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Phase II – Environmental Site Assessment

797 Richmond Road
Ottawa, Ontario

Prepared For

Dentech Holdings Inc.

April 12, 2021

Report: PE5190-2

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the property addressed 797 Richmond Road, 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 March 3 and March 4, 2021 and consisted of drilling four (4) boreholes (BH1-BH4) throughout the subject site, of which three (3) were instrumented with groundwater monitoring wells (BH2-BH4). Boreholes BH2-BH4 were advanced to depths ranging from approximately 8.48 m to 9.91 m below the existing ground surface and terminated within the bedrock, whereas BH1 was terminated at a depth of approximately 5.97 m below the existing ground surface within a layer of grey silty sand on practical refusal to augering on inferred bedrock.

Seven (7) soil samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), PAHs, metals, and pH parameters. Based on the analytical test results, the concentrations of several PAH and/or metal parameters identified in the shallow fill samples from all four (4) boreholes were in excess of the selected MECP Table 3 residential standards. No contamination was identified in the native soil samples.

Three (3) groundwater samples were recovered from the monitoring wells installed in BH2-BH4 and submitted for laboratory analysis of BTEX and PHC (F_1-F_4) parameters. Based on the analytical test results, all detected parameter concentrations in the groundwater samples analyzed comply with the selected MECP Table 3 residential standards.

Recommendations

Soil

Based on the findings of this assessment, PAH and/or metal impacted fill material was identified in all four (4) boreholes placed throughout subject site, 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.

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

While the PAH and metal contaminants are expected to reside only in the fill layer, well above the water table, consideration should be given to sampling the wells for these parameters prior to the commencement of any construction activities.

Monitoring Wells

If the groundwater monitoring wells installed on-site (BH2-BH4) 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 Dentech Holdings Inc., Paterson Group (Paterson) conducted a Phase II – Environmental Site Assessment (Phase II ESA) for the property addressed 797 Richmond Road, 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, completed by Paterson in March 2021.

1.1 Site Description

Address:	797 Richmond Road, Ottawa, Ontario.
Legal Description:	Part of Lots 26 & 27, Concession 1 (Ottawa Front), Formerly the Township of Nepean, in the City of Ottawa.
Location:	The subject site is located on the north side of Richmond Road, approximately 70 m west of Cleary Avenue, in the City of Ottawa, Ontario. Refer to Figure 1 – Key Plan for the site location.
Latitude and Longitude:	45° 22' 54" N, 75° 46' 16" W.

Site Description:

Configuration:	Rectangular
Site Area:	1,165 m^2 (approximate)
Zoning:	TM – Traditional Main Street Zone
Current Uses:	The subject site is currently occupied with a one (1) storey denture care centre.
Services:	The subject site is located within a municipally serviced area.

1.2 Property Ownership

The subject property is currently owned by Dentech Holdings Inc. Paterson was retained to complete this Phase II ESA by Mr. Joe Tallis, courtesy of Dentech Holdings Inc., whose offices are located at 797 Richmond Road, Ottawa, Ontario. Dentech Holdings Inc. can be contacted via telephone at 613-748-5312.

1.3 Current and Proposed Future Uses

The subject site is currently occupied with a one (1) storey office building, used as a denture care centre, which is surrounded entirely by asphaltic concrete parking areas and laneways. It is our understanding that the subject site is to be redeveloped with a residential high-rise building.

1.4 Applicable Site Condition Standard

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

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

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

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

The MECP Table 1 standards for Full Depth Background Site Conditions were also selected for additional consideration in order to assess the on-site soil conditions prior to future off-site disposal.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The subject site is currently occupied with a one (1) storey office building, located in the northern portion of the property, and surrounded entirely by asphaltic concrete parking areas and laneways. The site topography is relatively flat, 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 Richmond Road and the adjacent properties. Water drainage on the subject site occurs primarily via sheet flow towards catch basins located along Richmond Road.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation for this assessment was conducted on March 3 and March 4, 2021 and consisted of drilling four (4) boreholes (BH1-BH4) throughout the subject site, of which three (3) were instrumented with groundwater monitoring wells (BH2-BH4). Boreholes BH2-BH4 were advanced to depths ranging from approximately 8.48 m to 9.91 m below the existing grade and terminated within the bedrock, whereas BH1 was terminated at a depth of approximately 5.97 m below the existing grade within a layer of grey silty sand on practical refusal to augering on inferred bedrock.

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);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Metals (including mercury and hexavalent chromium).

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, whereas the surficial geology consists of glacial till plains, with an overburden thickness ranging from approximately 5 m to 10 m. Groundwater is anticipated to be encountered within the bedrock and flow in a northwesterly direction.

Existing Buildings and Structures

The subject site is currently occupied with a one (1) storey, slab-on-grade style office building, currently utilized as a denture care centre.

Areas of Natural Significance

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

Water Bodies

No water bodies are present on the subject site. The nearest named water body with respect to the subject site is the Ottawa River, located approximately 200 m to the north.

Drinking Water Wells

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

Neighbouring Land Use

Neighbouring land use within the Phase I study area consists mainly of residential, commercial, and institutional properties.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.1, four (4) 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 retail fuel outlet/auto service garage, located adjacent to the northeast of the subject site (75 Cleary Avenue);
- A former coal storage shed, located adjacent to the southwest of the subject site (801 Richmond Road);
- An existing auto service garage, adjacent to the southwest of the subject site (801 Richmond Road);
- Fill material of unknown quality, located beneath the subject site.

Other off-site PCAs were identified within the Phase I study area but were deemed not to be of any environmental concern to the subject site based on their separation distances as well as their down-gradient or cross-gradient orientation.

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);
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs);
- ❒ Metals (including mercury and hexavalent chromium).

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

Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I ESA is considered to be sufficient to conclude that there are PCAs and APECs associated with the subject site. The presence of these 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 March 3 and March 4, 2021 and consisted of drilling four (4) boreholes (BH1-BH4) throughout the subject site, of which three (3) were instrumented with groundwater monitoring wells (BH2-BH4). Boreholes BH2-BH4 were advanced to depths ranging from approximately 8.48 m to 9.91 m below the existing grade and terminated within the bedrock, whereas BH1 was terminated at a depth of approximately 5.97 m below the existing grade within a layer of grey silty sand on practical refusal to augering on inferred bedrock.

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 PE5190-3 – 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.

Thirty-five (35) 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.

The soil profile generally consists of asphaltic concrete, underlain by fill material over top of brown/grey silty sand with gravel and cobbles (glacial till), followed by interbedded dolostone and shale bedrock.

4.3 Field Screening Measurements

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

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

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

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

4.4 Groundwater Monitoring Well Installation

Three (3) groundwater monitoring wells were installed on the subject site as part of this Phase II ESA investigation. These monitoring wells were 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 wells were developed using a dedicated inertial lift pump, with a minimum of three (3) well volumes being removed from the wells at the time of installation. The wells were developed until the appearance of the water was noted to have stabilized. In addition, the ground surface elevations of each borehole were subsequently surveyed with respect to a known geodetic elevation.

Table 1
Monitoring Well Construction Details

Well ID	Ground Surface Elevation (m ASL)	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH2	64.11	8.48	6.98-8.48	6.40-8.48	0.25-6.40	Flushmount
BH3	64.27	9.91	8.41-9.91	7.60-9.91	0.10-7.60	Flushmount
BH4	64.07	9.68	8.18-9.68	7.57-9.68	0.18-7.57	Flushmount

4.5 Field Measurement of Water Quality Parameters

Groundwater monitoring and sampling was conducted at Boreholes BH2-BH4 on March 10 and March 16, 2021. No water quality parameters were measured in the field at that time.

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 2
Testing Parameters for Submitted Soil Samples

Sample ID	Sample Depth & Stratigraphic Unit	Parameters Analyzed					Rationale
		BTEX	PHCs (F_1-F_4)	PAHs	Metals[1]	pH	
BH1-SS2	0.76 m – 1.37 m Fill Material			X	X	X	To assess for potential impacts resulting from the presence of poor-quality fill material.
BH2-SS2	0.76 m – 1.37 m Fill Material			X	X		To assess for potential impacts resulting from the presence of poor-quality fill material.
BH2-SS7	4.57 m – 5.18 m Grey Clayey Silt	X	X			X	To assess for potential impacts resulting from the presence of an off-site auto service garage.
BH3-SS3	1.52 m – 2.13 m Fill Material			X	X		To assess for potential impacts resulting from the presence of poor-quality fill material.
BH3-SS10	6.86 m – 7.24 m Grey Silty Sand	X	X				To assess for potential impacts resulting from the historical presence of an off-site retail fuel outlet.
BH4-SS2	0.76 m – 1.37 m Fill Material			X	X		To assess for potential impacts resulting from the presence of poor-quality fill material.
BH4-SS9	6.10 m – 6.71 m Grey Silty Sand	X	X				To assess for potential impacts resulting from the historical presence of an off-site retail fuel outlet.
DUP1[2]	6.86 m – 7.24 m Grey Silty Sand	X	X				For laboratory QA/QC purposes.

1 – Includes Mercury and Hexavalent Chromium
2 – Duplicate sample of BH3-SS10

Table 3
Testing Parameters for Submitted Groundwater Samples

Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed		Rationale
		BTEX	PHCs F_1-F_4	
BH2-GW1	6.98 m – 8.48 m Bedrock	X	X	To assess for potential impacts resulting from the presence of an off-site auto service garage.
BH3-GW1	8.41 m – 9.91 m Bedrock	X	X	To assess for potential impacts resulting from the historical presence of an off-site retail fuel outlet.
BH4-GW1	8.18 m – 9.68 m Bedrock	X	X	To assess for potential impacts resulting from the historical presence of an off-site retail fuel outlet.
DUP1[1]	8.41 m – 9.91 m Bedrock	X	X	For laboratory QA/QC purposes.

1 – Duplicate sample of BH3-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 profile encountered at the borehole locations consists of asphaltic concrete, underlain by fill material over top of brown/grey silty sand with gravel, cobbles, and probable boulders (glacial till).

The fill material encountered beneath the asphaltic concrete ground surface at each borehole location consisted of brown silty sand and crushed stone (engineered fill as part of the pavement structure), underlain by brown silty sand with some gravel and organics, as well as trace amounts of asphalt and construction debris (brick fragments and glass shards).

Bedrock, consisting of dolostone with black shale seams, was encountered in BH2-BH4 at depths ranging from approximately 5.87 m to 7.34 m below the existing grade. Practical refusal to augering on inferred bedrock was encountered at BH1 at a depth of 5.97 m below the existing grade.

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 boreholes BH2-BH4 on March 16, 2021. The groundwater levels are summarized below in Table 4.

Table 4
Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH2	64.11	4.87	59.24	March 16, 2021
BH3	64.27	7.36	56.91	
BH4	64.07	6.10	57.97	

The groundwater at the subject site was generally encountered within the overburden at depths ranging from approximately 4.87 m to 7.36 m below the existing ground surface. No unusual visual or olfactory observations were noted within the recovered groundwater samples at the time of the sampling event.

Using the groundwater elevations recorded during the sampling event, groundwater contour mapping was completed as part of this assessment. According to the mapped contour data, illustrated on Drawing PE5190-3 – 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 0.123 m/m was also calculated as part of this assessment.

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

5.3 Fine/Coarse Soil Texture

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

5.4 Field Screening

Field screening of the soil samples collected during the drilling program resulted in organic vapour readings ranging from 0.1 ppm to 8.9 ppm. The organic vapour readings obtained from the field screening indicate that there is a negligible potential for the presence of volatile substances.

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

5.5 Soil Quality

Seven (7) soil samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), PAHs, Metals, and pH parameters. The results of the analytical testing are presented below in Tables 5 to 8, and on the laboratory certificates of analysis included in Appendix 1.

Table 5
Analytical Test Results – Soil
BTEX & PHCs (F_1-F_4)

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 1 Background Soil Standards (µg/g)	MECP Table 3 Residential Soil Standards (µg/g)
		March 3, 2021		March 4, 2021		
		BH2-SS7	BH3-SS10	BH4-SS9		
Benzene	0.02	nd	nd	nd	0.02	0.21
Ethylbenzene	0.05	nd	nd	nd	0.05	2
Toluene	0.05	nd	nd	nd	0.2	2.3
Xylenes	0.05	nd	nd	nd	0.05	3.1
PHCs F_1	7	nd	nd	nd	25	55
PHCs F_2	4	nd	nd	nd	10	230
PHCs F_3	8	nd	nd	60	240	1,700
PHCs F_4	6	nd	nd	26	120	3,300

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- Underlined – Value exceeds MECP Table 1 standards
- **Bold and Underlined** – value exceeds selected MECP standards

All detected BTEX and PHC concentrations in the soil samples analyzed are in compliance with the selected MECP Table 3 residential standards. The results also comply with the MECP Table 1 standards.

Table 6
Analytical Test Results – Soil
PAHs

Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 1 Background Soil Standards (µg/g)	MECP Table 3 Residential Soil Standards (µg/g)
		Mar. 3, 2021			Mar. 4, 2021		
		BH1-SS2	BH2-SS2	BH3-SS3	BH4-SS2		
Acenaphthene	0.02	0.05	0.04	nd	0.03	0.072	7.9
Acenaphthylene	0.02	0.14	**0.28**	0.08	**0.51**	0.093	0.15
Anthracene	0.02	0.20	0.33	0.08	0.38	0.16	0.67
Benzo[a]anthracene	0.02	**0.76**	0.42	0.14	**1.09**	0.36	0.5
Benzo[a]pyrene	0.02	**0.71**	**0.56**	0.18	**1.38**	0.3	0.3
Benzo[b]fluoranthene	0.02	0.44	0.59	0.20	**0.80**	0.47	0.78
Benzo[g,h,i]perylene	0.02	0.39	0.39	0.14	0.99	0.68	6.6
Benzo[k]fluoranthene	0.02	0.24	0.31	0.10	0.43	0.48	0.78
Chrysene	0.02	0.57	0.43	0.14	1.05	2.8	7
Dibenzo[a,h]anthracene	0.02	**0.12**	0.10	0.03	**0.23**	0.1	0.1
Fluoranthene	0.02	**1.51**	**0.88**	0.25	**1.65**	0.56	0.69
Fluorene	0.02	0.07	0.05	nd	0.03	0.12	62
Indeno[1,2,3-cd]pyrene	0.02	**0.39**	0.36	0.13	**0.88**	0.23	0.38
1-Methylnaphthalene	0.02	0.03	0.02	nd	nd	0.59	0.99
2-Methylnaphthalene	0.02	0.04	0.03	nd	0.02	0.59	0.99
Methylnaphthalene (1&2)	0.04	0.07	0.05	nd	nd	0.59	0.99
Naphthalene	0.01	0.08	0.05	0.02	0.05	0.09	0.6
Phenanthrene	0.02	0.89	0.57	0.14	0.36	0.69	6.2
Pyrene	0.02	1.20	0.71	0.24	1.63	1	78

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- Underlined – Value exceeds MECP Table 1 standards
- **Bold and Underlined** – value exceeds selected MECP standards

The concentration of several PAH parameters in BH1, BH2, and BH4 are in excess of the MECP Table 3 residential standards.

The concentration of several PAH parameters in soil samples BH1-SS2, BH2-SS2, and BH4-SS2 are in excess of the MECP Table 1 standards. These exceedances are not considered to pose a concern to the subject site, however, if the soil is ever to be removed from the property, it may have to be classified as contaminated and disposed of at an approved waste disposal site.

Table 7
Analytical Test Results – Soil
Metals

Parameter	MDL (µg/g)	Soil Samples (µg/g)				MECP Table 1 Background Soil Standards (µg/g)	MECP Table 3 Residential Soil Standards (µg/g)
		Mar. 3, 2021			Mar. 4, 2021		
		BH1-SS2	BH2-SS2	BH3-SS3	BH4-SS2		
Antimony	1.0	1.4	nd	nd	nd	1.3	7.5
Arsenic	1.0	7.8	4.4	15.7	3.9	18	18
Barium	1.0	276	140	276	226	220	390
Beryllium	0.5	0.8	nd	0.6	0.5	2.5	4
Boron	5.0	17.1	9.4	15.8	11.9	36	120
Cadmium	0.5	nd	nd	0.5	nd	1.2	1.2
Chromium	5.0	39.2	24.5	37.0	23.0	70	160
Chromium (VI)	0.2	nd	nd	nd	nd	0.66	8
Cobalt	1.0	10.3	8.0	11.4	8.6	21	22
Copper	5.0	50.5	22.5	44.6	22.4	92	140
Lead	1.0	**212**	52.4	**204**	87.3	120	120
Mercury	0.1	**0.5**	nd	nd	nd	0.27	0.27
Molybdenum	1.0	1.4	nd	nd	nd	2	6.9
Nickel	5.0	21.2	16.3	24.8	19.0	82	100
Selenium	1.0	nd	nd	nd	nd	1.5	2.4
Silver	0.3	0.4	nd	nd	nd	0.5	20
Thallium	1.0	nd	nd	nd	nd	1	1
Uranium	1.0	nd	nd	nd	nd	2.5	23
Vanadium	10.0	45.2	34.5	39.0	29.6	86	86
Zinc	20.0	142	76.2	168	86.2	290	340

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- Underlined – Value exceeds MECP Table 1 standards
- **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, with some exceptions. The concentrations of lead and mercury in BH1-SS2 as well as the concentration of lead in BH3-SS3 are in excess of the MECP Table 3 residential standards.

The concentration of barium in sample BH1-SS2, BH3-SS3, and BH4-SS2, as well as the concentration of antimony in sample BH1-SS2 are marginally in excess of the MECP Table 1 standards. These exceedances are not considered to pose an environmental concern to the subject site, however, if the soil is ever to be removed from the property, it may have to be classified as contaminated and disposed of at an approved waste disposal site.

Table 8
Analytical Test Results – Soil
pH

Parameter	MDL (units)	Soil Samples (units)		MECP Table 3 Residential Soil Standards (units)
		March 3, 2021		
		BH1-SS2	BH2-SS7	
pH	0.05	7.73	7.89	5.00 – 9.00

Notes:
- MDL – Method Detection Limit
- **Bold and Underlined** – value exceeds selected MECP standards

All detected pH levels in the soil samples analyzed are in compliance with the selected MECP Table 3 residential standards.

Table 9
Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
PHCs F_3	60	BH4-SS9	6.10 m – 6.71 m
PHCs F_4	26	BH4-SS9	6.10 m – 6.71 m
Acenaphthene	0.05	BH1-SS2	0.15 m – 0.61 m
Acenaphthylene	**0.51**	BH4-SS2	0.76 m – 1.37 m
Anthracene	0.38	BH4-SS2	0.76 m – 1.37 m
Benzo[a]anthracene	**1.09**	BH4-SS2	0.76 m – 1.37 m
Benzo[a]pyrene	**1.38**	BH4-SS2	0.76 m – 1.37 m
Benzo[b]fluoranthene	**0.80**	BH4-SS2	0.76 m – 1.37 m
Benzo[g,h,i]perylene	0.99	BH4-SS2	0.76 m – 1.37 m
Benzo[k]fluoranthene	0.43	BH4-SS2	0.76 m – 1.37 m
Chrysene	1.05	BH4-SS2	0.76 m – 1.37 m
Dibenzo[a,h]anthracene	**0.23**	BH4-SS2	0.76 m – 1.37 m
Fluoranthene	**1.65**	BH4-SS2	0.76 m – 1.37 m
Fluorene	0.07	BH1-SS2	0.15 m – 0.61 m
Indeno[1,2,3-cd]pyrene	**0.88**	BH4-SS2	0.76 m – 1.37 m
1-Methylnaphthalene	0.03	BH1-SS2	0.15 m – 0.61 m
2-Methylnaphthalene	0.04	BH1-SS2	0.15 m – 0.61 m
Methylnaphthalene (1&2)	0.07	BH1-SS2	0.15 m – 0.61 m
Naphthalene	0.08	BH1-SS2	0.15 m – 0.61 m
Phenanthrene	0.89	BH1-SS2	0.15 m – 0.61 m
Pyrene	1.63	BH4-SS2	0.76 m – 1.37 m
Antimony	1.4	BH1-SS2	0.15 m – 0.61 m
Arsenic	15.7	BH3-SS3	1.52 m – 2.13 m
Barium	276	BH1-SS2/BH3-SS3	0.15 m – 0.61 m / 1.52 m – 2.13 m
Beryllium	0.8	BH1-SS2	0.15 m – 0.61 m
Boron	17.1	BH1-SS2	0.15 m – 0.61 m
Cadmium	0.5	BH3-SS3	1.52 m – 2.13 m
Chromium	39.2	BH1-SS2	0.15 m – 0.61 m
Cobalt	11.4	BH3-SS3	1.52 m – 2.13 m
Copper	50.5	BH1-SS2	0.15 m – 0.61 m
Lead	**212**	BH1-SS2	0.15 m – 0.61 m
Mercury	**0.5**	BH1-SS2	0.15 m – 0.61 m
Molybdenum	1.4	BH1-SS2	0.15 m – 0.61 m
Nickel	24.8	BH3-SS3	1.52 m – 2.13 m
Silver	0.4	BH1-SS2	0.15 m – 0.61 m
Vanadium	45.2	BH1-SS2	0.15 m – 0.61 m
Zinc	168	BH3-SS3	1.52 m – 2.13 m
pH	7.89	BH2-SS7	4.57 m – 5.18 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.

5.6 Groundwater Quality

Groundwater samples were recovered from the monitoring wells installed in BH2-BH4 and submitted for laboratory analysis of BTEX and PHC (F_1-F_4) parameters. The results of the analytical testing are presented below in Table 10, as well as on the laboratory certificates of analysis included in Appendix 1.

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

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 3 Residential Groundwater Standards (µg/L)
		March 10, 2021			
		BH2-GW1	BH3-GW1	BH4-GW1	
Benzene	0.5	nd	nd	nd	44
Ethylbenzene	0.5	nd	nd	nd	2,300
Toluene	0.5	1.7	nd	nd	18,000
Xylenes	0.5	nd	nd	nd	4,200
PHC F_1	25	nd	nd	nd	750
PHC F_2	100	nd	nd	nd	150
PHC F_3	100	nd	189	nd	500
PHC F_4	100	nd	nd	nd	500

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

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

Table 11
Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Sample ID	Depth Interval (m BGS)
Toluene	1.7	BH2-GW1	6.98 m – 8.48 m
PHC F_3	189	BH3-GW1	8.41 m – 9.91 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

As per the Sampling and Analysis Plan, a duplicate soil sample was obtained from sample BH3-SS10 and submitted for laboratory analysis of BTEX and PHC F_1-F_4 parameters. No BTEX or PHC parameter concentrations were detected in either the original or the duplicate soil samples.

Similarly, a duplicate groundwater sample was obtained from the monitoring well installed in BH3 and submitted for laboratory analysis of BTEX and PHC F_1-F_4 parameters. The relative percent difference (RPD) calculations for the original and duplicate samples are provided below in Table 12.

Table 12
QA/QC Calculations – Groundwater

Parameter	MDL (µg/L)	BH3-GW1	DUP1	RPD (%)	QA/QC Result
Benzene	0.5	nd	nd	0	Meets Target
Ethylbenzene	0.5	nd	nd	0	Meets Target
Toluene	0.5	nd	nd	0	Meets Target
Xylenes	0.5	nd	nd	0	Meets Target
PHC F_1	25	nd	nd	0	Meets Target
PHC F_2	100	nd	nd	0	Meets Target
PHC F_3	100	189	nd	N/A	Does Not Meet Target
PHC F_4	100	nd	nd	0	Meets Target

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

The relative percent difference (RPD) calculated for one (1) of the parameters fell outside of the acceptable range of 20%, and thus does not meet the data quality objectives outlined in the Sampling and Analysis Plan, appended to this report. It should be noted, however, that the test results comply with the MECP Table 3 residential standards and that all remaining parameters were non-detect in both the original and the duplicate sample. As a result, the quality of the field data collected during this Phase II ESA is considered to be sufficient to meet the overall objectives of this assessment.

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

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

5.8 Phase II Conceptual Site Model

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

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

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 retail fuel outlet/auto service garage, located adjacent to the northeast of the subject site (75 Cleary Avenue).

- *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 lot on 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 retail fuel outlet/auto service garage, located adjacent to the northeast of the subject site (75 Cleary Avenue), as well as an existing auto service garage, located adjacent to the southwest (801 Richmond Road).

- *No Item Number: "Former Coal Storage Shed"*

This PCA was identified as a result of the presence of a former coal storage shed, located adjacent to the southwest of the subject site (801 Richmond Road).

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);
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs);
- ❒ Metals (including mercury and hexavalent chromium).

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

Subsurface Structures and Utilities

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; consisting of a 0.08 m thick layer of asphaltic concrete over top of engineered fill (brown silty sand with crushed stone) and extending to depths ranging from approximately 0.53 m to 0.69 m below ground surface;
- ❒ Fill material; consisting of brown silty sand with some gravel and organics, as well as trace amounts of asphalt, construction debris, brick fragments, and glass shards and extending to depths ranging from approximately 1.52 m to 2.29 m below ground surface;
- ❒ Glacial till; consisting of brown/grey silty sand with gravel, cobbles, and possible boulders and extending to depths ranging from approximately 5.87 m to 7.34 m below ground surface.
- ❒ Interbedded dolostone bedrock with shale seams; encountered at depths ranging from approximately 5.87 m to 7.34 m below the existing grade.

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

Hydrogeological Characteristics

The groundwater at the subject site was generally encountered within the overburden at BH2-BH4 at depths ranging from approximately 4.87 m to 7.36 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 dolostone with shale seams, was encountered in BH2-BH4 at depths ranging from approximately 5.87 m to 7.34 m below the existing grade. Practical refusal to augering on inferred bedrock was encountered at BH1 at a depth of 5.97 m below the existing grade.

Approximate Depth to Water Table

The depth to the water table is approximately 4.87 m to 7.36 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.

Existing Buildings and Structures

The subject site is currently occupied with a one (1) storey, slab-on-grade style office building, currently utilized as a denture care centre. The remainder of the property is covered by an asphaltic concrete parking lot and laneway.

Water Bodies and Areas of Natural and Scientific Interest

No water bodies or areas of natural and scientific interest are present on the subject site. The nearest named water body with respect to the subject site is the Ottawa River, located approximately 200 m to the north.

Proposed Buildings and Other Structures

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

Environmental Condition

Areas Where Contaminants are Present

According to the analytical test results, PAH and/or metal impacted fill material was identified in all four (4) boreholes placed on the subject site.

No contaminant concentrations exceeding the MECP Table 3 residential standards were identified in the native soils or groundwater beneath the subject site.

Types of Contaminants

According to the analytical test results, the contaminants of concern identified in the fill at concentrations exceeding the selected MECP Table 3 residential standards include:

- *Polycyclic Aromatic Hydrocarbons*: (acenaphthylene, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenzo[a,h]anthracene, fluoranthene, as well as indeno[1,2,3-cd]pyrene);
- *Metals*: (mercury and lead).

Contaminated Media

Based on the findings of this Phase II ESA, the fill material is impacted with various PAH and metal parameters.

As noted above, the native soils and the groundwater beneath the subject site are not contaminated.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of this Phase II ESA, PAH and/or metal impacted fill was identified in all four (4) boreholes placed throughout the subject site. This contaminated fill is considered likely to have been the result of the importation and placement of poor quality fill material (soil mixed with demolition debris).

Distribution and Migration of Contaminants

As previously noted, PAH and/or metal impacted fill was identified at all four (4) borehole locations. Based on their low mobility, it is anticipated that these contaminants are contained within the fill material beneath the subject site.

Discharge of Contaminants

The PAH and/or metal impacted fill identified is considered likely to be the result of the importation and placement of poor quality fill material on the subject site (soil mixed with demolition debris).

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, and the type of contaminants do not readily dissolve. Fluctuations in the groundwater level and groundwater flow are also not considered to have affected contaminant distribution based on the depth of the water table, well below the shallow fill material.

Potential for Vapour Intrusion

Given the the low-volatility of these contaminants, the potential for vapours to be present within the slab-on-grade subject structure is considered to be low and does not pose a safety hazard to the current occupants.

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

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the property addressed 797 Richmond Road, 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 March 3 and March 4, 2021 and consisted of drilling four (4) boreholes (BH1-BH4) throughout the subject site, of which three (3) were instrumented with groundwater monitoring wells (BH2-BH4). Boreholes BH2-BH4 were advanced to depths ranging from approximately 8.48 m to 9.91 m below the existing ground surface and terminated within the bedrock, whereas BH1 was terminated at a depth of approximately 5.97 m below the existing ground surface within a layer of grey silty sand on practical refusal to augering on inferred bedrock.

Seven (7) soil samples were submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), PAHs, metals, and pH parameters. Based on the analytical test results, the concentrations of several PAH and/or metal parameters identified in the shallow fill samples from all four (4) boreholes were in excess of the selected MECP Table 3 residential standards. No contamination was identified in the native soil samples.

Three (3) groundwater samples were recovered from the monitoring wells installed in BH2-BH4 and submitted for laboratory analysis of BTEX and PHC (F_1-F_4) parameters. Based on the analytical test results, all detected parameter concentrations in the groundwater samples analyzed comply with the selected MECP Table 3 residential standards.

Recommendations

Soil

Based on the findings of this assessment, PAH and/or metal impacted fill material was identified in all four (4) boreholes placed throughout subject site, 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.

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

While the PAH and metal contaminants are expected to reside only in the fill layer, well above the water table, consideration should be given to sampling the wells for these parameters prior to the commencement of any construction activities.

Monitoring Wells

If the groundwater monitoring wells installed on-site (BH2-BH4) 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 Dentech Holdings Inc. Permission and notification from Dentech Holdings 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:

- Dentech Holdings Inc.
- Paterson Group Inc.

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE5190-3 – TEST HOLE LOCATION PLAN

DRAWING PE5190-4 – ANALYTICAL TESTING PLAN – SOIL (BTEX & PHCs)

DRAWING PE5190-4A – CROSS SECTION A-A' – SOIL (BTEX & PHCs)

DRAWING PE5190-4B – CROSS SECTION B-B' – SOIL (BTEX & PHCs)

DRAWING PE5190-5 – ANALYTICAL TESTING PLAN – SOIL (PAHs)

DRAWING PE5190-5A – CROSS SECTION A-A' – SOIL (PAHs)

DRAWING PE5190-5B – CROSS SECTION B-B' – SOIL (PAHs)

DRAWING PE5190-6 – ANALYTICAL TESTING PLAN – SOIL (METALS)

DRAWING PE5190-6A – CROSS SECTION A-A' – SOIL (METALS)

DRAWING PE5190-6B – CROSS SECTION B-B' – SOIL (METALS)

DRAWING PE5190-7 – ANALYTICAL TESTING PLAN – GROUNDWATER

DRAWING PE5190-7A – CROSS SECTION A-A' – GROUNDWATER

DRAWING PE5190-7B – CROSS SECTION B-B' – GROUNDWATER

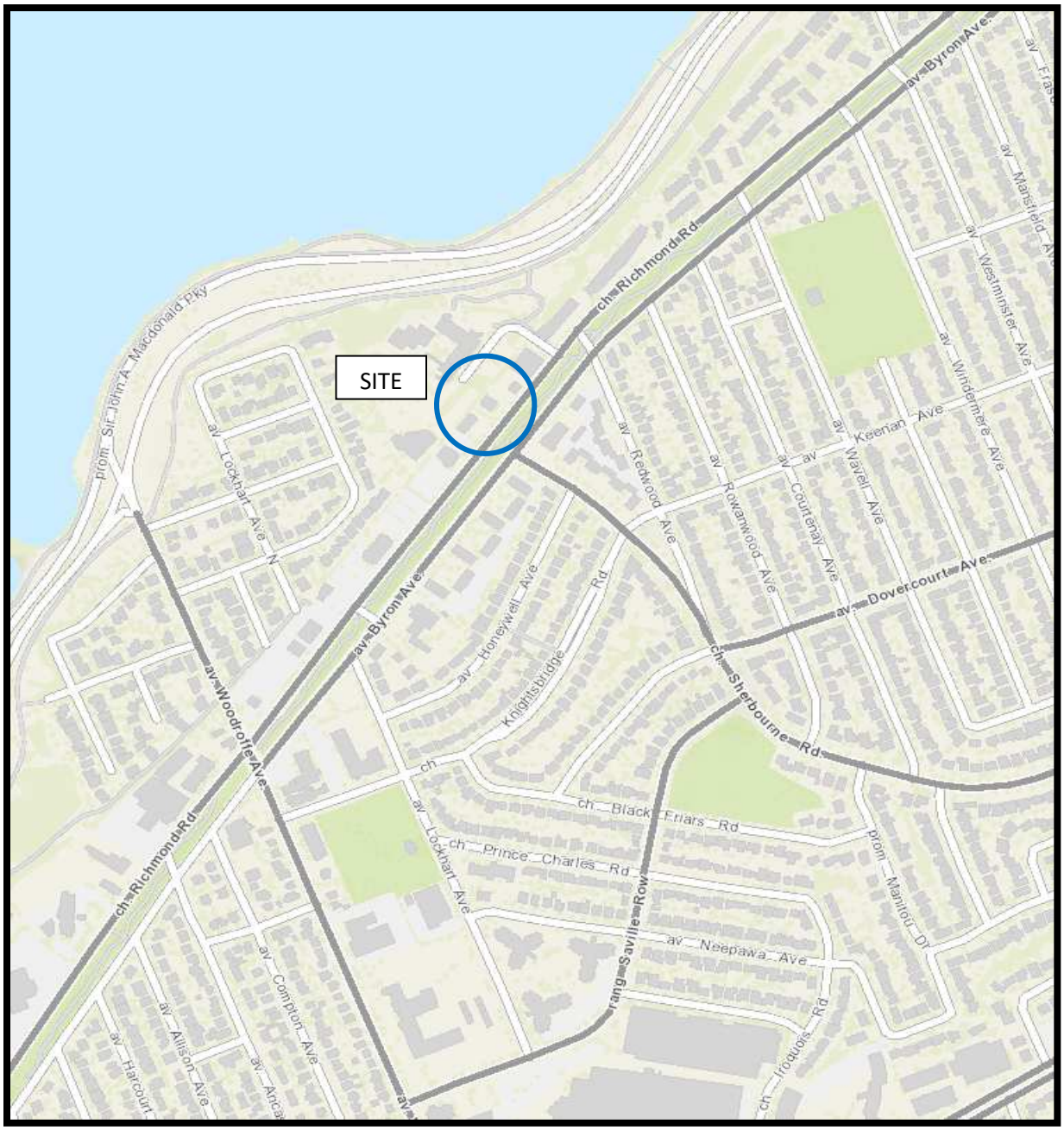
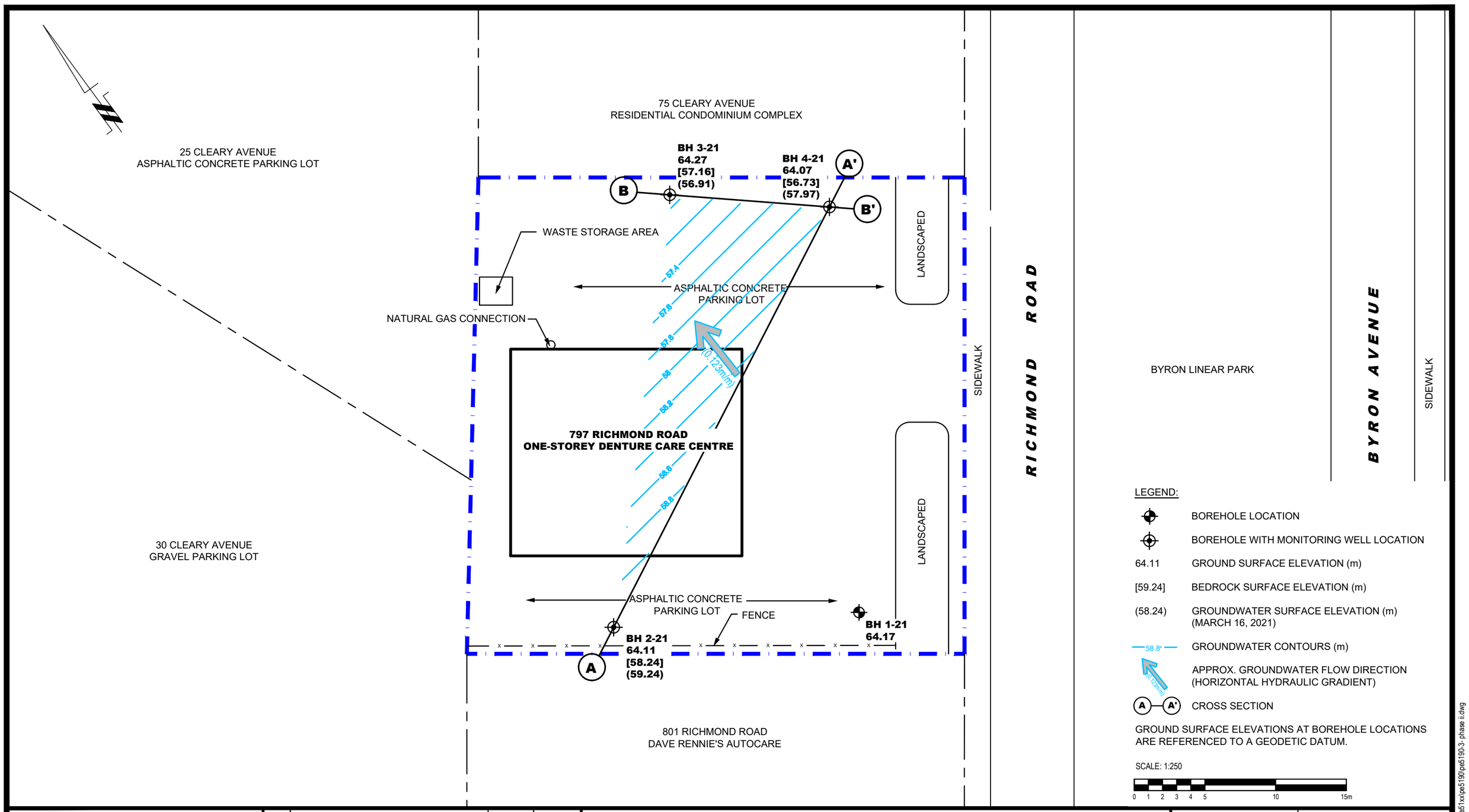


FIGURE 1

KEY PLAN



LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 64.11 GROUND SURFACE ELEVATION (m)
- [59.24] BEDROCK SURFACE ELEVATION (m)
- (58.24) GROUNDWATER SURFACE ELEVATION (m) (MARCH 16, 2021)
- 58.8 GROUNDWATER CONTOURS (m)
- APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)
- A — A' CROSS SECTION

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

SCALE: 1:250

0 1 2 3 4 5 10 15m

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NO.	REVISIONS	DATE	INITIAL

DENTECH HOLDINGS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
797 RICHMOND ROAD

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:250	Date: 04/2021
Drawn by: JM	Report No.: PE5190-2
Checked by: NS	Dwg No.: PE5190-3
Approved by: MSD	Revision No.:

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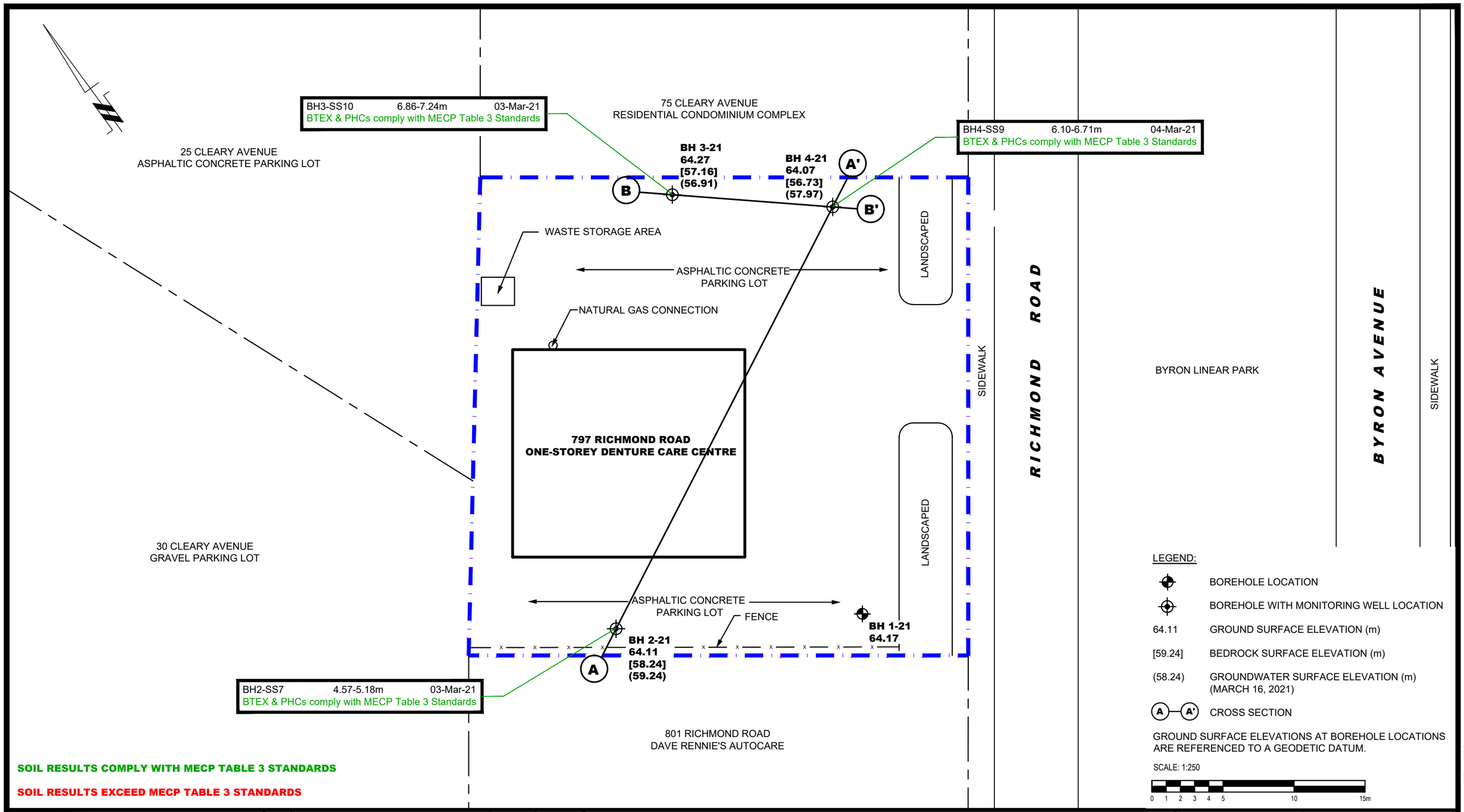

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NO.	REVISIONS	DATE	INITIAL

DENTECH HOLDINGS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
797 RICHMOND ROAD

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (BTEX, PHCs)

Scale: 1:250	Date: 04/2021
Drawn by: JM	Report No.: PE5190-2
Checked by: NS	Dwg No.: PE5190-4
Approved by: MSD	Revision No.:

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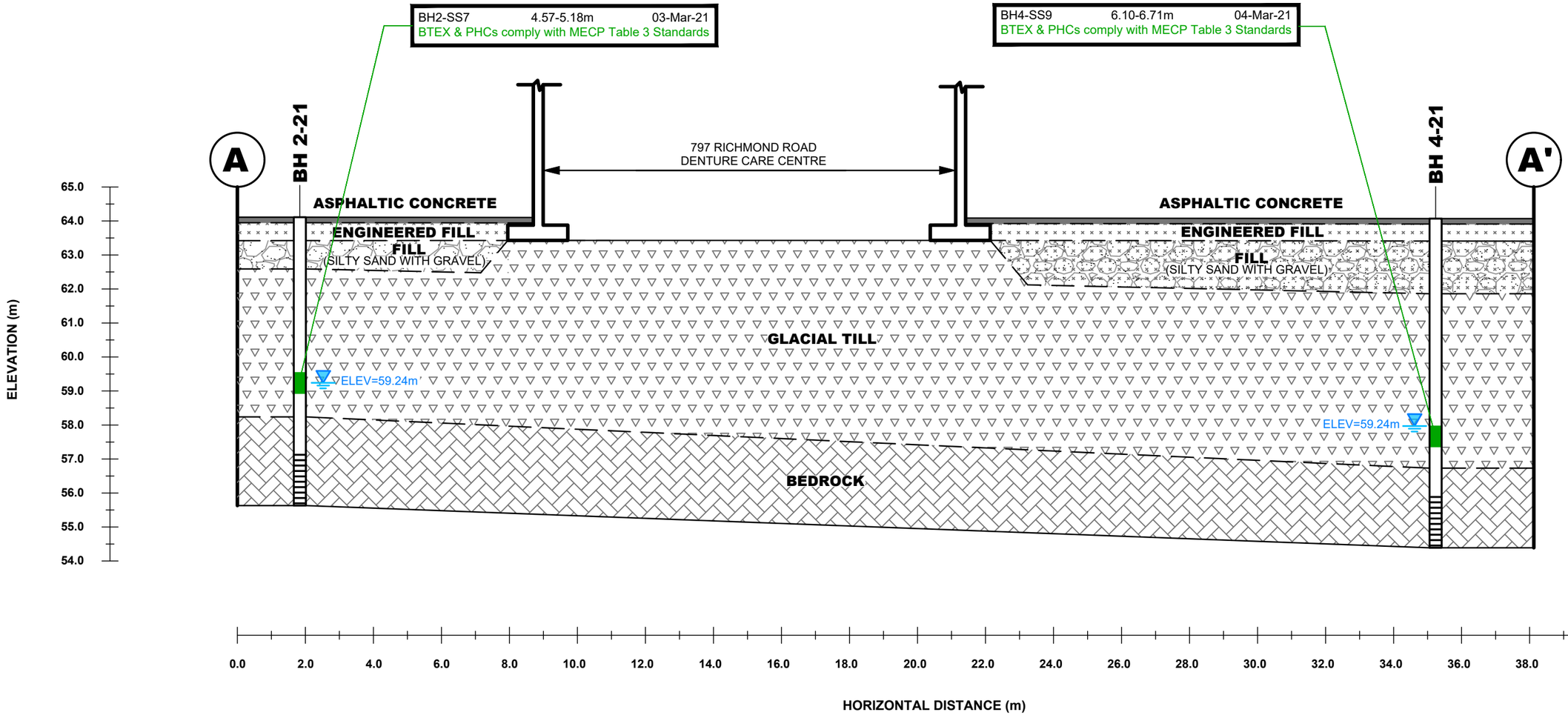

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL

DENTECH HOLDINGS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
797 RICHMOND ROAD

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (BTEX, PHCs)

Scale: AS SHOWN	Date: 04/2021
Drawn by: YA	Report No.: PE5190-2
Checked by: NS	Dwg No.: PE5190-4A
Approved by: MSD	Revision No.:

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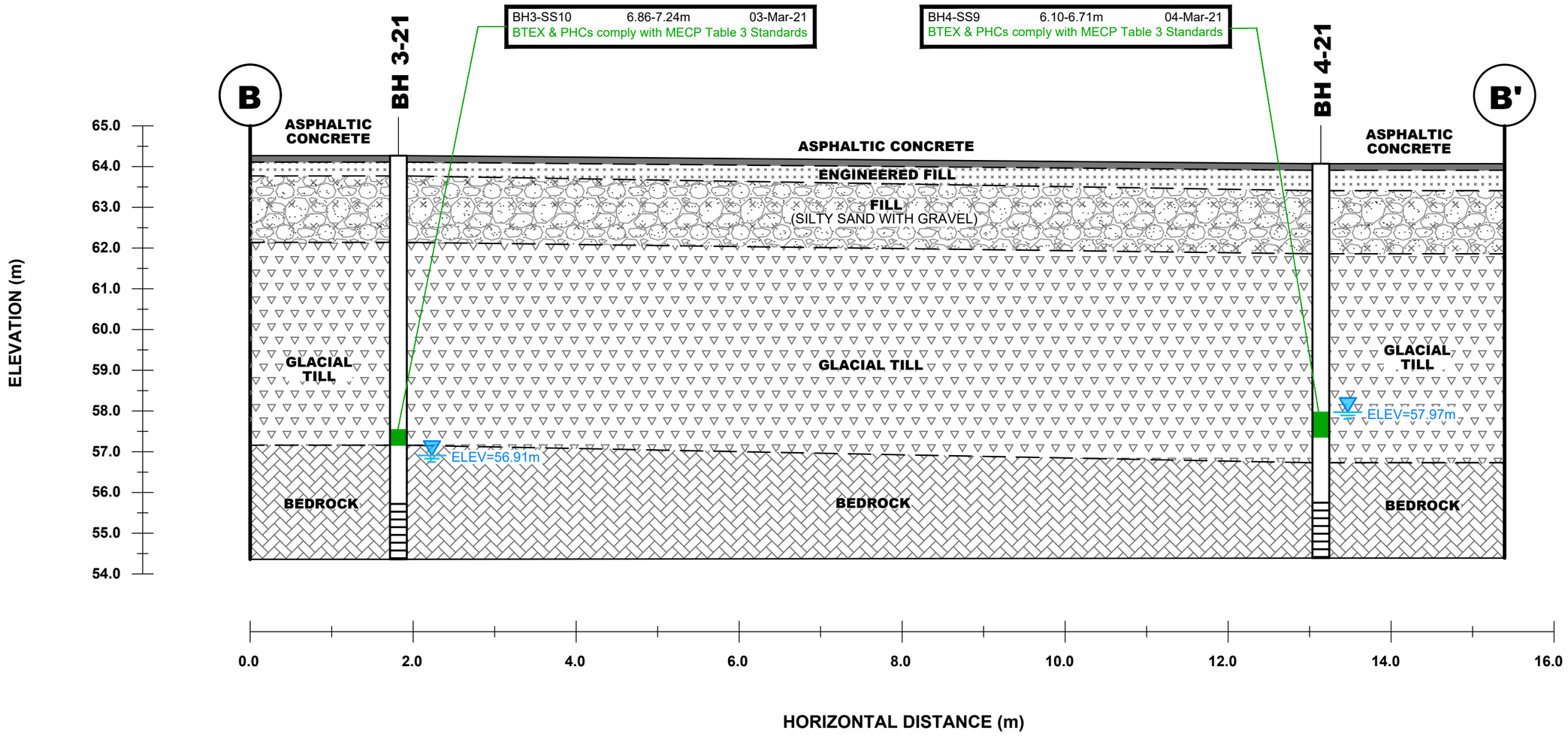

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
797 RICHMOND ROAD

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (BTEX, PHCs)

Scale: AS SHOWN	Date: 04/2021
Drawn by: YA	Report No.: PE5190-2
Checked by: NS	Dwg No.: **PE5190-4B**
Approved by: MSD	Revision No.:

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BH3-SS3 1.52-2.13m 03-Mar-21
PAHs comply with MECP Table 3 Standards

75 CLEARY AVENUE
RESIDENTIAL CONDOMINIUM COMPLEX

25 CLEARY AVENUE
ASPHALTIC CONCRETE PARKING LOT

BH 3-21
64.27
[57.16]
(56.91)

BH 4-21
64.07
[56.73]
(57.97)

B

B'

A'

WASTE STORAGE AREA

ASPHALTIC CONCRETE
PARKING LOT

NATURAL GAS CONNECTION

LANDSCAPED

SIDEWALK

797 RICHMOND ROAD
ONE-STOREY DENTURE CARE CENTRE

BH4-SS2	0.76-1.37m	04-Mar-21
PARAMETER	RESULT(µg/g)	STANDARD(µg/g)
Acenapthylene	0.51	0.15
Benzo[a]anthracene	1.09	0.5
Benzo[a]pyrene	1.38	0.3
Benzo[b]fluoranthene	0.80	0.78
Dibenzo[a,h]anthracene	0.23	0.1
Fluoranthene	1.65	0.69
Indeno[1,2,3-cd]pyrene	0.88	0.38
Remaining PAHs comply with MECP Table 3 Standards		

RICHMOND ROAD

BYRON LINEAR PARK

BYRON AVENUE

SIDEWALK

BH1-SS2	0.76-1.37m	03-Mar-21
PARAMETER	RESULT(µg/g)	STANDARD(µg/g)
Benzo[a]anthracene	0.76	0.5
Benzo[a]pyrene	0.71	0.3
Dibenzo[a,h]anthracene	0.12	0.1
Fluoranthene	1.51	0.69
Indeno[1,2,3-cd]pyrene	0.39	0.38
Remaining PAHs comply with MECP Table 3 Standards		

30 CLEARY AVENUE
GRAVEL PARKING LOT

ASPHALTIC CONCRETE
PARKING LOT

FENCE

BH 2-21
64.11
[58.24]
(59.24)

BH 1-21
64.17

A

BH2-SS2	0.76-1.37m	03-Mar-21
PARAMETER	RESULT(µg/g)	STANDARD(µg/g)
Acenapthylene	0.28	0.15
Benzo[a]pyrene	0.56	0.3
Fluoranthene	0.88	0.69
Remaining PAHs comply with MECP Table 3 Standards		

801 RICHMOND ROAD
DAVE RENNIE'S AUTOCARE

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 64.11 GROUND SURFACE ELEVATION (m)
- [59.24] BEDROCK SURFACE ELEVATION (m)
- (58.24) GROUNDWATER SURFACE ELEVATION (m) (MARCH 16, 2021)
- A — A' CROSS SECTION

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

SCALE: 1:250

0 1 2 3 4 5 10 15m

patersongroup
consulting engineers

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NO.	REVISIONS	DATE	INITIAL

DENTECH HOLDINGS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
797 RICHMOND ROAD

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (PAHs)

Scale: 1:250	Date: 04/2021
Drawn by: JM	Report No.: PE5190-2
Checked by: NS	Dwg No.: PE5190-5
Approved by: MSD	Revision No.:

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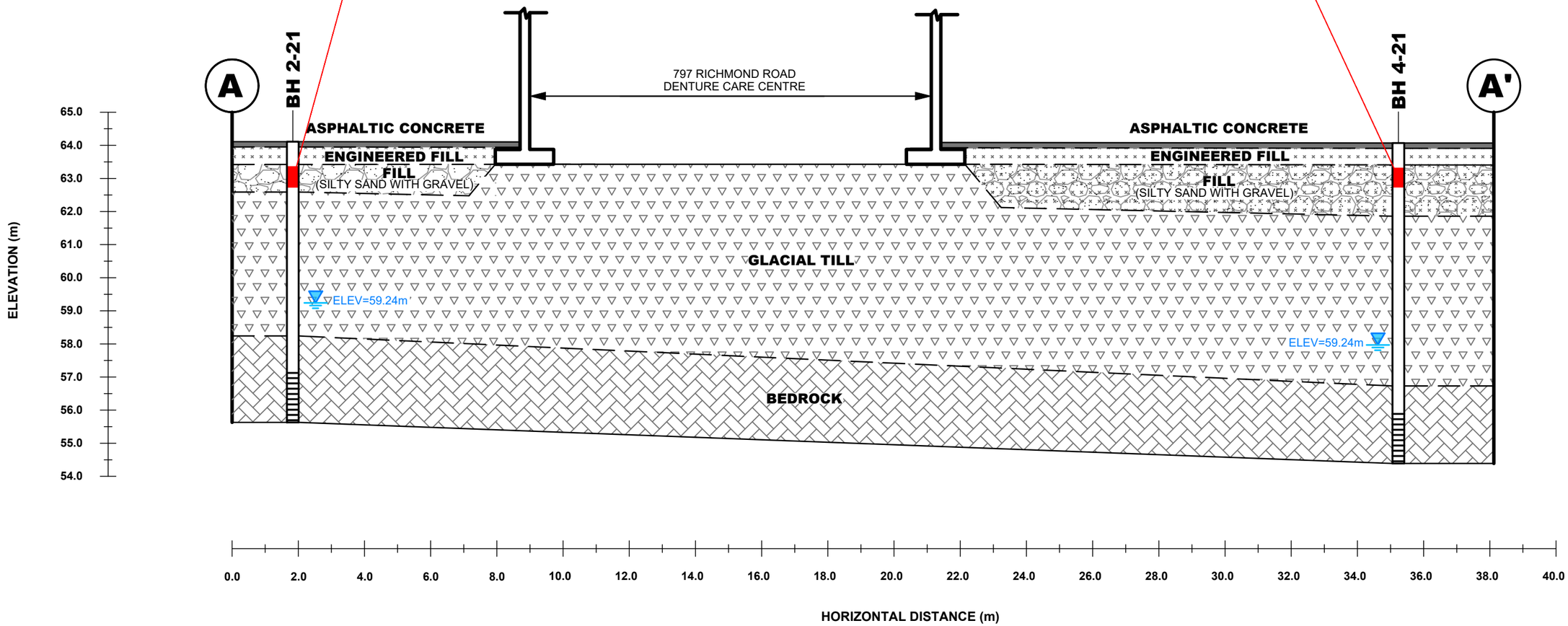
BH2-SS2	0.76-1.37m	03-Mar-21
PARAMETER	RESULT(µg/g)	STANDARD(µg/g)
Acenapthylene	0.28	0.15
Benzo[a]pyrene	0.56	0.3
Fluoranthene	0.88	0.69
Remaining PAHs comply with MECP Table 3 Standards		

BH4-SS2	0.76-1.37m	04-Mar-21
PARAMETER	RESULT(µg/g)	STANDARD(µg/g)
Acenapthylene	0.51	0.15
Benzo[a]anthracene	1.09	0.5
Benzo[a]pyrene	1.38	0.3
Benzo[b]fluoranthene	0.80	0.78
Dibenzo[a,h]anthracene	0.23	0.1
Fluoranthene	1.65	0.69
Indeno[1,2,3-cd]pyrene	0.88	0.38
Remaining PAHs 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
797 RICHMOND ROAD

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (PAHs)

Scale: AS SHOWN	Date: 04/2021
Drawn by: YA	Report No.: PE5190-2
Checked by: NS	Dwg No.: PE5190-5A
Approved by: MSD	Revision No.:

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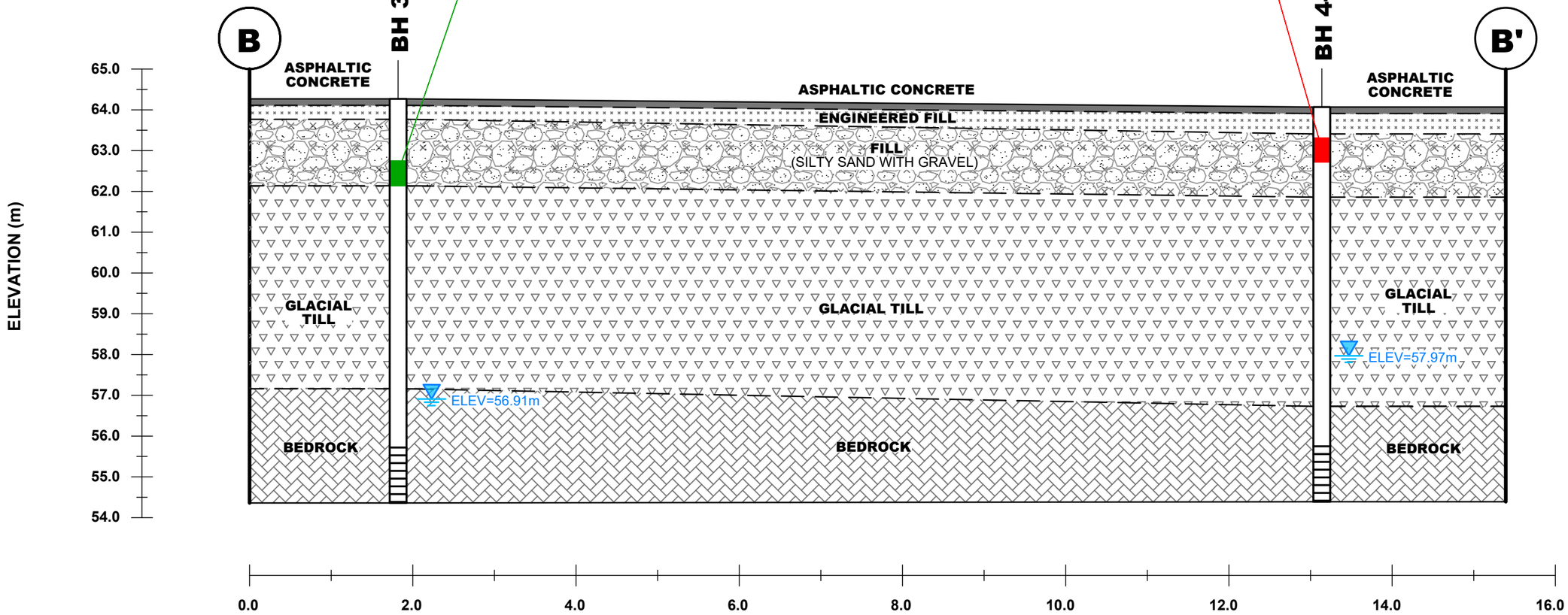
BH3-SS3	1.52-2.13m	03-Mar-21
PAHs comply with MECP Table 3 Standards		

BH4-SS2	0.76-1.37m	04-Mar-21
PARAMETER	RESULT(µg/g)	STANDARD(µg/g)
Acenapthylene	0.51	0.15
Benzo[a]anthracene	1.09	0.5
Benzo[a]pyrene	1.38	0.3
Benzo[b]fluoranthene	0.80	0.78
Dibenzo[a,h]anthracene	0.23	0.1
Fluoranthene	1.65	0.69
Indeno[1,2,3-cd]pyrene	0.88	0.38
Remaining PAHs comply with MECP Table 3 Standards		



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SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
797 RICHMOND ROAD

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (PAHs)

Scale: AS SHOWN	Date: 04/2021
Drawn by: YA	Report No.: PE5190-2
Checked by: NS	Dwg No.: PE5190-5B
Approved by: MSD	Revision No.:

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BH3-SS3	1.52-2.13m	03-Mar-21
PARAMETER	RESULT(µg/g)	STANDARD(µg/g)
Lead	204	120
Remaining Metals comply with MECP Table 3 Standards		

BH4-SS2	0.76-1.37m	04-Mar-21
Metals comply with MECP Table 3 Standards		

BH1-SS2	0.15-0.61m	03-Mar-21
PARAMETER	RESULT(µg/g)	STANDARD(µg/g)
Lead	212	120
Mercury	0.5	0.27
Remaining Metals comply with MECP Table 3 Standards		

BH2-SS2	0.76-1.37m	03-Mar-21
Metals comply with MECP Table 3 Standards		

75 CLEARY AVENUE
RESIDENTIAL CONDOMINIUM COMPLEX

25 CLEARY AVENUE
ASPHALTIC CONCRETE PARKING LOT

30 CLEARY AVENUE
GRAVEL PARKING LOT

801 RICHMOND ROAD
DAVE RENNIE'S AUTOCARE

BYRON LINEAR PARK

797 RICHMOND ROAD
ONE-STOREY DENTURE CARE CENTRE

BH 3-21
64.27
[57.16]
(56.91)

BH 4-21
64.07
[56.73]
(57.97)

BH 2-21
64.11
[58.24]
(59.24)

BH 1-21
64.17

WATER STORAGE AREA

ASPHALTIC CONCRETE PARKING LOT

NATURAL GAS CONNECTION

ASPHALTIC CONCRETE PARKING LOT

FENCE

LANDSCAPED

LANDSCAPED

SIDEWALK

SIDEWALK

RICHMOND ROAD

BYRON AVENUE

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 64.11 GROUND SURFACE ELEVATION (m)
- [59.24] BEDROCK SURFACE ELEVATION (m)
- (58.24) GROUNDWATER SURFACE ELEVATION (m) (MARCH 16, 2021)
- A — A' CROSS SECTION

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

SCALE: 1:250

0 1 2 3 4 5 10 15m

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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DENTECH HOLDINGS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
797 RICHMOND ROAD

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (METALS)

Scale: 1:250	Date: 04/2021
Drawn by: JM	Report No.: PE5190-2
Checked by: NS	Dwg No.: **PE5190-6**
Approved by: MSD	Revision No.:

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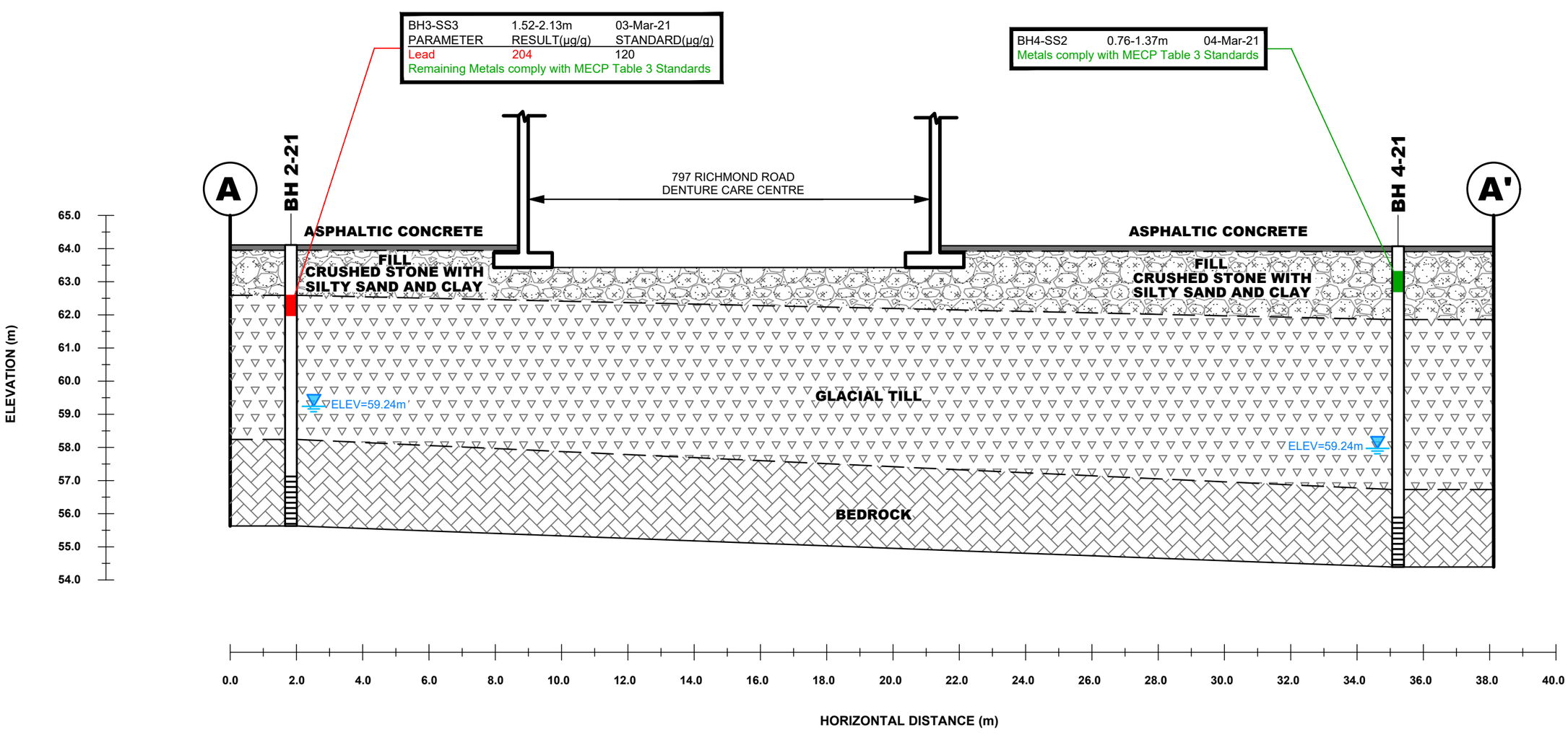
BH3-SS3	1.52-2.13m	03-Mar-21
PARAMETER	RESULT(µg/g)	STANDARD(µg/g)
Lead	204	120

Remaining Metals comply with MECP Table 3 Standards

BH4-SS2 0.76-1.37m 04-Mar-21
Metals 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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NO.	REVISIONS	DATE	INITIAL

DENTECH HOLDINGS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
797 RICHMOND ROAD

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (METALS)

Scale: AS SHOWN	Date: 04/2021
Drawn by: YA	Report No.: PE5190-2
Checked by: NS	Dwg No.: PE5190-6A
Approved by: MSD	Revision No.:

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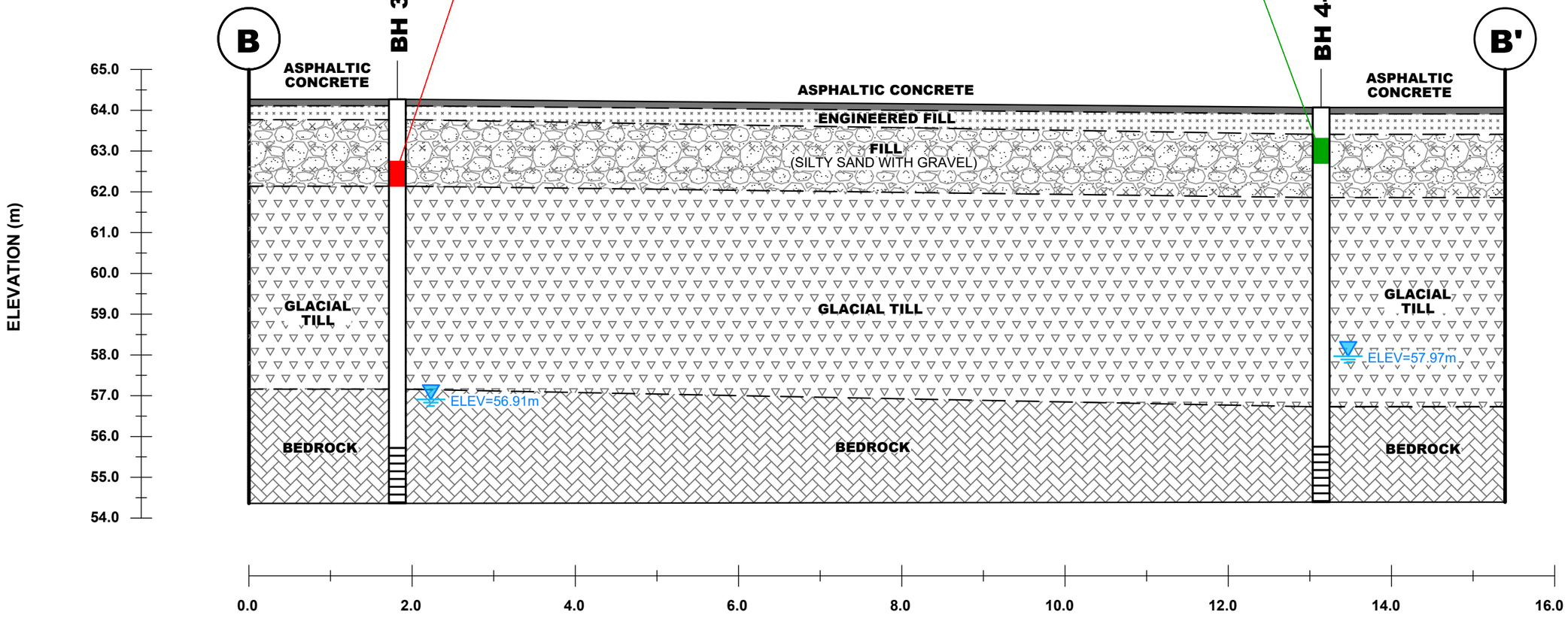
BH3-SS3	1.52-2.13m	03-Mar-21
PARAMETER	RESULT(µg/g)	STANDARD(µg/g)
Lead	204	120

Remaining Metals comply with MECP Table 3 Standards

BH4-SS2 0.76-1.37m 04-Mar-21
Metals 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
797 RICHMOND ROAD

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (METALS)

Scale: AS SHOWN	Date: 04/2021
Drawn by: YA	Report No.: PE5190-2
Checked by: NS	Dwg No.: PE5190-6B
Approved by: MSD	Revision No.:

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BH3-GW1 8.41-9.91m 10-Mar-21
BTEX & PHCs comply with MECP Table 3 Standards

BH4-GW1 8.18-9.68m 10-Mar-21
BTEX & PHCs comply with MECP Table 3 Standards

BH2-GW1 6.98-8.48m 10-Mar-21
BTEX & PHCs comply with MECP Table 3 Standards

75 CLEARY AVENUE
RESIDENTIAL CONDOMINIUM COMPLEX

25 CLEARY AVENUE
ASPHALTIC CONCRETE PARKING LOT

30 CLEARY AVENUE
GRAVEL PARKING LOT

801 RICHMOND ROAD
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BH 3-21
64.27
[57.16]
(56.91)

BH 4-21
64.07
[56.73]
(57.97)

BH 2-21
64.11
[58.24]
(59.24)

BH 1-21
64.17

A
A'
B
B'

WASTE STORAGE AREA

ASPHALTIC CONCRETE PARKING LOT

NATURAL GAS CONNECTION

797 RICHMOND ROAD
ONE-STOREY DENTURE CARE CENTRE

ASPHALTIC CONCRETE PARKING LOT

FENCE

LANDSCAPED

LANDSCAPED

SIDEWALK

RICHMOND ROAD

BYRON LINEAR PARK

BYRON AVENUE

SIDEWALK

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 64.11 GROUND SURFACE ELEVATION (m)
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- A — A' CROSS SECTION

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

SCALE: 1:250

0 1 2 3 4 5 10 15m

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NO.	REVISIONS	DATE	INITIAL

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
797 RICHMOND ROAD

OTTAWA, ONTARIO

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

Scale: 1:250	Date: 04/2021
Drawn by: JM	Report No.: PE5190-2
Checked by: NS	Dwg No.: PE5190-7
Approved by: MSD	Revision No.:

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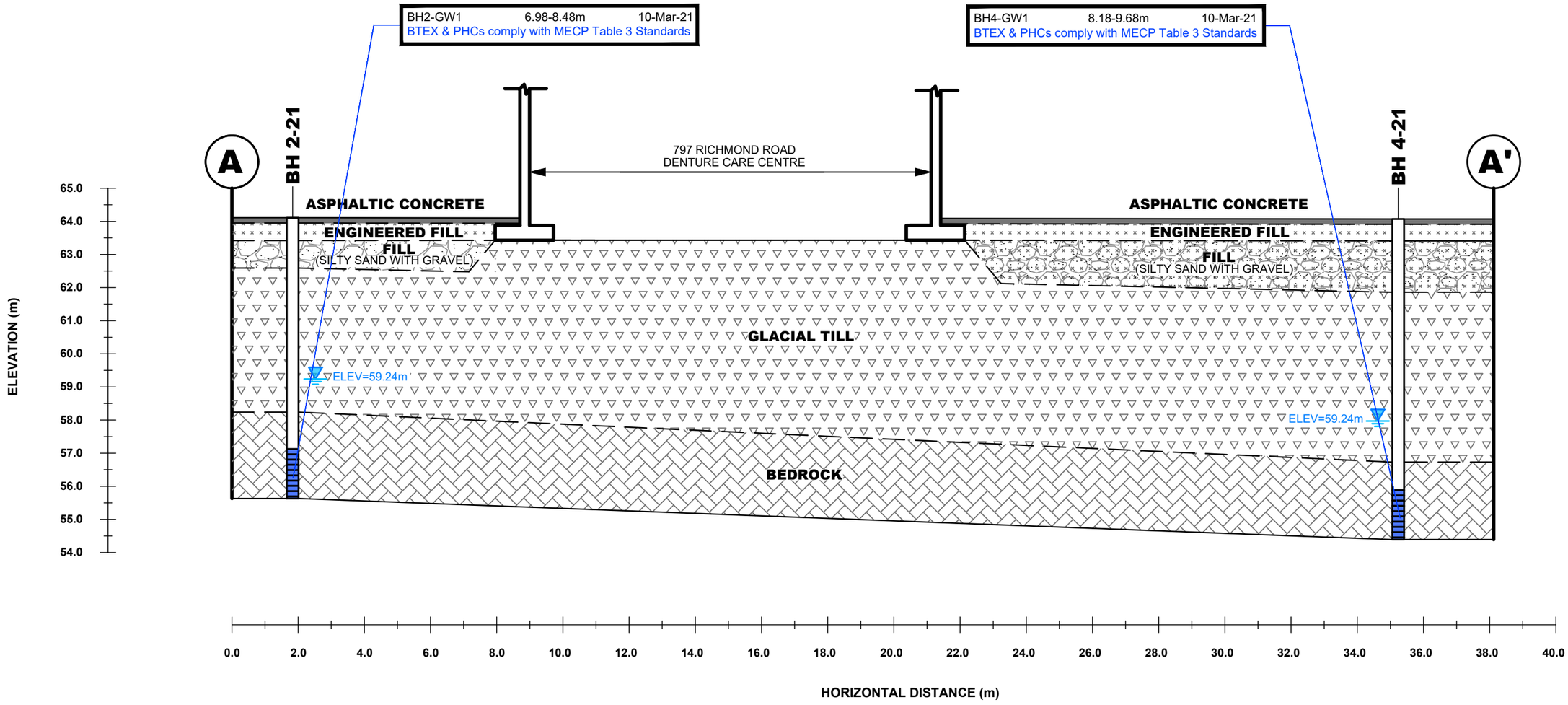

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
797 RICHMOND ROAD

OTTAWA, ONTARIO

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

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

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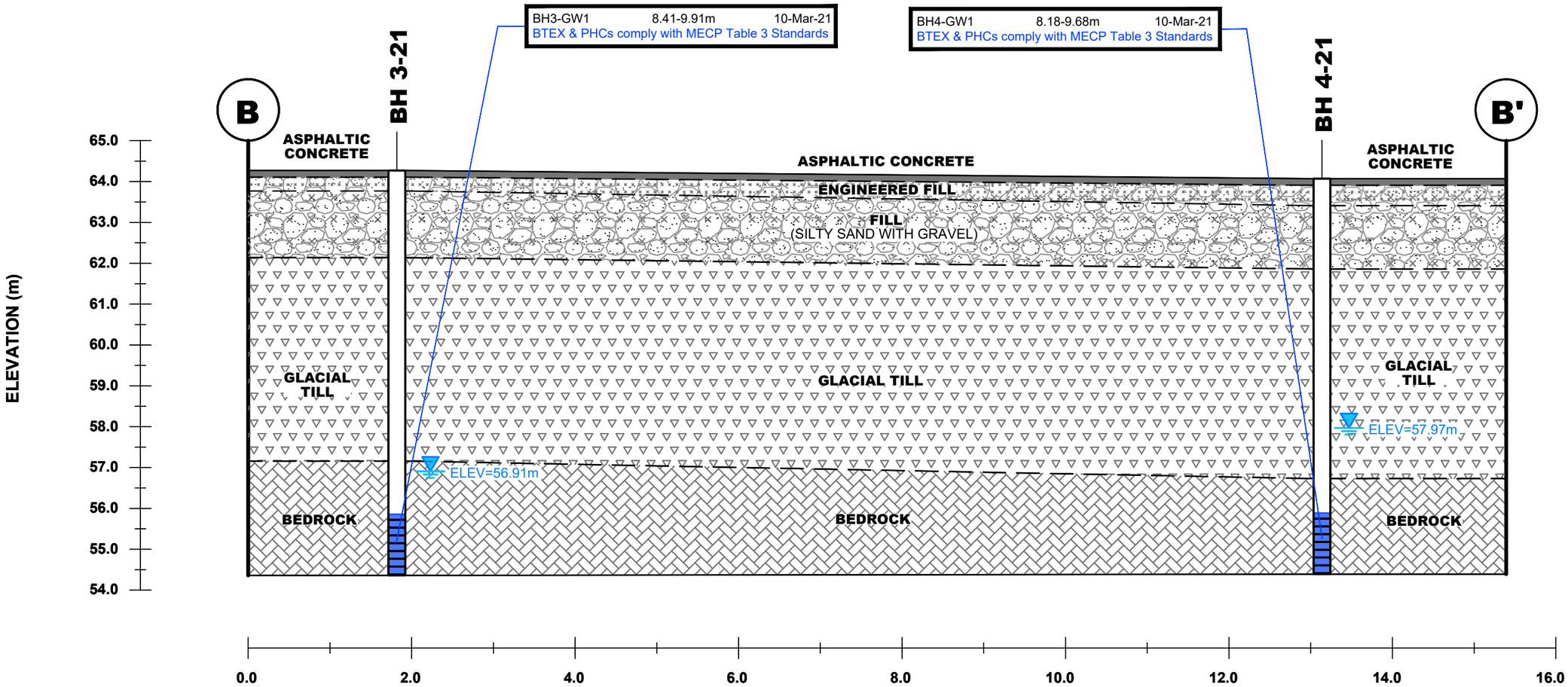

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

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OTTAWA, ONTARIO

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Approved by: MSD	Revision No.:

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Paterson Group Inc.

Consulting Engineers
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patersongroup

Sampling & Analysis Plan

Phase II – Environmental Site Assessment
797 Richmond Road
Ottawa, Ontario

Prepared For

Dentech Holdings Inc.

February 22, 2021

Report: PE5190-SAP

TABLE OF CONTENTS

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Dentech Holdings Inc., to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for the property addressed 797 Richmond Road, 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	Southern portion of subject site; to assess for potential impacts resulting from the presence of a former off-site coal storage shed and existing off-site auto service garage to the southwest.	6-8 m; for geotechnical and general coverage purposes.
BH2	Western portion of subject site; to assess for potential impacts resulting from the presence a former off-site coal storage shed and existing off-site auto service garage to the southwest.	8-10 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH3	Northern portion of subject site; to assess for potential impacts resulting from the presence of a former off-site retail fuel outlet/auto service garage.	8-10 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.
BH4	Eastern portion of subject site; to assess for potential impacts resulting from the presence of a former off-site retail fuel outlet/auto service garage.	8-10 m; to intercept the groundwater table for the purpose of installing a groundwater monitoring well.

Borehole locations are shown on Drawing PE5190-3 – Test Hole Location Plan, appended to the main report.

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

Following the borehole drilling, groundwater monitoring wells will be installed in boreholes BH2, BH3, and BH4 for the collection of groundwater samples.

2.0 ANALYTICAL TESTING PROGRAM

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

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

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

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

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

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

Drilling Procedure

The actual drilling procedure for environmental boreholes is the same as geotechnical boreholes (see SOP for drilling and sampling) with a few exceptions as follows:

- ❒ Continuous split spoon samples (every 0.6 m or 2') or semi-continuous (every 0.76 m or 2'6") are required.
- ❒ Make sure samples are well sealed in plastic bags with no holes prior to screening and are kept cool but unfrozen.
- ❒ If sampling for VOCs, BTEX, or PHCs F_1, a soil core from each soil sample, which may be analyzed, must be taken and placed in the laboratory-provided methanol vial.
- ❒ Note all and any odours or discolouration of samples.
- ❒ Split spoon samplers must be washed between samples.
- ❒ If obvious contamination is encountered, continue sampling until vertical extent of contamination is delineated.
- ❒ As a general rule, environmental boreholes should be deep enough to intercept the groundwater table (unless this is impossible/impractical - call project manager to discuss).
- ❒ If at all possible, soil samples should be submitted to a preliminary screening procedure on site, either using a RKI Eagle, PID, etc. depending on type of suspected contamination.

Spoon Washing Procedure

All sampling equipment (spilt spoons, etc.) must be washed between samples in order to prevent cross contamination of soil samples.

- ❒ Obtain two buckets of water (preferably hot if available)
- ❒ Add a small amount of dish soap to one bucket
- ❒ Scrub spoons with brush in soapy water, inside and out, including tip
- ❒ Rinse in clean water
- ❒ Apply a small amount of methyl hydrate to the inside of the spoon. (A spray bottle or water bottle with a small hole in the cap works well)
- ❒ Allow to dry (takes seconds)
- ❒ Rinse with distilled water, a spray bottle works well.

The methyl hydrate eliminates any soap residue that may be on the spoon and is especially important when dealing with suspected VOCs.

Screening Procedure

The RKI Eagle is used to screen most soil samples, particularly where petroleum hydrocarbon contamination is suspected. The MiniRae is used when VOCs are suspected, however it also can be useful for detecting petroleum. These tools are for screening purposes only and cannot be used in place of laboratory testing. Vapour results obtained from the RKI Eagle and the PID are relative and must be interpreted.

Screening equipment should be calibrated on an approximately monthly basis, more frequently if heavily used.

- ❒ Samples should be brought to room temperature; this is specifically important in colder weather. Soil must not be frozen.
- ❒ Turn instrument on and allow to come to zero - calibrate if necessary
- ❒ If using RKI Eagle, ensure instrument is in methane elimination mode unless otherwise directed.
- ❒ Ensure measurement units are ppm (parts per million) initially. RKI Eagle will automatically switch to %LEL (lower explosive limit) if higher concentrations are encountered.
- ❒ Break up large lumps of soil in the sample bag, taking care not to puncture bag.
- ❒ Insert probe into soil bag, creating a seal with your hand around the opening.
- ❒ Gently manipulate soil in bag while observing instrument readings.
- ❒ Record the highest value obtained in the first 15 to 25 seconds
- ❒ Make sure to indicate scale (ppm or LEL); also note which instrument was used (RKI Eagle 1 or 2, or MiniRae).
- ❒ Jar samples and refrigerate as per Sampling and Analysis Plan.

3.2 Monitoring Well Installation Procedure

Equipment

- ❒ 5' x 2" threaded sections of Schedule 40 PVC slotted well screen (5' x 1 ¼" if installing in cored hole in bedrock)
- ❒ 5' x 2" threaded sections of Schedule 40 PVC riser pipe (5' x 1 ¼" if installing in cored hole in bedrock)
- ❒ Threaded end-cap
- ❒ Slip-cap or J-plug
- ❒ Asphalt cold patch or concrete
- ❒ Silica Sand
- ❒ Bentonite chips (Holeplug)
- ❒ Steel flushmount casing

Procedure

- ❒ Drill borehole to required depth, using drilling and sampling procedures described above.
- ❒ If borehole is deeper than required monitoring well, backfill with bentonite chips to required depth. This should only be done on wells where contamination is not suspected, in order to prevent downward migration of contamination.
- ❒ Only one monitoring well should be installed per borehole.
- ❒ Monitoring wells should not be screened across more than one stratigraphic unit to prevent potential migration of contaminants between units.
- ❒ Where LNAPLs are the suspected contaminants of concern, monitoring wells should be screened straddling the water table in order to capture any free product floating on top of the water table.
- ❒ Thread the end cap onto a section of screen. Thread second section of screen if required. Thread risers onto screen. Lower into borehole to required depth. Ensure slip-cap or J-plug is inserted to prevent backfill materials entering well.
- ❒ As drillers remove augers, backfill borehole annulus with silica sand until the level of sand is approximately 0.3 m above the top of the screen.
- ❒ Backfill with holeplug until at least 0.3 m of holeplug is present above the top of the silica sand.
- ❒ Backfill remainder of borehole with holeplug or with auger cuttings (if contamination is not suspected).
- ❒ Install flushmount casing. Seal space between flushmount and borehole annulus with concrete, cold patch, or holeplug to match surrounding ground surface.

3.3 Monitoring Well Sampling Procedure

Equipment

- ❒ Water level metre or interface probe on hydrocarbon/LNAPL sites
- ❒ Spray bottles containing water and methanol to clean water level tape or interface probe
- ❒ Peristaltic pump
- ❒ Polyethylene tubing for peristaltic pump
- ❒ Flexible tubing for peristaltic pump
- ❒ Latex or nitrile gloves (depending on suspected contaminant)
- ❒ Allen keys and/or 9/16" socket wrench to remove well caps
- ❒ Graduated bucket with volume measurements
- ❒ pH/Temperature/Conductivity combo pen
- ❒ Laboratory-supplied sample bottles

Sampling Procedure

- ❒ Locate well and use socket wrench or Allan key to open metal flush mount protector cap. Remove plastic well cap.
- ❒ Measure water level, with respect to existing ground surface, using water level meter or interface probe. If using interface probe on suspected NAPL site, measure the thickness of free product.
- ❒ Measure total depth of well.
- ❒ Clean water level tape or interface probe using methanol and water. Change gloves between wells.
- ❒ Calculate volume of standing water within well and record.
- ❒ Insert polyethylene tubing into well and attach to peristaltic pump. Turn on peristaltic pump and purge into graduated bucket. Purge at least three well volumes of water from the well. Measure and record field chemistry. Continue to purge, measuring field chemistry after every well volume purged, until appearance or field chemistry stabilizes.
- ❒ Note appearance of purge water, including colour, opacity (clear, cloudy, silty), sheen, presence of LNAPL, and odour. Note any other unusual features (particulate matter, effervescence (bubbling) of dissolved gas, etc.).
- ❒ Fill required sample bottles. If sampling for metals, attach 75-micron filter to discharge tube and filter metals sample. If sampling for VOCs, use low flow rate to ensure continuous stream of non-turbulent flow into sample bottles. Ensure no headspace is present in VOC vials.
- ❒ Replace well cap and flushmount casing cap.

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

The QA/QC program for this Phase II ESA is as follows:

- ❒ All non-dedicated sampling equipment (split spoons) will be decontaminated according to the SOPs listed above.
- ❒ All groundwater sampling equipment is dedicated (polyethylene and flexible peristaltic tubing is replaced for each well).
- ❒ Where groundwater samples are to be analyzed for VOCs, one laboratory-provided trip blank will be submitted for analysis with every laboratory submission.
- ❒ Approximately one (1) field duplicate will be submitted for every ten (10) samples submitted for laboratory analysis. A minimum of one (1) field duplicate per project will be submitted. Field duplicates will be submitted for soil and groundwater samples
- ❒ Where combo pens are used to measure field chemistry, they will be calibrated on an approximately monthly basis, according to frequency of use.

5.0 DATA QUALITY OBJECTIVES

The purpose of setting data quality objectives (DQOs) is to ensure that the level of uncertainty in data collected during the Phase II ESA is low enough that decision-making is not affected, and that the overall objectives of the investigation are met.

The quality of data is assessed by comparing field duplicates with original samples. If the relative percent difference (RPD) between the duplicate and the sample is within 20%, the data are considered to be of sufficient quality so as not to affect decision-making. The RPD is calculated as follows:

$$RPD = \left|\frac{x_1 - x_2}{(x_1 + x_2)/2}\right| \times 100\%$$

Where x_1 is the concentration of a given parameter in an original sample and x_2 is the concentration of that same parameter in the field duplicate sample.

For the purpose of calculating the RPD, it is desirable to select field duplicates from samples for which parameters are present in concentrations above laboratory detection limits, i.e. samples which are expected to be contaminated. If parameters are below laboratory detection limits for selected samples or duplicates, the RPD may be calculated using a concentration equal to one half the laboratory detection limit.

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS

Physical impediments to the Sampling and Analysis plan may include:

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

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

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
Proposed Multi-Storey Residential Building
797 Richmond Road - Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5190

REMARKS

HOLE NO. BH 1-21

BORINGS BY CME-55 Low Clearance Drill **DATE** 2021 March 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	64.17
Asphaltic Concrete 0.10							
FILL: Crushed stone with silty sand 0.64		AU	1				
FILL: Brown silty sand some gravel, clay, trace asphalt and organics 1.45		SS	2	46	25	1	63.17
FILL: Brown silty sand some clay and gravel 1.98		SS	3	46	7	2	62.17
Brown **SILTY CLAY** trace sand 2.29		SS	4	33	18		
GLACIAL TILL: Compact brown silty sand to silty clay with gravel, cobbles and boulders		SS	5	58	11	3	61.17
- Increasing clay content with depth		SS	6	75	7	4	60.17
		SS	7	50	9	5	59.17
- Grey by 5.3 m depth		SS	8	63	13		
5.97							
End of Borehole							

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
Proposed Multi-Storey Residential Building
797 Richmond Road - Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5190

REMARKS

HOLE NO. BH 2-21

BORINGS BY CME-55 Low Clearance Drill **DATE** 2021 March 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic Concrete 0.08						0	64.11
FILL: Crushed stone with brown silty sand 0.69		AU	1				
FILL: Brown silty sand with gravel, trace organics 1.52		SS	2	38	12	1	63.11
GLACIAL TILL: Compact brown silty sand to silty clay with gravel, trace cobbles and boulders		SS	3	54	16	2	62.11
		SS	4	67	40	3	61.11
		SS	5	63	16	4	60.11
		SS	6	75	33		
4.88		SS	7	67	2	5	59.11
GLACIAL TILL: Grey clayey silt with sand, gravel, cobbles and boulders		SS	8	90	+50		
5.87		RC	1	100	0	6	58.11
BEDROCK: Good to excellent quality grey dolostone with interbedded black shale		RC	2	100	77	7	57.11
		RC	3	100	97	8	56.11
8.48							
End of Borehole							
(GWL @ 4.87 m depth - March 16, 2021)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

Monitoring Well Construction

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
Proposed Multi-Storey Residential Building
797 Richmond Road - Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5190

REMARKS

HOLE NO. BH 3-21

BORINGS BY CME-55 Low Clearance Drill **DATE** 2021 March 3

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic Concrete 0.08						0	64.27
FILL: Crushed stone with brown silty sand 0.53		AU	1				
FILL: Brown silty sand with crushed stone, construction debris, and organics 1.52		SS	2	79	41	1	63.27
FILL: Brown silty sand with gravel, trace crushed stone 2.13		SS	3	71	15	2	62.27
GLACIAL TILL: Compact brown silty sand to silty clay with gravel, trace cobbles and boulders		SS	4	63	16		
- Grey by 3.0 m depth		SS	5	46	9	3	61.27
- Decreasing clay content with depth		SS	6	54	23	4	60.27
		SS	7	42	40		
		SS	8	54	31	5	59.27
		SS	9	21	36	6	58.27
7.11		SS	10	61	+50	7	57.27
BEDROCK: Fair to good quality grey dolostone with interbedded black shale		RC	1	100	46		
		RC	2	100	67	8	56.27
		RC	3	100	78	9	55.27
9.91							
End of Borehole							
(GWL @ 7.36 m depth - March 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
Proposed Multi-Storey Residential Building
797 Richmond Road - Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5190

REMARKS

HOLE NO. BH 4-21

BORINGS BY CME-55 Low Clearance Drill **DATE** 2021 March 4

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic Concrete 0.08						0	64.07
FILL: Crushed stone with brown silty sand 0.66		AU	1				
FILL: Brown silty sand with gravel and brick fragments 1.45		SS	2	71	21	1	63.07
FILL: Brown silty clay with sand, some gravel, trace brick fragments and glass 2.21		SS	3	50	10	2	62.07
GLACIAL TILL: Compact brown silty sand with clay, gravel, cobbles and boulders		SS	4	42	19		
- Grey by 3.0 m depth		SS	5	54	8	3	61.07
- Decreasing clay content with depth		SS	6	50	9	4	60.07
5.26		SS	7	46	36	5	59.07
GLACIAL TILL: Compact to dense grey silty sand with gravel, cobbles and boulders		SS	8	75	26		
7.34		SS	9	13	61	6	58.07
BEDROCK: Good to excellent quality grey dolostone with interbedded black shale		RC	1	100	80	7	57.07
		RC	2	100	93	8	56.07
9.68		RC	3	100	96	9	55.07
End of Borehole							
(GWL @ 6.10 m depth - March 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

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

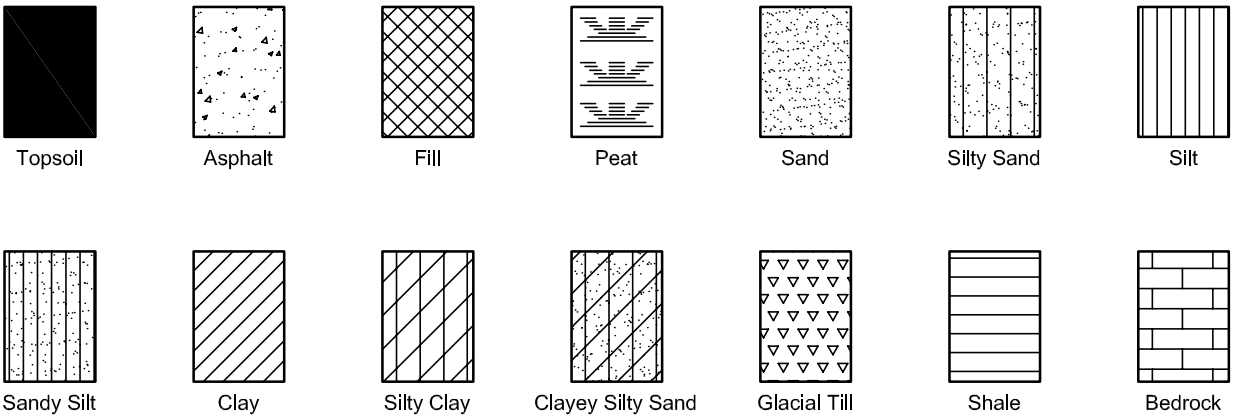
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

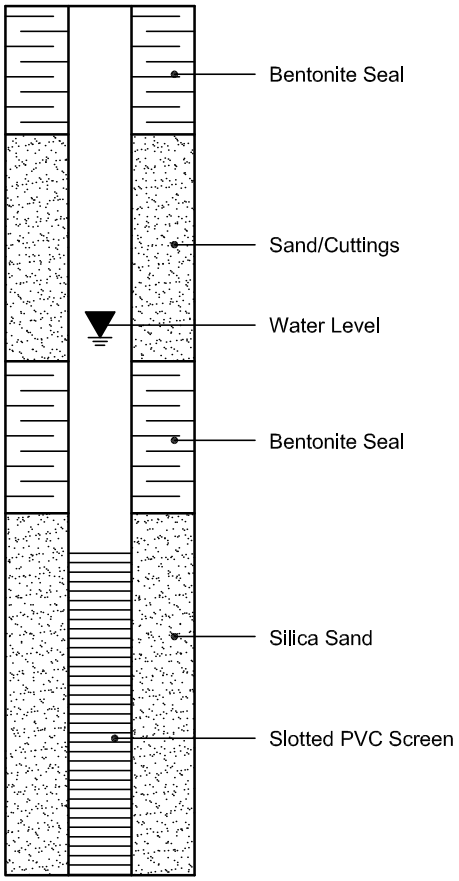
SYMBOLS AND TERMS (continued)

STRATA PLOT

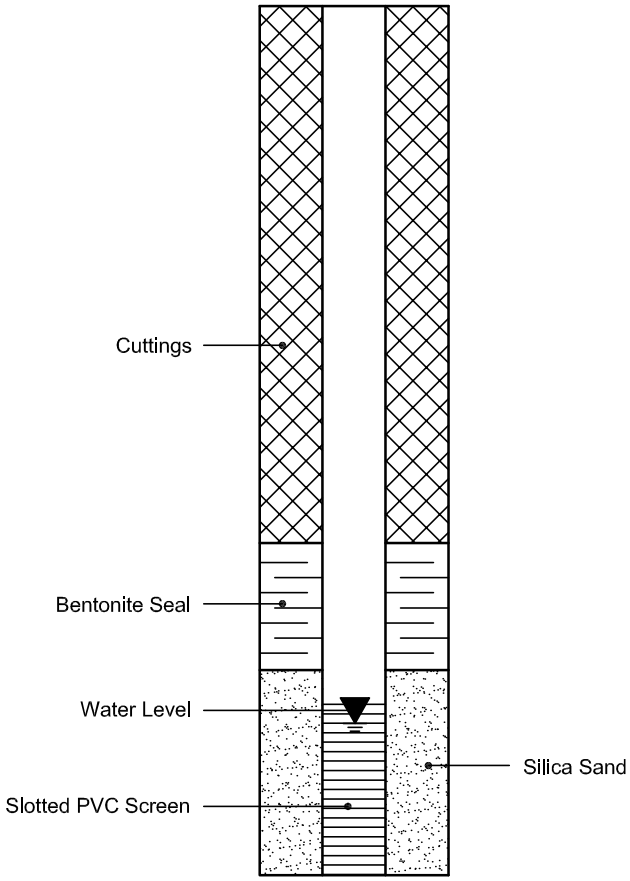


MONITORING WELL AND PIEZOMETER CONSTRUCTION

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: 31976
Project: PE5190
Custody: 59317

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

Order #: 2111393

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

Paracel ID	Client ID
2111393-01	BH1-SS2
2111393-02	BH2-SS2
2111393-03	BH2-SS7
2111393-04	BH3-SS3
2111393-05	BH3-SS10
2111393-06	BH4-SS2
2111393-07	BH4-SS9
2111393-08	DUP1

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 15-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 10-Mar-2021

Client PO: 31976

Project Description: PE5190

Analysis Summary Table

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

Certificate of Analysis

Report Date: 15-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 10-Mar-2021

Client PO: 31976

Project Description: PE5190

	Client ID:	BH1-SS2	BH2-SS2	BH2-SS7	BH3-SS3
	Sample Date:	03-Mar-21 09:00	03-Mar-21 09:00	03-Mar-21 09:00	03-Mar-21 09:00
	Sample ID:	2111393-01	2111393-02	2111393-03	2111393-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	91.1	88.8	89.7	84.9
General Inorganics					
pH	0.05 pH Units	7.73	-	7.89	-
Metals					
Antimony	1.0 ug/g dry	1.4	<1.0	-	<1.0
Arsenic	1.0 ug/g dry	7.8	4.4	-	15.7
Barium	1.0 ug/g dry	276	140	-	276
Beryllium	0.5 ug/g dry	0.8	<0.5	-	0.6
Boron	5.0 ug/g dry	17.1	9.4	-	15.8
Cadmium	0.5 ug/g dry	<0.5	<0.5	-	0.5
Chromium	5.0 ug/g dry	39.2	24.5	-	37.0
Chromium (VI)	0.2 ug/g dry	<0.2	<0.2	-	<0.2
Cobalt	1.0 ug/g dry	10.3	8.0	-	11.4
Copper	5.0 ug/g dry	50.5	22.5	-	44.6
Lead	1.0 ug/g dry	212	52.4	-	204
Mercury	0.1 ug/g dry	0.5	<0.1	-	<0.1
Molybdenum	1.0 ug/g dry	1.4	<1.0	-	<1.0
Nickel	5.0 ug/g dry	21.2	16.3	-	24.8
Selenium	1.0 ug/g dry	<1.0	<1.0	-	<1.0
Silver	0.3 ug/g dry	0.4	<0.3	-	<0.3
Thallium	1.0 ug/g dry	<1.0	<1.0	-	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	-	<1.0
Vanadium	10.0 ug/g dry	45.2	34.5	-	39.0
Zinc	20.0 ug/g dry	142	76.2	-	168
Volatiles					
Benzene	0.02 ug/g dry	-	-	<0.02	-
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	-
Toluene	0.05 ug/g dry	-	-	<0.05	-
m,p-Xylenes	0.05 ug/g dry	-	-	<0.05	-
o-Xylene	0.05 ug/g dry	-	-	<0.05	-
Xylenes, total	0.05 ug/g dry	-	-	<0.05	-
Toluene-d8	Surrogate	-	-	118%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	-	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	-	-	<4	-

Certificate of Analysis

Report Date: 15-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 10-Mar-2021

Client PO: 31976

Project Description: PE5190

	Client ID:	BH1-SS2	BH2-SS2	BH2-SS7	BH3-SS3
	Sample Date:	03-Mar-21 09:00	03-Mar-21 09:00	03-Mar-21 09:00	03-Mar-21 09:00
	Sample ID:	2111393-01	2111393-02	2111393-03	2111393-04
	MDL/Units	Soil	Soil	Soil	Soil
F3 PHCs (C16-C34)	8 ug/g dry	-	-	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	-	-	<6	-
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	0.05	0.04	-	<0.02
Acenaphthylene	0.02 ug/g dry	0.14	0.28	-	0.08
Anthracene	0.02 ug/g dry	0.20	0.33	-	0.08
Benzo [a] anthracene	0.02 ug/g dry	0.76	0.42	-	0.14
Benzo [a] pyrene	0.02 ug/g dry	0.71	0.56	-	0.18
Benzo [b] fluoranthene	0.02 ug/g dry	0.44	0.59	-	0.20
Benzo [g,h,i] perylene	0.02 ug/g dry	0.39	0.39	-	0.14
Benzo [k] fluoranthene	0.02 ug/g dry	0.24	0.31	-	0.10
Chrysene	0.02 ug/g dry	0.57	0.43	-	0.14
Dibenzo [a,h] anthracene	0.02 ug/g dry	0.12	0.10	-	0.03
Fluoranthene	0.02 ug/g dry	1.51	0.88	-	0.25
Fluorene	0.02 ug/g dry	0.07	0.05	-	<0.02
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	0.39	0.36	-	0.13
1-Methylnaphthalene	0.02 ug/g dry	0.03	0.02	-	<0.02
2-Methylnaphthalene	0.02 ug/g dry	0.04	0.03	-	<0.02
Methylnaphthalene (1&2)	0.04 ug/g dry	0.07	0.05	-	<0.04
Naphthalene	0.01 ug/g dry	0.08	0.05	-	0.02
Phenanthrene	0.02 ug/g dry	0.89	0.57	-	0.14
Pyrene	0.02 ug/g dry	1.20	0.71	-	0.24
2-Fluorobiphenyl	Surrogate	79.2%	75.7%	-	53.6%
Terphenyl-d14	Surrogate	106%	96.8%	-	80.9%

Certificate of Analysis

Report Date: 15-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 10-Mar-2021

Client PO: 31976

Project Description: PE5190

	Client ID:	BH3-SS10	BH4-SS2	BH4-SS9	DUP1
	Sample Date:	03-Mar-21 09:00	04-Mar-21 09:00	04-Mar-21 09:00	03-Mar-21 09:00
	Sample ID:	2111393-05	2111393-06	2111393-07	2111393-08
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	86.6	90.2	92.4	86.3
Metals					
Antimony	1.0 ug/g dry	-	<1.0	-	-
Arsenic	1.0 ug/g dry	-	3.9	-	-
Barium	1.0 ug/g dry	-	226	-	-
Beryllium	0.5 ug/g dry	-	0.5	-	-
Boron	5.0 ug/g dry	-	11.9	-	-
Cadmium	0.5 ug/g dry	-	<0.5	-	-
Chromium	5.0 ug/g dry	-	23.0	-	-
Chromium (VI)	0.2 ug/g dry	-	<0.2	-	-
Cobalt	1.0 ug/g dry	-	8.6	-	-
Copper	5.0 ug/g dry	-	22.4	-	-
Lead	1.0 ug/g dry	-	87.3	-	-
Mercury	0.1 ug/g dry	-	<0.1	-	-
Molybdenum	1.0 ug/g dry	-	<1.0	-	-
Nickel	5.0 ug/g dry	-	19.0	-	-
Selenium	1.0 ug/g dry	-	<1.0	-	-
Silver	0.3 ug/g dry	-	<0.3	-	-
Thallium	1.0 ug/g dry	-	<1.0	-	-
Uranium	1.0 ug/g dry	-	<1.0	-	-
Vanadium	10.0 ug/g dry	-	29.6	-	-
Zinc	20.0 ug/g dry	-	86.2	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	-	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	<0.05	-	<0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	-	<0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	<0.05	-	<0.05	<0.05
o-Xylene	0.05 ug/g dry	<0.05	-	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	<0.05	-	<0.05	<0.05
Toluene-d8	Surrogate	118%	-	118%	119%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	<7	<7
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	<4	<4
F3 PHCs (C16-C34)	8 ug/g dry	<8	-	60	<8
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	26	<6

Certificate of Analysis

Report Date: 15-Mar-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 10-Mar-2021

Client PO: 31976

Project Description: PE5190

	Client ID:	BH3-SS10	BH4-SS2	BH4-SS9	DUP1
	Sample Date:	03-Mar-21 09:00	04-Mar-21 09:00	04-Mar-21 09:00	03-Mar-21 09:00
	Sample ID:	2111393-05	2111393-06	2111393-07	2111393-08
	MDL/Units	Soil	Soil	Soil	Soil
Semi-Volatiles					
Acenaphthene	0.02 ug/g dry	-	0.03	-	-
Acenaphthylene	0.02 ug/g dry	-	0.51	-	-
Anthracene	0.02 ug/g dry	-	0.38	-	-
Benzo [a] anthracene	0.02 ug/g dry	-	1.09	-	-
Benzo [a] pyrene	0.02 ug/g dry	-	1.38	-	-
Benzo [b] fluoranthene	0.02 ug/g dry	-	0.80	-	-
Benzo [g,h,i] perylene	0.02 ug/g dry	-	0.99	-	-
Benzo [k] fluoranthene	0.02 ug/g dry	-	0.43	-	-
Chrysene	0.02 ug/g dry	-	1.05	-	-
Dibenzo [a,h] anthracene	0.02 ug/g dry	-	0.23	-	-
Fluoranthene	0.02 ug/g dry	-	1.65	-	-
Fluorene	0.02 ug/g dry	-	0.03	-	-
Indeno [1,2,3-cd] pyrene	0.02 ug/g dry	-	0.88	-	-
1-Methylnaphthalene	0.02 ug/g dry	-	<0.02	-	-
2-Methylnaphthalene	0.02 ug/g dry	-	0.02	-	-
Methylnaphthalene (1&2)	0.04 ug/g dry	-	<0.04	-	-
Naphthalene	0.01 ug/g dry	-	0.05	-	-
Phenanthrene	0.02 ug/g dry	-	0.36	-	-
Pyrene	0.02 ug/g dry	-	1.63	-	-
2-Fluorobiphenyl	Surrogate	-	53.3%	-	-
Terphenyl-d14	Surrogate	-	70.2%	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Semi-Volatiles									
Acenaphthene	ND	0.02	ug/g						
Acenaphthylene	ND	0.02	ug/g						
Anthracene	ND	0.02	ug/g						
Benzo [a] anthracene	ND	0.02	ug/g						
Benzo [a] pyrene	ND	0.02	ug/g						
Benzo [b] fluoranthene	ND	0.02	ug/g						
Benzo [g,h,i] perylene	ND	0.02	ug/g						
Benzo [k] fluoranthene	ND	0.02	ug/g						
Chrysene	ND	0.02	ug/g						
Dibenzo [a,h] anthracene	ND	0.02	ug/g						
Fluoranthene	ND	0.02	ug/g						
Fluorene	ND	0.02	ug/g						
Indeno [1,2,3-cd] pyrene	ND	0.02	ug/g						
1-Methylnaphthalene	ND	0.02	ug/g						
2-Methylnaphthalene	ND	0.02	ug/g						
Methylnaphthalene (1&2)	ND	0.04	ug/g						
Naphthalene	ND	0.01	ug/g						
Phenanthrene	ND	0.02	ug/g						
Pyrene	ND	0.02	ug/g						
Surrogate: 2-Fluorobiphenyl	*1.02*		*ug/g*		*76.7*	*50-140*			
Surrogate: Terphenyl-d14	*1.52*		*ug/g*		*114*	*50-140*			
Volatiles									
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	*9.35*		*ug/g*		*117*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
General Inorganics									
pH	7.00	0.05	pH Units	6.99			0.1	2.3	
Hydrocarbons									
F1 PHCs (C6-C10)	221	7	ug/g dry	289			26.4	40	
F2 PHCs (C10-C16)	ND	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Metals									
Antimony	2.9	1.0	ug/g dry	1.6			NC	30	
Arsenic	20.7	1.0	ug/g dry	16.1			24.9	30	
Barium	133	1.0	ug/g dry	102			26.3	30	
Beryllium	0.6	0.5	ug/g dry	0.5			9.5	30	
Boron	6.0	5.0	ug/g dry	5.1			17.2	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	23.4	5.0	ug/g dry	20.6			12.5	30	
Cobalt	7.8	1.0	ug/g dry	6.6			17.7	30	
Copper	32.8	5.0	ug/g dry	29.0			12.3	30	
Mercury	0.141	0.1	ug/g dry	0.129			9.0	30	
Molybdenum	2.3	1.0	ug/g dry	1.6			NC	30	
Nickel	18.5	5.0	ug/g dry	16.1			13.7	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	ND	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	1.1	1.0	ug/g dry	ND			NC	30	
Vanadium	37.7	10.0	ug/g dry	33.4			12.1	30	
Zinc	109	20.0	ug/g dry	94.1			14.4	30	
Physical Characteristics									
% Solids	88.4	0.1	% by Wt.	91.1			3.1	25	
Semi-Volatiles									
Acenaphthene	0.104	0.02	ug/g dry	0.051			68.8	40	QR-04
Acenaphthylene	0.136	0.02	ug/g dry	0.140			2.7	40	
Anthracene	0.272	0.02	ug/g dry	0.197			32.0	40	
Benzo [a] anthracene	0.743	0.02	ug/g dry	0.761			2.5	40	
Benzo [a] pyrene	0.693	0.02	ug/g dry	0.708			2.1	40	
Benzo [b] fluoranthene	0.355	0.02	ug/g dry	0.440			21.4	40	
Benzo [g,h,i] perylene	0.373	0.02	ug/g dry	0.389			4.3	40	
Benzo [k] fluoranthene	0.194	0.02	ug/g dry	0.241			21.6	40	
Chrysene	0.836	0.02	ug/g dry	0.570			37.9	40	
Dibenzo [a,h] anthracene	0.110	0.02	ug/g dry	0.118			7.0	40	
Fluoranthene	1.65	0.02	ug/g dry	1.51			9.1	40	
Fluorene	0.136	0.02	ug/g dry	0.069			65.8	40	QR-04
Indeno [1,2,3-cd] pyrene	0.365	0.02	ug/g dry	0.390			6.6	40	
1-Methylnaphthalene	0.075	0.02	ug/g dry	0.029			88.5	40	QR-04
2-Methylnaphthalene	0.083	0.02	ug/g dry	0.037			77.7	40	QR-04
Naphthalene	0.243	0.01	ug/g dry	0.077			104.0	40	QR-04
Phenanthrene	1.52	0.02	ug/g dry	0.894			52.1	40	QR-04
Pyrene	1.28	0.02	ug/g dry	1.20			6.6	40	
Surrogate: 2-Fluorobiphenyl	*1.14*		*ug/g dry*		*78.1*	*50-140*			
Surrogate: Terphenyl-d14	*1.44*		*ug/g dry*		*98.3*	*50-140*			
Volatiles									
Benzene	0.156	0.02	ug/g dry	0.163			4.5	50	
Ethylbenzene	2.89	0.05	ug/g dry	3.21			10.4	50	
Toluene	4.13	0.05	ug/g dry	4.27			3.2	50	
m,p-Xylenes	8.92	0.05	ug/g dry	10.0			11.6	50	
o-Xylene	4.49	0.05	ug/g dry	5.16			13.8	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Surrogate: Toluene-d8	*10.3*		*ug/g dry*		*119*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	205	7	ug/g	ND	103	80-120			
F2 PHCs (C10-C16)	72	4	ug/g	ND	80.6	60-140			
F3 PHCs (C16-C34)	233	8	ug/g	ND	107	60-140			
F4 PHCs (C34-C50)	147	6	ug/g	ND	106	60-140			
Metals									
Antimony	43.7	1.0	ug/g	ND	86.2	70-130			
Arsenic	55.0	1.0	ug/g	6.5	97.2	70-130			
Barium	96.4	1.0	ug/g	40.9	111	70-130			
Beryllium	51.7	0.5	ug/g	ND	103	70-130			
Boron	48.6	5.0	ug/g	ND	93.2	70-130			
Cadmium	47.6	0.5	ug/g	ND	95.0	70-130			
Chromium (VI)	5.0	0.2	ug/g	ND	100	70-130			
Chromium	60.8	5.0	ug/g	8.3	105	70-130			
Cobalt	53.3	1.0	ug/g	2.6	101	70-130			
Copper	60.2	5.0	ug/g	11.6	97.3	70-130			
Lead	46.2	1.0	ug/g	ND	92.4	70-130			
Mercury	1.64	0.1	ug/g	0.129	101	70-130			
Molybdenum	51.7	1.0	ug/g	ND	102	70-130			
Nickel	55.5	5.0	ug/g	6.5	98.1	70-130			
Selenium	46.3	1.0	ug/g	ND	92.0	70-130			
Silver	44.0	0.3	ug/g	ND	87.9	70-130			
Thallium	46.4	1.0	ug/g	ND	92.6	70-130			
Uranium	48.3	1.0	ug/g	ND	96.0	70-130			
Vanadium	66.7	10.0	ug/g	13.3	107	70-130			
Zinc	84.9	20.0	ug/g	37.6	94.6	70-130			
Semi-Volatiles									
Acenaphthene	0.223	0.02	ug/g	0.051	94.3	50-140			
Acenaphthylene	0.272	0.02	ug/g	0.140	72.5	50-140			
Anthracene	0.340	0.02	ug/g	0.197	78.3	50-140			
Benzo [a] anthracene	0.130	0.02	ug/g	ND	78.2	50-140			
Benzo [a] pyrene	0.133	0.02	ug/g	ND	79.8	50-140			
Benzo [b] fluoranthene	0.565	0.02	ug/g	0.440	68.3	50-140			
Benzo [g,h,i] perylene	0.485	0.02	ug/g	0.389	52.5	50-140			
Benzo [k] fluoranthene	0.373	0.02	ug/g	0.241	72.0	50-140			
Chrysene	0.160	0.02	ug/g	ND	95.9	50-140			
Dibenzo [a,h] anthracene	0.276	0.02	ug/g	0.118	86.3	50-140			
Fluoranthene	0.138	0.02	ug/g	ND	82.8	50-140			
Fluorene	0.231	0.02	ug/g	0.069	88.4	50-140			
Indeno [1,2,3-cd] pyrene	0.498	0.02	ug/g	0.390	59.2	50-140			
1-Methylnaphthalene	0.218	0.02	ug/g	0.029	103	50-140			
2-Methylnaphthalene	0.247	0.02	ug/g	0.037	115	50-140			
Naphthalene	0.331	0.01	ug/g	0.077	139	50-140			
Phenanthrene	1.05	0.02	ug/g	0.894	83.9	50-140			
Pyrene	0.138	0.02	ug/g	ND	83.0	50-140			
Surrogate: 2-Fluorobiphenyl	*1.07*		*ug/g*		*73.0*	*50-140*			
Surrogate: Terphenyl-d14	*1.34*		*ug/g*		*91.9*	*50-140*			
Volatiles									
Benzene	4.14	0.02	ug/g	ND	104	60-130			

Certificate of Analysis

Report Date: 15-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 10-Mar-2021

Client PO: 31976

Project Description: PE5190

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Ethylbenzene	4.06	0.05	ug/g	ND	102	60-130			
Toluene	4.59	0.05	ug/g	ND	115	60-130			
m,p-Xylenes	8.54	0.05	ug/g	ND	107	60-130			
o-Xylene	4.12	0.05	ug/g	ND	103	60-130			
Surrogate: Toluene-d8	*8.07*		*ug/g*		*101*	*50-140*			

Qualifier Notes:

QC Qualifiers :

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

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

PARACEL LABORATORIES LTD

Paracel ID: 2111393

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2111393	№ 59317

Client Name: Paterson Group	Project Ref: PE5190	Page 1 of 1
Contact Name: Nick Sullivan	Quote #:	Turnaround Time
Address: 154 Colonnade Rd. S.	PO #: 31976	☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone: 613-226-7381	E-mail: 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	Required Analysis: BTEX	PHCs F1-F4	PAHs	ICP Metals	Hg	Cr6	pH
1	BH1-SS2	S		1	Mar 3/21				X	X	X	X	X
2	BH2-SS2	S		1	Mar 3/21				X	X	X	X	
3	BH2-SS7	S		2	Mar 3/21		X	X					X
4	BH3-SS3	S		1	Mar 3/21				X	X	X	X	
5	BH3-SS10	S		2	Mar 3/21		X	X					
6	BH4-SS2	S		1	Mar 4/21				X	X	X	X	
7	BH4-SS9	S		2	Mar 4/21		X	X					
8	DUP 1	S		2	Mar 3/21		X	X					
9													
10													

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): N. Sullivan	Received By Driver/Depot: A. DeLouse	Received at Lab:	Verified By:
Relinquished By (Print): Nick Sullivan	Date/Time: 10/03/21 4:05	Date/Time: March 10, 2021 17:10	Date/Time: March 10, 2021 17:29
Date/Time: March 10/2021	Temperature: °C PM	Temperature: 11.4 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 31980
Project: PE5190
Custody: 59266

Report Date: 16-Mar-2021
Order Date: 11-Mar-2021

Order #: 2111543

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

Paracel ID	Client ID
2111543-01	BH2-GW1
2111543-02	BH3-GW1
2111543-03	BH4-GW1
2111543-04	DUP1

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 16-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 11-Mar-2021

Client PO: 31980

Project Description: PE5190

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 624 - P&T GC-MS	12-Mar-21	12-Mar-21
PHC F1	CWS Tier 1 - P&T GC-FID	12-Mar-21	12-Mar-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	12-Mar-21	12-Mar-21

Certificate of Analysis

Report Date: 16-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 11-Mar-2021

Client PO: 31980

Project Description: PE5190

	Client ID:	BH2-GW1	BH3-GW1	BH4-GW1	DUP1
	Sample Date:	10-Mar-21 09:00	10-Mar-21 09:00	10-Mar-21 09:00	10-Mar-21 09:00
	Sample ID:	2111543-01	2111543-02	2111543-03	2111543-04
	MDL/Units	Water	Water	Water	Water
Volatiles					
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	1.7	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene-d8	Surrogate	108%	118%	120%	117%
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	<25
F2 PHCs (C10-C16)	100 ug/L	<100	<100	<100	<100
F3 PHCs (C16-C34)	100 ug/L	<100	189	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100

Certificate of Analysis

Client: Paterson Group Consulting Engineers

Client PO: 31980

Report Date: 16-Mar-2021

Order Date: 11-Mar-2021

Project Description: PE5190

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	*96.3*		*ug/L*		*120*	*50-140*			

Certificate of Analysis

Report Date: 16-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 11-Mar-2021

Client PO: 31980

Project Description: PE5190

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	*88.5*		*ug/L*		*111*	*50-140*			

Certificate of Analysis

Report Date: 16-Mar-2021

Client: Paterson Group Consulting Engineers

Order Date: 11-Mar-2021

Client PO: 31980

Project Description: PE5190

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	2080	25	ug/L	ND	104	68-117			
F2 PHCs (C10-C16)	1250	100	ug/L	ND	78.1	60-140			
F3 PHCs (C16-C34)	3380	100	ug/L	ND	86.3	60-140			
F4 PHCs (C34-C50)	2150	100	ug/L	ND	86.8	60-140			
Volatiles									
Benzene	43.5	0.5	ug/L	ND	109	60-130			
Ethylbenzene	42.6	0.5	ug/L	ND	107	60-130			
Toluene	45.3	0.5	ug/L	ND	113	60-130			
m,p-Xylenes	83.1	0.5	ug/L	ND	104	60-130			
o-Xylene	41.1	0.5	ug/L	ND	103	60-130			
Surrogate: Toluene-d8	*80.6*		*ug/L*		*101*	*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: 2111543

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2111543	№ 59266

Client Name: Paterson Group	Project Ref: PE5190	Page 1 of 1
Contact Name: Nick Sullivan	Quote #:	Turnaround Time
Address: 154 Colonnade Rd. S.	PO #: 31980	☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone: 613-226-7381	E-mail: 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	Required Analysis: BTEX	Required Analysis: PHCs F1-F4
1	BH2-GW1	GW		2	Mar 10/21		X	X
2	BH3-GW1	↓		2	↓		↓	↓
3	BH4-GW1	↓		2	↓		↓	↓
4	DUP 1	↓		2	↓		↓	↓
5								
6								
7								
8								
9								
10								

Comments:

Method of Delivery: ~~PARACEL~~ COURIER

Relinquished By (Sign): N. Sullivan	Received By Driver/Depot: A. DeLouse	Received at Lab: BGM	Verified By: BGM
Relinquished By (Print): Nick Sullivan	Date/Time: 11/03/21 4:05	Date/Time: March 11, 2021 16:55	Date/Time: March 11, 2021 17:09
Date/Time: March 11/2021	Temperature: °C PM.	Temperature: 11.1 °C	pH Verified: ☐ By: