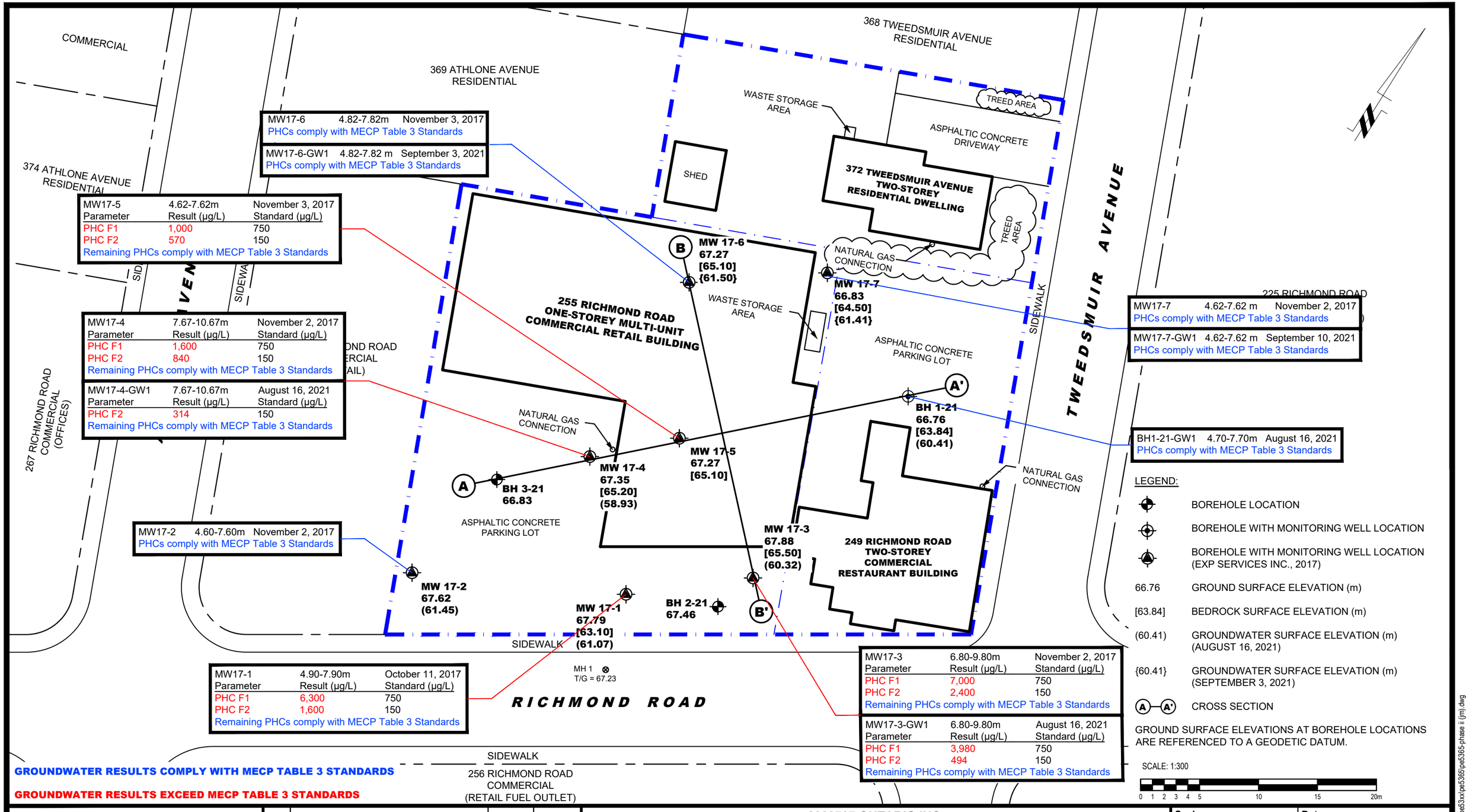

MW17-6	4.82-7.82m	November 3, 2017
PHCs comply with MECP Table 3 Standards		

MW17-6-GW1	4.82-7.82 m	September 3, 2021
PHCs comply with MECP Table 3 Standards		

MW17-5	4.62-7.62m	November 3, 2017
Parameter	Result (µg/L)	Standard (µg/L)
PHC F1	1,000	750
PHC F2	570	150
Remaining PHCs comply with MECP Table 3 Standards		

MW17-4	7.67-10.67m	November 2, 2017
Parameter	Result (µg/L)	Standard (µg/L)
PHC F1	1,600	750
PHC F2	840	150
Remaining PHCs comply with MECP Table 3 Standards		

MW17-4-GW1	7.67-10.67m	August 16, 2021
Parameter	Result (µg/L)	Standard (µg/L)
PHC F2	314	150
Remaining PHCs comply with MECP Table 3 Standards		

MW17-2	4.60-7.60m	November 2, 2017
PHCs comply with MECP Table 3 Standards		

MW17-1	4.90-7.90m	October 11, 2017
Parameter	Result (µg/L)	Standard (µg/L)
PHC F1	6,300	750
PHC F2	1,600	150
Remaining PHCs comply with MECP Table 3 Standards		

MW17-7	4.62-7.62 m	November 2, 2017
PHCs comply with MECP Table 3 Standards		

MW17-7-GW1	4.62-7.62 m	September 10, 2021
PHCs comply with MECP Table 3 Standards		

BH1-21-GW1	4.70-7.70m	August 16, 2021
PHCs comply with MECP Table 3 Standards		

MW17-3	6.80-9.80m	November 2, 2017
Parameter	Result (µg/L)	Standard (µg/L)
PHC F1	7,000	750
PHC F2	2,400	150
Remaining PHCs comply with MECP Table 3 Standards		

MW17-3-GW1	6.80-9.80m	August 16, 2021
Parameter	Result (µg/L)	Standard (µg/L)
PHC F1	3,980	750
PHC F2	494	150
Remaining PHCs comply with MECP Table 3 Standards		

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION (EXP SERVICES INC., 2017)
- 66.76 GROUND SURFACE ELEVATION (m)
- [63.84] BEDROCK SURFACE ELEVATION (m)
- (60.41) GROUNDWATER SURFACE ELEVATION (m) (AUGUST 16, 2021)
- {60.41} GROUNDWATER SURFACE ELEVATION (m) (SEPTEMBER 3, 2021)
- A—A' CROSS SECTION

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

SCALE: 1:300

0 1 2 3 4 5 10 15 20m

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

2828727 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
249 & 255 RICHMOND ROAD & 372 TWEEDSMUIR AVENUE
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - GROUNDWATER (PHCs)

Scale: 1:300	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-6
Approved by: MSD	Revision No.:

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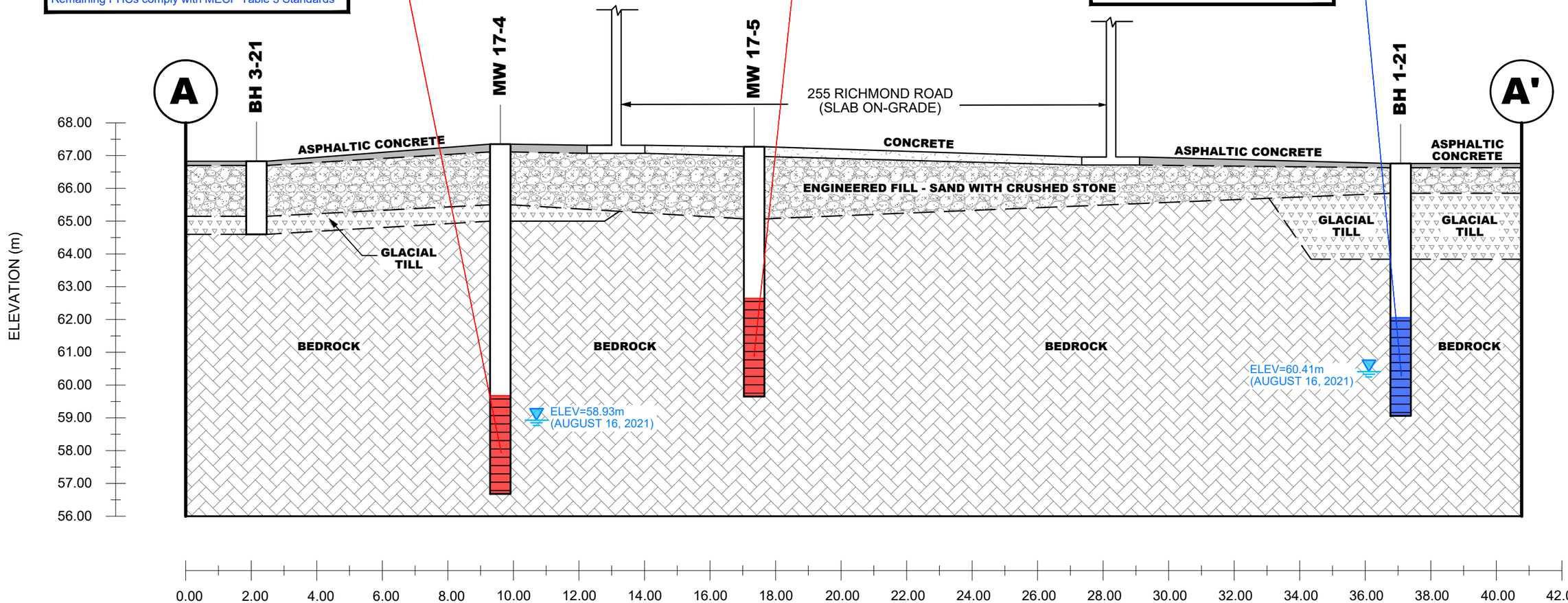
11x17

MW17-4	7.67-10.67m	November 2, 2017
Parameter	Result (µg/L)	Standard (µg/L)
PHC F1	1,600	750
PHC F2	840	150
Remaining PHCs comply with MECP Table 3 Standards		

MW17-4-GW1	7.67-10.67m	August 16, 2021
Parameter	Result (µg/L)	Standard (µg/L)
PHC F2	314	150
Remaining PHCs comply with MECP Table 3 Standards		

MW17-5	4.62-7.62m	November 3, 2017
Parameter	Result (µg/L)	Standard (µg/L)
PHC F1	1,000	750
PHC F2	570	150
Remaining PHCs comply with MECP Table 3 Standards		

BH1-21-GW1 4.70-7.70m August 16, 2021
PHCs comply with MECP Table 3 Standards



GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
249 & 255 RICHMOND ROAD & 372 TWEEDSMUIR AVENUE
OTTAWA, ONTARIO

Title:
CROSS SECTION A-A' - GROUNDWATER (PHCs)

Scale: 1:300	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-6A
Approved by: MSD	Revision No.:

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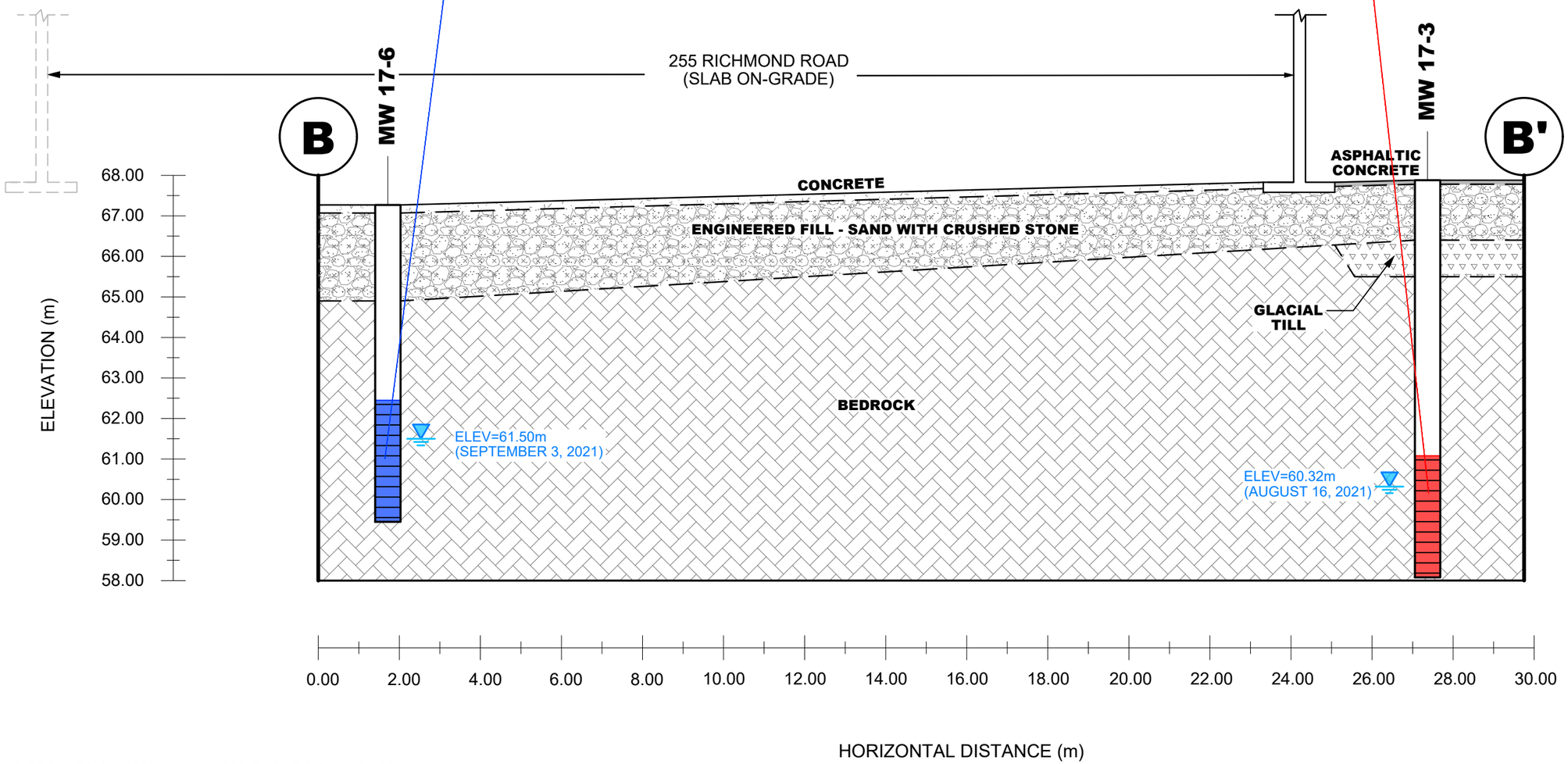
11x17

MW17-6	4.82-7.82m	November 3, 2017
PHCs comply with MECP Table 3 Standards		
MW17-6-GW1	4.82-7.82 m	September 3, 2021
PHCs comply with MECP Table 3 Standards		

MW17-3	6.80-9.80m	November 2, 2017
Parameter	Result (µg/L)	Standard (µg/L)
PHC F1	7,000	750
PHC F2	2,400	150
Remaining PHCs comply with MECP Table 3 Standards		

MW17-3-GW1	6.80-9.80m	August 16, 2021
Parameter	Result (µg/L)	Standard (µg/L)
PHC F1	3,980	750
PHC F2	494	150
Remaining PHCs comply with MECP Table 3 Standards		



GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

2828727 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
249 & 255 RICHMOND ROAD & 372 TWEEDSMUIR AVENUE
OTTAWA, ONTARIO

Title:
CROSS SECTION B-B' - GROUNDWATER (PHCs)

Scale: 1:300	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-6B
Approved by: MSD	Revision No.:

11x17

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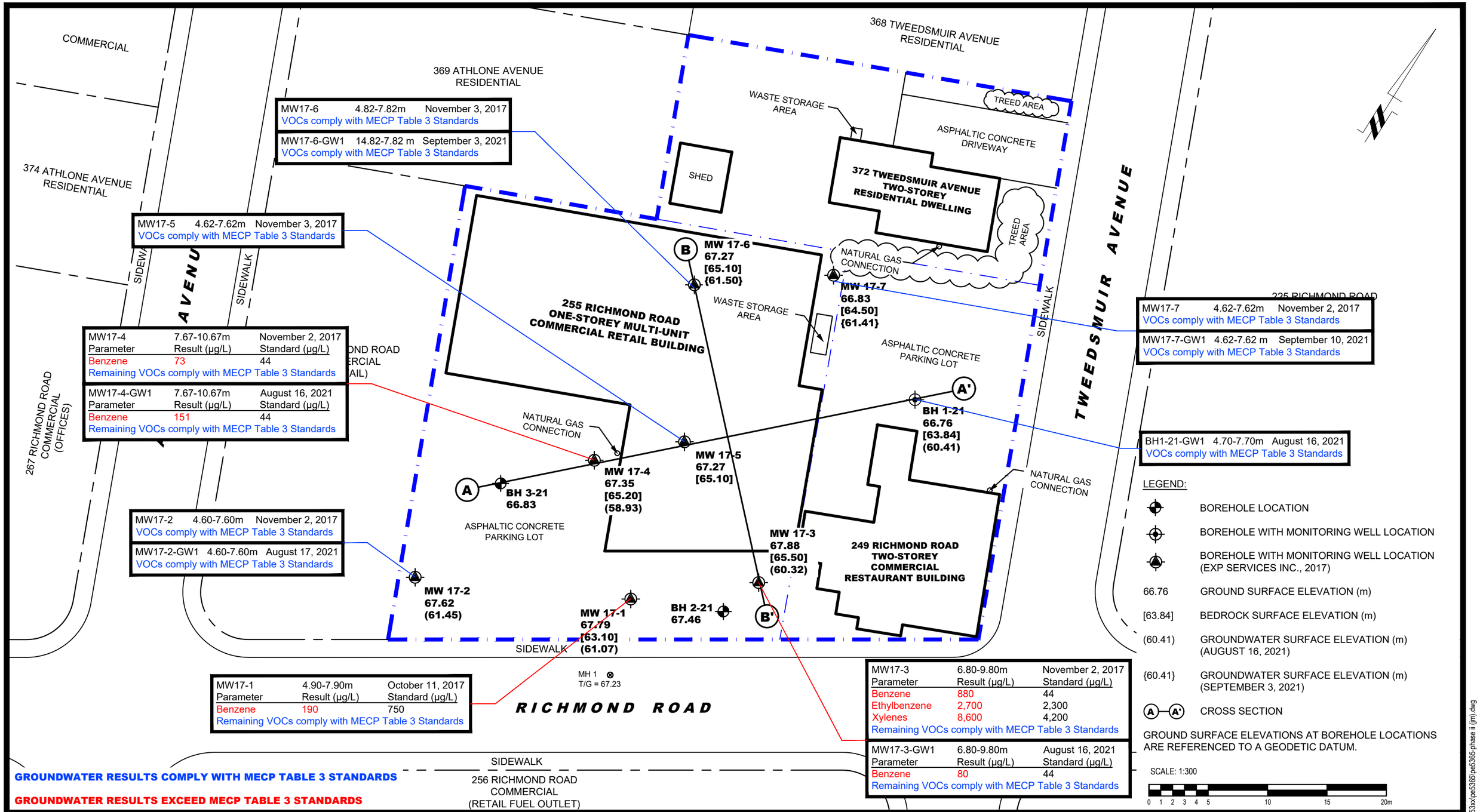

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NO.	REVISIONS	DATE	INITIAL

2828727 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
249 & 255 RICHMOND ROAD & 372 TWEEDSMUIR AVENUE

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - GROUNDWATER (VOCs)

Scale: 1:300	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-7
Approved by: MSD	Revision No.:

11x17

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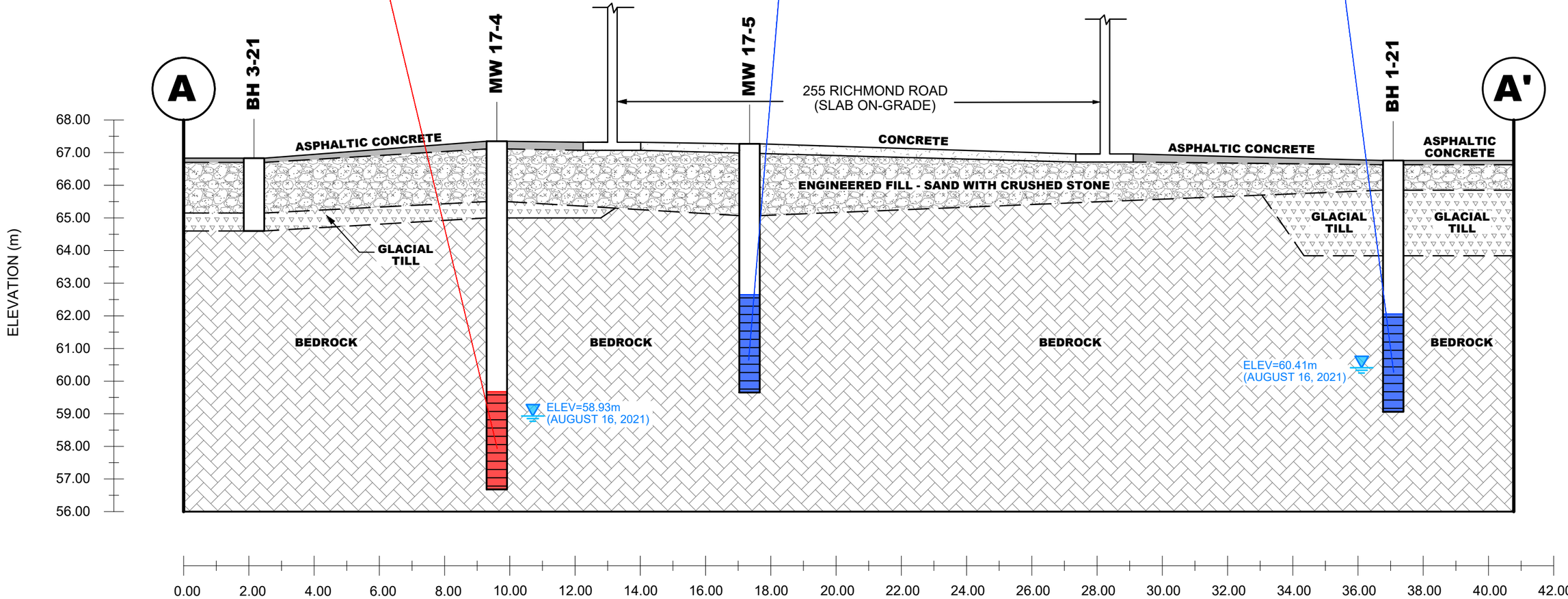
MW17-4	7.67-10.67m	November 2, 2017
Parameter	Result (µg/L)	Standard (µg/L)
Benzene	73	44
Remaining VOCs comply with MECP Table 3 Standards		

MW17-4-GW1	7.67-10.67m	August 16, 2021
Parameter	Result (µg/L)	Standard (µg/L)
Benzene	151	44
Remaining VOCs comply with MECP Table 3 Standards		

MW17-5 4.62-7.62m November 3, 2017
VOCs comply with MECP Table 3 Standards

BH1-21-GW1 4.70-7.70m August 16, 2021
VOCs comply with MECP Table 3 Standards



GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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2828727 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
249 & 255 RICHMOND ROAD & 372 TWEEDSMUIR AVENUE
OTTAWA, ONTARIO

Title:
CROSS SECTION A-A' - GROUNDWATER (VOCs)

Scale: 1:300	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-7A
Approved by: MSD	Revision No.:

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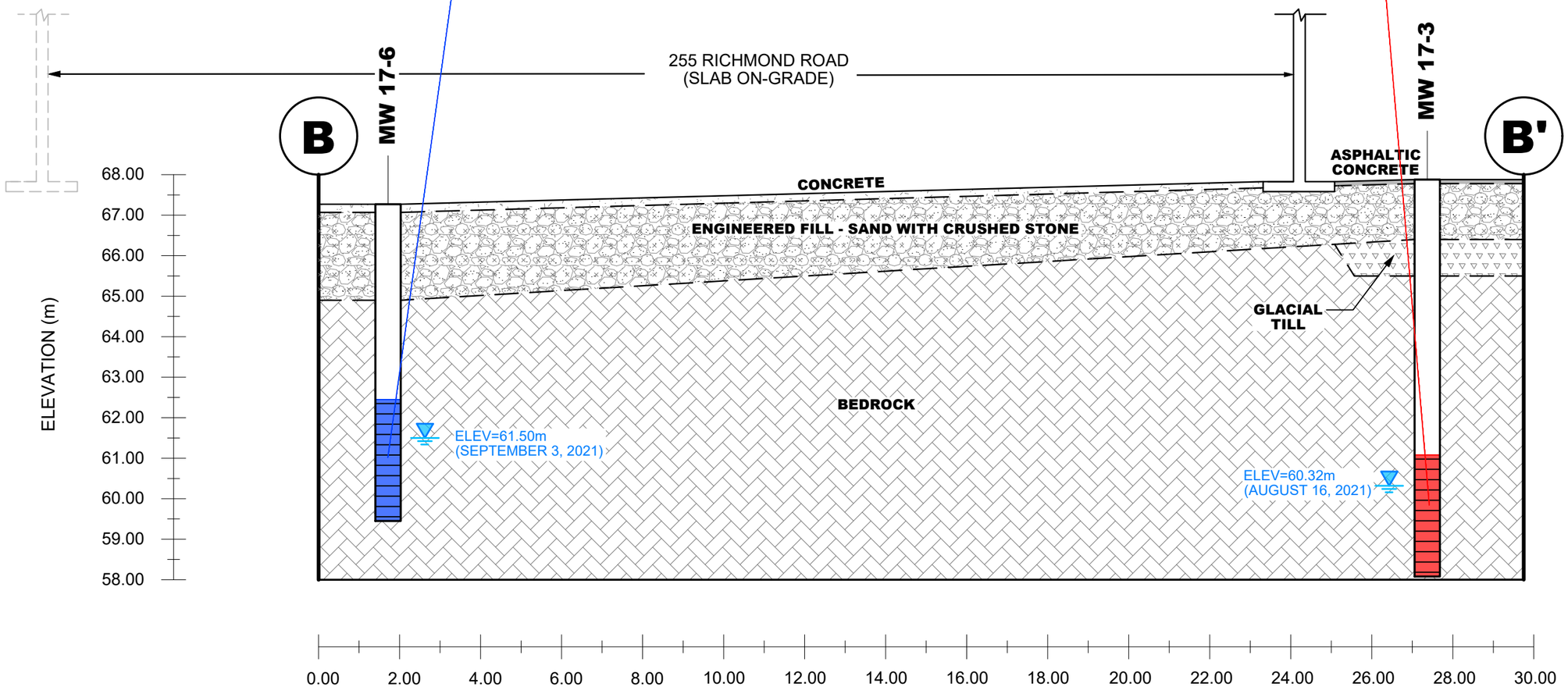
11x17

MW17-6	4.82-7.82m	November 3, 2017
VOCs comply with MECP Table 3 Standards		
MW17-6-GW1	14.82-7.82 m	September 3, 2021
VOCs comply with MECP Table 3 Standards		

MW17-3	6.80-9.80m	November 2, 2017
Parameter	Result (µg/L)	Standard (µg/L)
Benzene	880	44
Ethylbenzene	2,700	2,300
Xylenes	8,600	4,200
Remaining VOCs comply with MECP Table 3 Standards		

MW17-3-GW1	6.80-9.80m	August 16, 2021
Parameter	Result (µg/L)	Standard (µg/L)
Benzene	80	44
Remaining VOCs comply with MECP Table 3 Standards		



GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

2828727 ONTARIO INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
249 & 255 RICHMOND ROAD & 372 TWEEDSMUIR AVENUE
OTTAWA, ONTARIO

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

Scale: 1:300	Date: 09/2021
Drawn by: YA	Report No.: PE5365-2
Checked by: NS	Dwg. No.: PE5365-7B
Approved by: MSD	Revision No.:

11x17

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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

patersongroup

Sampling & Analysis Plan

Phase II – Environmental Site Assessment
249 & 255 Richmond Road and
372 Tweedsmuir Avenue
Ottawa, Ontario

Prepared For

2828727 Ontario inc.

August 1, 2021

Report: PE5365-SAP

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TABLE OF CONTENTS

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by 2828727 Ontario Inc., to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for the properties addressed 249 & 255 Richmond Road and 372 Tweedsmuir Avenue, in the City of Ottawa, Ontario.

Based on the findings of the Phase I ESA, the following subsurface investigation program was developed.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1-21	Eastern portion of subject site; to assess for potential impacts resulting from a former on-site auto service garage, fill material of unknown quality, and a former off-site auto service garage and retail fuel outlet.	7-9 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH2-21	Southern portion of subject site; to assess for potential impacts resulting from a former on-site auto service garage, fill material of unknown quality, a former underground fuel storage tank nest, a former off-site retail fuel outlet and auto service garage, and an existing off-site retail fuel outlet.	2-4 m; for general coverage purposes.
BH3-21	Southwestern portion of subject site; to assess for potential impacts resulting from a former on-site auto service garage, fill material of unknown quality, and an existing off-site retail fuel outlet	2-4 m; for general coverage purposes.

Borehole locations are shown on Drawing PE5365-3 – 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, a groundwater monitoring well will be installed in borehole BH1-21 for the collection of a groundwater sample.

The groundwater monitoring wells (MW17-1–MW17-7) previously installed in 2017 as part of a previous subsurface investigation by EXP Services Inc., will be located and sampled as part of this investigation.

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.

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
249, 251, 255 Richmond Road & 372 Tweedsmuir Ave.
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5365

REMARKS

HOLE NO. BH 1-21

BORINGS BY CME-55 Low Clearance Drill **DATE** August 6, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.13						0	66.76
FILL: Brown silty sand with crushed stone		AU	1				
0.91		SS	2	50	50+	1	65.76
GLACIAL TILL: Very dense, brown silty sand with gravel, cobbles and boulders, trace clay		SS	3	100	50+	2	64.76
		SS	4	94	50+		
2.92		RC	1	100	100	3	63.76
		RC	2	97	85	4	62.76
BEDROCK: Good to excellent quality, grey silty dolostone interbedded with grey limestone		RC	3	100	88	5	61.76
						6	60.76
		RC	4	100	100	7	59.76
7.70							
End of Borehole							
(GWL @ 6.35m - August 16, 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

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
249, 251, 255 Richmond Road & 372 Tweedsmuir Ave.
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5365

REMARKS

HOLE NO. BH 2-21

BORINGS BY CME-55 Low Clearance Drill **DATE** August 6, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.10						0	67.46		
FILL: Brown silty sand with crushed stone 0.76		AU	1						
FILL: Brown silty sand with gravel, trace wood and coal 1.52		SS	2	42	12	1	66.46		
GLACIAL TILL: Compact, brown silty sand with gravel, cobbles and boulders 2.23		SS	3	50	13	2	65.46		
End of Borehole									
Practical refusal to augering at 2.23m depth.									
(BH dry upon completion)									

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

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
249, 251, 255 Richmond Road & 372 Tweedsmuir Ave.
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5365

REMARKS

HOLE NO. BH 3-21

BORINGS BY CME-55 Low Clearance Drill **DATE** August 6, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: ● Volatile Organic Rdg. (ppm) / ○ Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.10									
FILL: Brown silty sand with crushed stone 0.76		AU	1			0	66.83		
FILL: Hard to very stiff, brown silty clay, trace gravel 1.68		SS	2	42	10	1	65.83		
GLACIAL TILL: Dense, brown silty sand with gravel, cobbles and boulders 2.23		SS	3	42	35	2	64.83		
End of Borehole									
Practical refusal to augering at 2.23m depth.									
(BH dry upon completion)									

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

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

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

CONSOLIDATION TEST

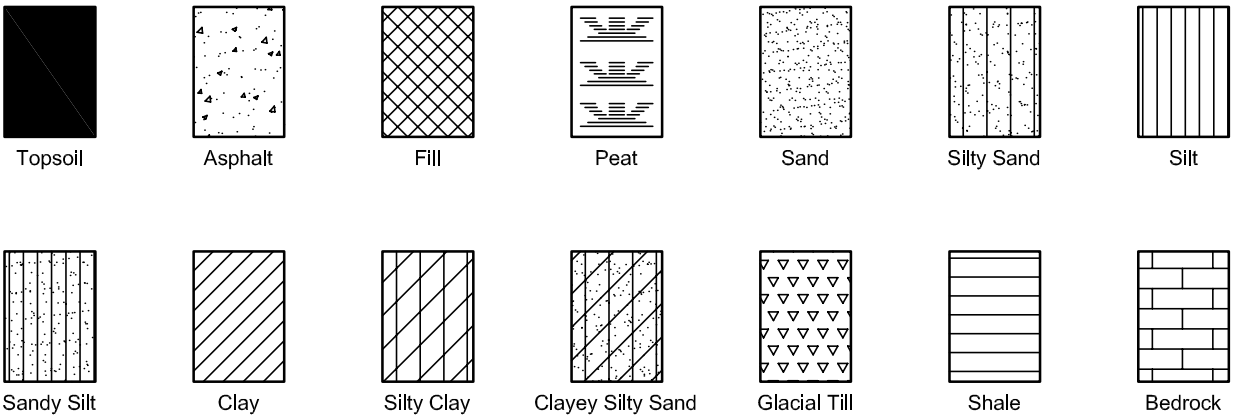
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

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

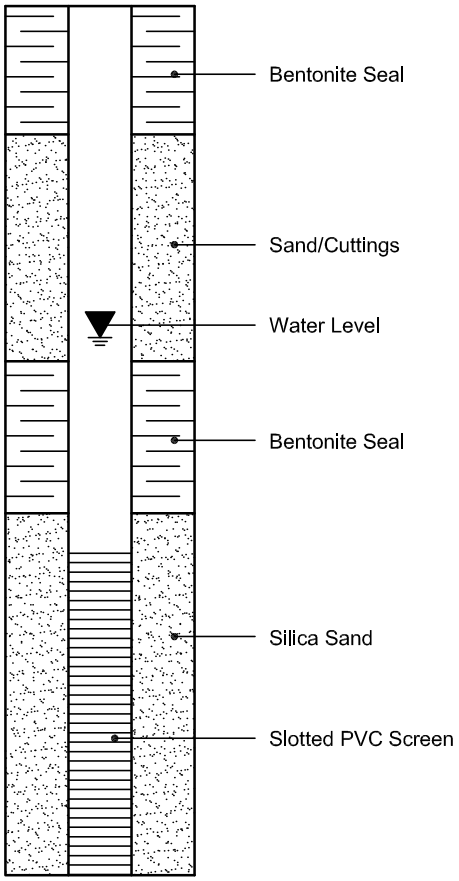
SYMBOLS AND TERMS (continued)

STRATA PLOT

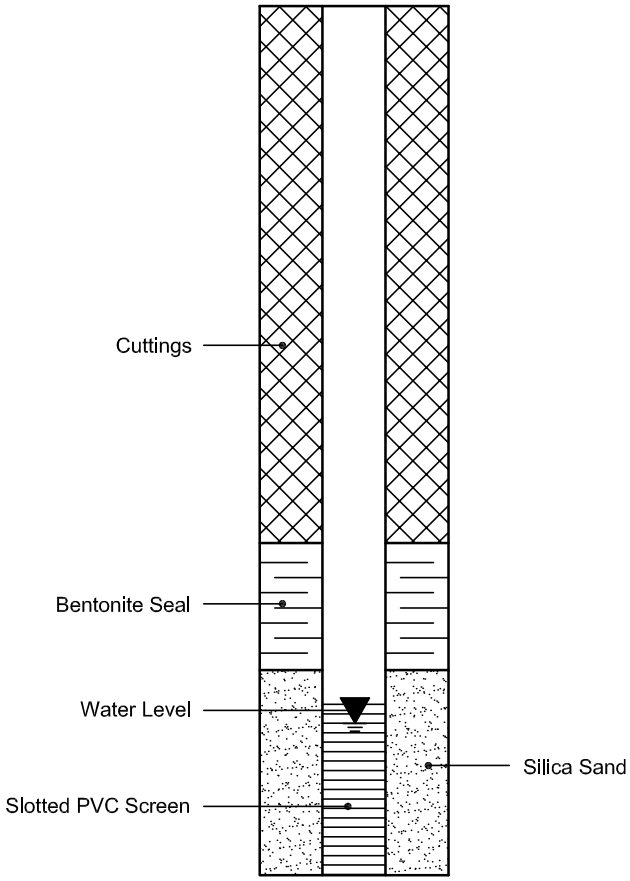


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Nick Sullivan

Client PO: 32634
Project: PE5365
Custody: 133063

Report Date: 13-Aug-2021
Order Date: 9-Aug-2021

Order #: 2133109

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

Paracel ID	Client ID
2133109-01	BH1-21-SS4
2133109-02	BH2-21-SS2
2133109-03	BH2-21-SS3
2133109-04	BH3-21-SS2
2133109-05	BH3-21-SS3
2133109-06	DUP1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 13-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 9-Aug-2021

Client PO: 32634

Project Description: PE5365

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	10-Aug-21	11-Aug-21
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	9-Aug-21	11-Aug-21
Conductivity	MOE E3138 - probe @25 °C, water ext	11-Aug-21	12-Aug-21
Mercury by CVAA	EPA 7471B - CVAA, digestion	11-Aug-21	11-Aug-21
pH, soil	EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext.	12-Aug-21	12-Aug-21
PHC F1	CWS Tier 1 - P&T GC-FID	10-Aug-21	11-Aug-21
PHC F4G (gravimetric)	CWS Tier 1 - Extraction Gravimetric	13-Aug-21	13-Aug-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	10-Aug-21	12-Aug-21
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	11-Aug-21	11-Aug-21
SAR	Calculated	12-Aug-21	12-Aug-21
Solids, %	Gravimetric, calculation	10-Aug-21	11-Aug-21

Certificate of Analysis

Report Date: 13-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 9-Aug-2021

Client PO: 32634

Project Description: PE5365

	Client ID:	BH1-21-SS4	BH2-21-SS2	BH2-21-SS3	BH3-21-SS2
	Sample Date:	06-Aug-21 09:00	06-Aug-21 09:00	06-Aug-21 09:00	06-Aug-21 12:00
	Sample ID:	2133109-01	2133109-02	2133109-03	2133109-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	92.3	89.8	93.6	77.4
General Inorganics					
SAR	0.01 N/A	-	8.80	-	9.14
Conductivity	5 uS/cm	-	1060	-	1740
pH	0.05 pH Units	7.95	7.56	-	-
Metals					
Antimony	1.0 ug/g dry	-	<1.0	-	2.0
Arsenic	1.0 ug/g dry	-	3.6	-	6.1
Barium	1.0 ug/g dry	-	94.2	-	143
Beryllium	0.5 ug/g dry	-	<0.5	-	<0.5
Boron	5.0 ug/g dry	-	7.8	-	6.4
Cadmium	0.5 ug/g dry	-	<0.5	-	<0.5
Chromium	5.0 ug/g dry	-	18.9	-	38.4
Chromium (VI)	0.2 ug/g dry	-	<0.2	-	<0.2
Cobalt	1.0 ug/g dry	-	6.1	-	8.5
Copper	5.0 ug/g dry	-	17.7	-	19.4
Lead	1.0 ug/g dry	-	29.4	-	47.8
Mercury	0.1 ug/g dry	-	<0.1	-	<0.1
Molybdenum	1.0 ug/g dry	-	<1.0	-	<1.0
Nickel	5.0 ug/g dry	-	11.5	-	20.5
Selenium	1.0 ug/g dry	-	<1.0	-	<1.0
Silver	0.3 ug/g dry	-	<0.3	-	<0.3
Thallium	1.0 ug/g dry	-	<1.0	-	<1.0
Uranium	1.0 ug/g dry	-	<1.0	-	<1.0
Vanadium	10.0 ug/g dry	-	30.3	-	39.8
Zinc	20.0 ug/g dry	-	64.6	-	103
Volatiles					
Benzene	0.02 ug/g dry	<0.02	-	<0.02	-
Ethylbenzene	0.05 ug/g dry	<0.05	-	<0.05	-
Toluene	0.05 ug/g dry	<0.05	-	<0.05	-
m,p-Xylenes	0.05 ug/g dry	<0.05	-	<0.05	-
o-Xylene	0.05 ug/g dry	<0.05	-	<0.05	-
Xylenes, total	0.05 ug/g dry	<0.05	-	<0.05	-
Toluene-d8	Surrogate	107%	-	102%	-
Hydrocarbons					

Certificate of Analysis

Report Date: 13-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 9-Aug-2021

Client PO: 32634

Project Description: PE5365

	Client ID:	BH1-21-SS4	BH2-21-SS2	BH2-21-SS3	BH3-21-SS2
	Sample Date:	06-Aug-21 09:00	06-Aug-21 09:00	06-Aug-21 09:00	06-Aug-21 12:00
	Sample ID:	2133109-01	2133109-02	2133109-03	2133109-04
	MDL/Units	Soil	Soil	Soil	Soil
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	<40 [1]	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	-	154	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	279 [2]	-
F4G PHCs (gravimetric)	50 ug/g dry	-	-	705	-

	Client ID:	BH3-21-SS3	DUP1	-	-
	Sample Date:	06-Aug-21 09:00	06-Aug-21 09:00	-	-
	Sample ID:	2133109-05	2133109-06	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	92.1	93.2	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	104%	103%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	21	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	22	<6	-	-

Certificate of Analysis

Report Date: 13-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 9-Aug-2021

Client PO: 32634

Project Description: PE5365

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
Conductivity	ND	5	uS/cm						
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
F4G PHCs (gravimetric)	ND	50	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*8.65*		*ug/g*		*108*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
SAR	9.39	0.01	N/A	8.80			6.5	30	
Conductivity	1040	5	uS/cm	1060			1.1	5	
pH	7.34	0.05	pH Units	7.38			0.5	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	300	7	ug/g dry	308			2.8	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Metals									
Antimony	ND	1.0	ug/g dry	ND			NC	30	
Arsenic	2.6	1.0	ug/g dry	2.5			4.7	30	
Barium	80.2	1.0	ug/g dry	74.3			7.6	30	
Beryllium	ND	0.5	ug/g dry	ND			NC	30	
Boron	6.5	5.0	ug/g dry	6.5			0.3	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	22.1	5.0	ug/g dry	21.1			4.8	30	
Cobalt	5.9	1.0	ug/g dry	5.6			5.3	30	
Copper	20.5	5.0	ug/g dry	20.9			2.0	30	
Lead	12.8	1.0	ug/g dry	12.9			0.8	30	
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	1.3	1.0	ug/g dry	1.2			5.0	30	
Nickel	14.6	5.0	ug/g dry	14.3			2.0	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	49.8	10.0	ug/g dry	48.7			2.2	30	
Zinc	62.7	20.0	ug/g dry	62.3			0.7	30	
Physical Characteristics									
% Solids	82.0	0.1	% by Wt.	82.1			0.0	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	0.772	0.05	ug/g dry	0.832			7.4	50	
Toluene	0.223	0.05	ug/g dry	0.240			7.5	50	
m,p-Xylenes	4.16	0.05	ug/g dry	4.40			5.7	50	
o-Xylene	2.94	0.05	ug/g dry	3.08			4.8	50	
Surrogate: Toluene-d8	*9.48*		*ug/g dry*		*108*	*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)	169	7	ug/g	ND	84.6	80-120			
F2 PHCs (C10-C16)	87	4	ug/g	ND	100	60-140			
F3 PHCs (C16-C34)	236	8	ug/g	ND	111	60-140			
F4 PHCs (C34-C50)	139	6	ug/g	ND	104	60-140			
F4G PHCs (gravimetric)	860	50	ug/g	ND	86.0	80-120			
Metals									
Antimony	49.7	1.0	ug/g	ND	98.6	70-130			
Arsenic	51.6	1.0	ug/g	1.0	101	70-130			
Barium	79.7	1.0	ug/g	29.7	99.8	70-130			
Beryllium	48.1	0.5	ug/g	ND	95.9	70-130			
Boron	48.1	5.0	ug/g	ND	91.1	70-130			
Cadmium	48.5	0.5	ug/g	ND	96.7	70-130			
Chromium (VI)	0.1	0.2	ug/g	ND	74.5	70-130			
Chromium	60.0	5.0	ug/g	8.4	103	70-130			
Cobalt	52.3	1.0	ug/g	2.2	100	70-130			
Copper	54.2	5.0	ug/g	8.4	91.8	70-130			
Lead	45.2	1.0	ug/g	5.2	80.1	70-130			
Mercury	1.48	0.1	ug/g	ND	98.9	70-130			
Molybdenum	51.3	1.0	ug/g	ND	102	70-130			
Nickel	53.2	5.0	ug/g	5.7	94.9	70-130			
Selenium	47.0	1.0	ug/g	ND	93.8	70-130			
Silver	47.8	0.3	ug/g	ND	95.5	70-130			
Thallium	48.2	1.0	ug/g	ND	96.4	70-130			
Uranium	48.8	1.0	ug/g	ND	97.2	70-130			
Vanadium	71.6	10.0	ug/g	19.5	104	70-130			
Zinc	68.7	20.0	ug/g	24.9	87.6	70-130			
Volatiles									
Benzene	3.54	0.02	ug/g	ND	88.5	60-130			
Ethylbenzene	4.30	0.05	ug/g	ND	108	60-130			
Toluene	4.26	0.05	ug/g	ND	107	60-130			
m,p-Xylenes	8.69	0.05	ug/g	ND	109	60-130			
o-Xylene	4.49	0.05	ug/g	ND	112	60-130			
Surrogate: Toluene-d8	*7.36*		*ug/g*		*92.0*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

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

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

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

PARAC LABORATORIES

Paracel ID: 2133109

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Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2133189	№ 133063

Client Name: Paterson Group	Project Ref: PE5365	Page 1 of 1
Contact Name: Nick Sullivan	Quote #:	Turnaround Time
Address: 154 Colonnade Rd. S.	PO #: 32634	☐ 1 day ☐ 3 day
	E-mail: nsullivan@patersongroup.ca	☐ 2 day ☒ Regular
Telephone: 613-226-7381		Date Required:

☒ REG 153/04 ☐ REG 406/19

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

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	Required Analysis: PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)	pH	EC	SAR		
1	BH1-21-SS4	S		2	Aug 6/21	AM	X							X				
2	BH2-21-SS2	↓		↓	↓	↓				X	X	X		X	X	X		
3	BH2-21-SS3					↓	X											
4	BH3-21-SS2					PM				X	X	X			X	X		
5	BH3-21-SS3					↓	X											
6	DUP1	↓		↓	↓		X											
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): N. Sullivan	Received By Driver/Depot: M. LEOUSE	Received at Lab:	Verified By:
Relinquished By (Print): Nick Sullivan	Date/Time: 09/08/21 2:51	Date/Time: Aug 9 2021 1545	Date/Time: Aug 10 2021 845
Date/Time: August 9 /2021	Temperature: °C FH.	Temperature: 22.7 °C	pH Verified: ☐ By: NA

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Nick Sullivan

Client PO: 32710
Project: PE5365
Custody: 133083

Report Date: 25-Aug-2021
Order Date: 19-Aug-2021

Order #: 2134560

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

Paracel ID	Client ID
2134560-01	BH1-21-GW1
2134560-02	MW17-2-GW1
2134560-03	MW17-3-GW1
2134560-04	MW17-4-GW1
2134560-05	DUP1

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 25-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 19-Aug-2021

Client PO: 32710

Project Description: PE5365

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	20-Aug-21	20-Aug-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	23-Aug-21	24-Aug-21
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	20-Aug-21	20-Aug-21

Certificate of Analysis

Report Date: 25-Aug-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 19-Aug-2021

Client PO: **32710**

Project Description: PE5365

	Client ID:	BH1-21-GW1	MW17-2-GW1	MW17-3-GW1	MW17-4-GW1
	Sample Date:	16-Aug-21 12:00	17-Aug-21 12:00	16-Aug-21 12:00	16-Aug-21 12:00
	Sample ID:	2134560-01	2134560-02	2134560-03	2134560-04
	MDL/Units	Water	Water	Water	Water
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	80.0	151
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	294	169
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	42.9	21.4
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis

Report Date: 25-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 19-Aug-2021

Client PO: 32710

Project Description: PE5365

	Client ID:	BH1-21-GW1	MW17-2-GW1	MW17-3-GW1	MW17-4-GW1
	Sample Date:	16-Aug-21 12:00	17-Aug-21 12:00	16-Aug-21 12:00	16-Aug-21 12:00
	Sample ID:	2134560-01	2134560-02	2134560-03	2134560-04
	MDL/Units	Water	Water	Water	Water
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	26.5	22.4
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	22.8
Xylenes, total	0.5 ug/L	<0.5	<0.5	26.5	45.2
4-Bromofluorobenzene	Surrogate	97.6%	95.2%	99.6%	102%
Dibromofluoromethane	Surrogate	84.8%	84.8%	95.0%	95.1%
Toluene-d8	Surrogate	104%	103%	104%	103%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	-	3980	360
F2 PHCs (C10-C16)	100 ug/L	<100	-	494	314
F3 PHCs (C16-C34)	100 ug/L	<100	-	188	<100
F4 PHCs (C34-C50)	100 ug/L	<100	-	<100	<100

Certificate of Analysis

Report Date: 25-Aug-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 19-Aug-2021

Client PO: **32710**

Project Description: PE5365

	Client ID:	DUP1	-	-	-
	Sample Date:	16-Aug-21 12:00	-	-	-
	Sample ID:	2134560-05	-	-	-
	MDL/Units	Water	-	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Ethylene dibromide (dibromoethane, 1	0.2 ug/L	<0.2	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-

Certificate of Analysis

Report Date: 25-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 19-Aug-2021

Client PO: 32710

Project Description: PE5365

	Client ID:	DUP1	-	-	-
	Sample Date:	16-Aug-21 12:00	-	-	-
	Sample ID:	2134560-05	-	-	-
	MDL/Units	Water	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	102%	-	-	-
Dibromofluoromethane	Surrogate	94.1%	-	-	-
Toluene-d8	Surrogate	102%	-	-	-

Certificate of Analysis

Report Date: 25-Aug-2021

Client: Paterson Group Consulting Engineers

Order Date: 19-Aug-2021

Client PO: 32710

Project Description: PE5365

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*76.3*		*ug/L*		*95.4*	*50-140*			
Surrogate: Dibromofluoromethane	*66.9*		*ug/L*		*83.6*	*50-140*			
Surrogate: Toluene-d8	*83.1*		*ug/L*		*104*	*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	*84.0*		*ug/L*		*105*	*50-140*			
Surrogate: Dibromofluoromethane	*74.1*		*ug/L*		*92.6*	*50-140*			
Surrogate: Toluene-d8	*81.5*		*ug/L*		*102*	*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)	1850	25	ug/L	ND	92.5	68-117			
F2 PHCs (C10-C16)	1580	100	ug/L	ND	98.8	60-140			
F3 PHCs (C16-C34)	4010	100	ug/L	ND	102	60-140			
F4 PHCs (C34-C50)	2780	100	ug/L	ND	112	60-140			
Volatiles									
Acetone	93.6	5.0	ug/L	ND	93.6	50-140			
Benzene	41.6	0.5	ug/L	ND	104	60-130			
Bromodichloromethane	27.2	0.5	ug/L	ND	68.0	60-130			
Bromoform	32.2	0.5	ug/L	ND	80.5	60-130			
Bromomethane	36.2	0.5	ug/L	ND	90.5	50-140			
Carbon Tetrachloride	27.8	0.2	ug/L	ND	69.4	60-130			
Chlorobenzene	42.7	0.5	ug/L	ND	107	60-130			
Chloroform	34.8	0.5	ug/L	ND	87.0	60-130			
Dibromochloromethane	29.2	0.5	ug/L	ND	73.0	60-130			
Dichlorodifluoromethane	32.2	1.0	ug/L	ND	80.5	50-140			
1,2-Dichlorobenzene	40.1	0.5	ug/L	ND	100	60-130			
1,3-Dichlorobenzene	39.5	0.5	ug/L	ND	98.8	60-130			
1,4-Dichlorobenzene	39.7	0.5	ug/L	ND	99.2	60-130			
1,1-Dichloroethane	35.5	0.5	ug/L	ND	88.7	60-130			
1,2-Dichloroethane	36.4	0.5	ug/L	ND	91.0	60-130			
1,1-Dichloroethylene	38.3	0.5	ug/L	ND	95.8	60-130			
cis-1,2-Dichloroethylene	37.1	0.5	ug/L	ND	92.8	60-130			
trans-1,2-Dichloroethylene	34.4	0.5	ug/L	ND	86.1	60-130			
1,2-Dichloropropane	35.7	0.5	ug/L	ND	89.3	60-130			
cis-1,3-Dichloropropylene	28.4	0.5	ug/L	ND	70.9	60-130			
trans-1,3-Dichloropropylene	42.6	0.5	ug/L	ND	107	60-130			
Ethylbenzene	38.9	0.5	ug/L	ND	97.2	60-130			
Ethylene dibromide (dibromoethane, 1,2-	39.8	0.2	ug/L	ND	99.5	60-130			
Hexane	37.6	1.0	ug/L	ND	94.0	60-130			
Methyl Ethyl Ketone (2-Butanone)	117	5.0	ug/L	ND	117	50-140			
Methyl Isobutyl Ketone	96.4	5.0	ug/L	ND	96.4	50-140			
Methyl tert-butyl ether	103	2.0	ug/L	ND	103	50-140			
Methylene Chloride	35.7	5.0	ug/L	ND	89.2	60-130			
Styrene	37.1	0.5	ug/L	ND	92.8	60-130			
1,1,1,2-Tetrachloroethane	28.5	0.5	ug/L	ND	71.2	60-130			
1,1,2,2-Tetrachloroethane	31.2	0.5	ug/L	ND	78.1	60-130			
Tetrachloroethylene	38.2	0.5	ug/L	ND	95.4	60-130			
Toluene	43.3	0.5	ug/L	ND	108	60-130			
1,1,1-Trichloroethane	27.6	0.5	ug/L	ND	68.9	60-130			
1,1,2-Trichloroethane	33.8	0.5	ug/L	ND	84.4	60-130			
Trichloroethylene	38.2	0.5	ug/L	ND	95.6	60-130			
Trichlorofluoromethane	32.0	1.0	ug/L	ND	79.9	60-130			
Vinyl chloride	33.3	0.5	ug/L	ND	83.2	50-140			
m,p-Xylenes	77.5	0.5	ug/L	ND	96.8	60-130			
o-Xylene	40.5	0.5	ug/L	ND	101	60-130			
Surrogate: 4-Bromofluorobenzene	*77.8*		*ug/L*		*97.3*	*50-140*			
Surrogate: Dibromofluoromethane	*73.9*		*ug/L*		*92.4*	*50-140*			
Surrogate: Toluene-d8	*82.8*		*ug/L*		*104*	*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: 2134560

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2134560	№ 133083

Client Name: Paterson Group
Contact Name: Nick Sullivan
Address: 154 Colonnade Rd. S.
Telephone: 613-226-7381

Project Ref: PE5365
Quote #:
PO #: 32710
E-mail: nsullivan@patersongroup.ca

Page 1 of 1

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

☐ REG 153/04 ☐ REG 406/19

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

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

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

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)					
1	BH1-21-GW1	GW		3	AUG 16	PM	X	X										
2	MW17-2-GW1	↓		2	AUG 17	↓		X										
3	MW17-3-GW1	↓		3	AUG 16	↓	X	X										
4	MW17-4-GW1	↓		3	↓	↓	X	X										
5	DUP1	↓		2	↓	↓		X										
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): N. Sullivan	Received By Driver/Depot: M. LOUISE	Received at Lab: Shreeram Dhimal	Verified By: BCam
Relinquished By (Print): Nick Sullivan	Date/Time: 19/08/21 1:30	Date/Time: Aug 19, 2021 03:30	Date/Time: AUG 19, 2021 16:28
Date/Time: August 19/2021	Temperature: °C 21	Temperature: 12.7 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Nick Sullivan

Client PO: 32092
Project: PE5365
Custody: 132412

Report Date: 10-Sep-2021
Order Date: 3-Sep-2021

Order #: 2137102

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

Paracel ID	Client ID
2137102-01	MW17-6-GW

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 32092

Report Date: 10-Sep-2021

Order Date: 3-Sep-2021

Project Description: PE5365

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	8-Sep-21	8-Sep-21
PHC F1	CWS Tier 1 - P&T GC-FID	8-Sep-21	8-Sep-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	8-Sep-21	9-Sep-21

Certificate of Analysis

Report Date: 10-Sep-2021

Client: Paterson Group Consulting Engineers

Order Date: 3-Sep-2021

Client PO: 32092

Project Description: PE5365

	Client ID:	MW17-6-GW	-	-	-
	Sample Date:	03-Sep-21 11:30	-	-	-
	Sample ID:	2137102-01	-	-	-
	MDL/Units	Water	-	-	-
Volatiles					
Benzene	0.5 ug/L	24.1	-	-	-
Ethylbenzene	0.5 ug/L	320	-	-	-
Toluene	0.5 ug/L	4.8	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
Toluene-d8	Surrogate	82.0%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	344	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-

Certificate of Analysis

Report Date: 10-Sep-2021

Client: Paterson Group Consulting Engineers

Order Date: 3-Sep-2021

Client PO: 32092

Project Description: PE5365

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Benzene	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: Toluene-d8	*87.3*		*ug/L*		*109*	*50-140*			

Certificate of Analysis

Report Date: 10-Sep-2021

Client: Paterson Group Consulting Engineers

Order Date: 3-Sep-2021

Client PO: 32092

Project Description: PE5365

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									
Benzene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: Toluene-d8	*71.1*		*ug/L*		*88.9*	*50-140*			

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 32092

Report Date: 10-Sep-2021

Order Date: 3-Sep-2021

Project Description: PE5365

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	2200	25	ug/L	ND	110	68-117			
F2 PHCs (C10-C16)	1590	100	ug/L	ND	99.5	60-140			
F3 PHCs (C16-C34)	3450	100	ug/L	ND	88.0	60-140			
F4 PHCs (C34-C50)	2240	100	ug/L	ND	90.5	60-140			
Volatiles									
Benzene	30.6	0.5	ug/L	ND	76.4	60-130			
Ethylbenzene	39.9	0.5	ug/L	ND	99.8	60-130			
Toluene	29.0	0.5	ug/L	ND	72.6	60-130			
m,p-Xylenes	84.4	0.5	ug/L	ND	106	60-130			
o-Xylene	33.2	0.5	ug/L	ND	83.1	60-130			
Surrogate: Toluene-d8	*65.4*		*ug/L*		*81.8*	*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.

PARA LABORATORI

Paracel ID: 2137102

Chain Of Custody
(Lab Use Only)
№ 132412

...ellabs.com | 2137102

Client Name: PATERSON	Project Ref: PE5365	Page 1 of 1
Contact Name: NICK SULLIVAN / MARK D'ARCY	Quote #:	Turnaround Time
Address: 154 COLONNADE Rd. S. OTTAWA, ONT.	PO #: 32092	☐ 1 day ☐ 3 day ☐ 2 day ☐ Regular
Telephone: 613 226 7381	E-mail: MDARCY@PATERSONGROUP.CA NSULLIVAN@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)	Required Analysis
1	MW17-6-GW	GW	\	3	SEPT 3/21	11:30A	\							
2														
3														
4														
5														
6														
7														
8														
9														
10														

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign):	Received By Driver/Depot: T. TROUSE	Received at Lab: C	Verified By:
Relinquished By (Print): DOMINIC LANDRY	Date/Time: 03/09/21 3:03	Date/Time: Sep 3 2021 9:45	Date/Time: Sep 7 2021 18:28
Date/Time: SEPT 3, 2021	Temperature: °C PK	Temperature: 20.4 °C	pH Verified: ☐ By:

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www.paracellabs.com

Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Nick Sullivan

Client PO: 33140
Project: PE5365
Custody: 133105

Report Date: 17-Sep-2021
Order Date: 14-Sep-2021

Order #: 2138237

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

Paracel ID	Client ID
2138237-01	MW17-7-GW1

Approved By: Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 33140

Report Date: 17-Sep-2021

Order Date: 14-Sep-2021

Project Description: PE5365

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	15-Sep-21	15-Sep-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	16-Sep-21	16-Sep-21
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	15-Sep-21	15-Sep-21

Certificate of Analysis

Report Date: 17-Sep-2021

Client: Paterson Group Consulting Engineers

Order Date: 14-Sep-2021

Client PO: 33140

Project Description: PE5365

	Client ID:	MW17-7-GW1	-	-	-
	Sample Date:	10-Sep-21 13:00	-	-	-
	Sample ID:	2138237-01	-	-	-
	MDL/Units	Water	-	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-

Certificate of Analysis

Report Date: 17-Sep-2021

Client: Paterson Group Consulting Engineers

Order Date: 14-Sep-2021

Client PO: 33140

Project Description: PE5365

	Client ID:	MW17-7-GW1	-	-	-
	Sample Date:	10-Sep-21 13:00	-	-	-
	Sample ID:	2138237-01	-	-	-
	MDL/Units	Water	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	117%	-	-	-
Dibromofluoromethane	Surrogate	84.9%	-	-	-
Toluene-d8	Surrogate	85.1%	-	-	-
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	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*103*		*ug/L*		*129*	*50-140*			
Surrogate: Dibromofluoromethane	*82.4*		*ug/L*		*103*	*50-140*			
Surrogate: Toluene-d8	*104*		*ug/L*		*130*	*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	*90.3*		*ug/L*		*113*	*50-140*			
Surrogate: Dibromofluoromethane	*70.7*		*ug/L*		*88.3*	*50-140*			
Surrogate: Toluene-d8	*66.5*		*ug/L*		*83.1*	*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)	1620	25	ug/L	ND	81.2	68-117			
F2 PHCs (C10-C16)	1410	100	ug/L	ND	88.1	60-140			
F3 PHCs (C16-C34)	3620	100	ug/L	ND	92.4	60-140			
F4 PHCs (C34-C50)	2060	100	ug/L	ND	83.1	60-140			
Volatiles									
Acetone	89.2	5.0	ug/L	ND	89.2	50-140			
Benzene	31.2	0.5	ug/L	ND	77.9	60-130			
Bromodichloromethane	29.7	0.5	ug/L	ND	74.3	60-130			
Bromoform	34.5	0.5	ug/L	ND	86.3	60-130			
Bromomethane	31.8	0.5	ug/L	ND	79.6	50-140			
Carbon Tetrachloride	30.4	0.2	ug/L	ND	76.1	60-130			
Chlorobenzene	37.0	0.5	ug/L	ND	92.5	60-130			
Chloroform	31.1	0.5	ug/L	ND	77.7	60-130			
Dibromochloromethane	35.5	0.5	ug/L	ND	88.7	60-130			
Dichlorodifluoromethane	40.5	1.0	ug/L	ND	101	50-140			
1,2-Dichlorobenzene	26.4	0.5	ug/L	ND	65.9	60-130			
1,3-Dichlorobenzene	27.0	0.5	ug/L	ND	67.4	60-130			
1,4-Dichlorobenzene	26.6	0.5	ug/L	ND	66.6	60-130			
1,1-Dichloroethane	31.1	0.5	ug/L	ND	77.7	60-130			
1,2-Dichloroethane	30.8	0.5	ug/L	ND	77.1	60-130			
1,1-Dichloroethylene	32.5	0.5	ug/L	ND	81.2	60-130			
cis-1,2-Dichloroethylene	29.6	0.5	ug/L	ND	74.0	60-130			
trans-1,2-Dichloroethylene	30.4	0.5	ug/L	ND	76.1	60-130			
1,2-Dichloropropane	30.0	0.5	ug/L	ND	74.9	60-130			
cis-1,3-Dichloropropylene	27.0	0.5	ug/L	ND	67.6	60-130			
trans-1,3-Dichloropropylene	27.8	0.5	ug/L	ND	69.6	60-130			
Ethylbenzene	30.6	0.5	ug/L	ND	76.4	60-130			
Ethylene dibromide (dibromoethane, 1,2-	35.5	0.2	ug/L	ND	88.8	60-130			
Hexane	37.0	1.0	ug/L	ND	92.5	60-130			
Methyl Ethyl Ketone (2-Butanone)	82.6	5.0	ug/L	ND	82.6	50-140			
Methyl Isobutyl Ketone	76.3	5.0	ug/L	ND	76.3	50-140			
Methyl tert-butyl ether	84.1	2.0	ug/L	ND	84.1	50-140			
Methylene Chloride	44.9	5.0	ug/L	ND	112	60-130			
Styrene	31.7	0.5	ug/L	ND	79.2	60-130			
1,1,1,2-Tetrachloroethane	36.3	0.5	ug/L	ND	90.7	60-130			
1,1,2,2-Tetrachloroethane	32.6	0.5	ug/L	ND	81.4	60-130			
Tetrachloroethylene	36.7	0.5	ug/L	ND	91.8	60-130			
Toluene	36.0	0.5	ug/L	ND	90.1	60-130			
1,1,1-Trichloroethane	31.5	0.5	ug/L	ND	78.7	60-130			
1,1,2-Trichloroethane	29.8	0.5	ug/L	ND	74.6	60-130			
Trichloroethylene	30.6	0.5	ug/L	ND	76.4	60-130			
Trichlorofluoromethane	32.6	1.0	ug/L	ND	81.5	60-130			
Vinyl chloride	36.5	0.5	ug/L	ND	91.3	50-140			
m,p-Xylenes	55.1	0.5	ug/L	ND	68.8	60-130			
o-Xylene	34.2	0.5	ug/L	ND	85.5	60-130			
Surrogate: 4-Bromofluorobenzene	*64.0*		*ug/L*		*80.0*	*50-140*			
Surrogate: Dibromofluoromethane	*80.9*		*ug/L*		*101*	*50-140*			
Surrogate: Toluene-d8	*57.4*		*ug/L*		*71.7*	*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.

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Paracel ID: 2138237

Chain Of Custody
(Lab Use Only)

№ 133105

Page 1 of 1

Client Name: Paterson Group	Project Ref: PE5365
Contact Name: Nick Sullivan	Quote #:
Address: 154 Colonnade Rd. S.	PO #: 33140
Telephone: 613-226-7381	E-mail: nsullivan@patersongroup.ca

Turnaround Time

☐ 1 day ☒ 3 day

☐ 2 day ☐ Regular

Date Required:

☒ REG 153/04 ☐ REG 406/19

☐ Table 1 ☒ Res/Park ☐ Med/Fine

☐ Table 2 ☐ Ind/Comm ☐ Coarse

☒ Table 3 ☐ Agri/Other

☐ Table ___

For RSC: ☐ Yes ☐ No

Other Regulation

☐ REG 558 ☐ PWQO

☐ CCME ☐ MISA

☐ SU - Sani ☐ SU - Storm

Mun:

☐ Other:

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

Required Analysis

#	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)					
1	MW17-7-GW1	GW		3	Sept. 10	1:00 PM	X	X										
2																		
3																		
4																		
5																		
6																		
7																		
8																		
9																		
10																		

Comments:

Method of Delivery: Paracel Courier

Relinquished By (Sign): N. Sullivan	Received By Driver/Depot: M. Jeouse	Received at Lab: Suneyorn Rehman	Verified By: C
Relinquished By (Print): Nick Sullivan	Date/Time: 14/09/20 3.20	Date/Time: Sep 14, 2021 04:07	Date/Time: Sept 14 2021 4:22
Date/Time: Sept. 14 2021	Temperature: °C PH	Temperature: 13.9 °C	pH Verified: ☐ By: