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Phase II – Environmental Site Assessment

7628 Flewellyn Road
Ottawa, Ontario

Prepared For

Cash for Trash Canada

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the property addressed 7628 Flewellyn 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 May 21 and May 25, 2021, and consisted of drilling six boreholes (BH1-BH6) throughout the subject site, three of which were instrumented with groundwater monitoring wells (BH1-BH3). Boreholes BH1-BH3 were drilled to depths ranging from approximately 9.91 m to 10.11 m below the existing ground surface and terminated within the bedrock, whereas boreholes BH4-BH6 were drilled to depths ranging from approximately 1.22 m to 2.24 m below the existing ground surface and terminated on practical refusal to augering on inferred bedrock. Three previously installed groundwater monitoring wells (MW1-MW3) were also located and utilized as part of this subsurface investigation.

In general, the subsurface soil profile encountered at the borehole locations consists of a thin (0.15 m) layer of brown silty sand with gravel and rock fragments, over top of interbedded limestone, dolostone, and shale bedrock.

Due to the shallow nature of the soil profile encountered at BH1-BH3 (less than 0.2 m of overburden), as well as the poor recovery of any surficial soils (mostly rock fragments), no soil samples were submitted for laboratory analysis.

As part of the previous subsurface investigation, completed by CM3 Environmental Inc. in December 2020, three soil samples were submitted for laboratory analysis of BTEX, PHCs F_1-F_4, and VOC parameters. Based on the analytical test results, the concentration of PHCs F_3 detected in the soil at MW1 was in excess of the selected MECP Table 6 commercial soil standards.

Groundwater samples were recovered from the monitoring wells installed in BH1-BH3 and submitted for laboratory analysis of VOCs and PHCs (F_1-F_4) parameters. Based on the analytical test results, all detected parameter concentrations in the groundwater samples analyzed are in compliance with the selected MECP Table 6 potable groundwater standards.

As part of the previous subsurface investigation, completed by CM3 Environmental Inc. in December 2020, three groundwater samples were recovered from the monitoring wells installed in MW1-MW3 and submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), VOCs, PAHs, metals, and PCB parameters. Based on the analytical test results, the concentrations of several PAHs detected in the groundwater sample recovered from MW2 were marginally in excess of the selected MECP Table 6 potable groundwater standards.

As part of this current investigation, a resampling of this well was carried out, which included the recovery and submission of a groundwater sample for laboratory analysis of VOCs, PHCs (F_1-F_4), and PAHs parameters. Based on the analytical test results, all detected parameter concentrations are in compliance with the selected MECP Table 6 potable groundwater standards. Based on this, it is our opinion that the previous PAH results were not representative of the actual groundwater quality in this well.

Recommendations

Soil

Based on the findings of this assessment, as well as the previous subsurface investigation completed by CM3 Environmental Inc. in September 2020, PHC contaminated soil was identified in the vicinity of MW1. While this soil possesses no risk to the use of the subject site, considerations should be given to remediating this soil at the time of future site redevelopment. 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.

Monitoring Wells

If the groundwater monitoring wells installed on-site are not going to be used in the future, or will be destroyed during future construction activities, then they must be decommissioned according to Ontario Regulation 903 (Ontario Water Resources Act), however, we recommend that the wells be maintained for future sampling purposes if practical to do so. 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 Cash for Trash Canada, Paterson Group (Paterson) conducted a Phase II – Environmental Site Assessment (Phase II ESA) for the property addressed 7628 Flewellyn 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.

1.1 Site Description

Address:	7628 Flewellyn Road, Ottawa, Ontario;
Legal Description:	Part of Lot 12, Concession 1, Formerly the Township of Goulbourn, in the City of Ottawa.
Location:	The subject site is located on the south side of Flewellyn Road, approximately 600 m east of Munster Road, in the City of Ottawa, Ontario. Refer to Figure 1 – Key Plan, appended to this report.
Latitude and Longitude:	45° 11' 45" N, 75° 57' 54" W.

Site Description:

Configuration:	Irregular
Site Area:	20.22 hectares (approximate)
Zoning:	RU – Rural Countryside Zone
Current Uses:	The subject site is currently occupied with an automotive salvage yard and metal recycling facility.
Services:	The subject site and the surrounding properties are serviced with private drinking water wells and septic systems.

1.2 Property Ownership

The subject property is currently owned by Cash for Trash Canada. Paterson was retained to complete this Phase II ESA by Mr. Charbel Bouroufail of Cash for Trash Canada, whose offices are located at 7628 Flewellyn Road, Ottawa, Ontario. Mr. Bouroufail can be contacted via telephone at 613-900-4434.

1.3 Current and Proposed Future Uses

The subject site is currently occupied with an automotive salvage yard and metal recycling facility. It is our understanding that the property is to be formally rezoned to allow for the construction of a permanent auto garage structure, in addition to allow for the expansion of the salvage yard operations within the northern and central portions of the subject site.

1.4 Applicable Site Condition Standard

The site condition standards for the subject property were obtained from Table 6 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:

- ❒ Shallow soil conditions;
- ❒ Coarse-grained soil conditions;
- ❒ Potable groundwater conditions;
- ❒ Commercial/industrial land use.

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

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The northern half of the subject site is occupied with an automotive salvage yard and metal recycling facility, whereas the southern half of the subject site consists of vacant land, recently stripped of vegetation. The salvage yard is comprised of a one (1) storey office building, a portable weigh scale office building, multiple equipment sheds and temporary storage buildings, an automobile fluid draining station, as well as several stockpiles of various automobiles, household appliances, and other scrap metal products.

The site topography slopes gently down to the south, whereas the regional topography appears to slope down to the southeast, in the general direction of the Jock River. The subject site is considered to be at grade with respect to Flewellyn Road and the adjacent properties. Water drainage on the subject site occurs via infiltration within the property.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation for this assessment was conducted on May 21 and May 25, 2021, and consisted of drilling six boreholes (BH1-BH6) throughout the subject site, three of which were instrumented with groundwater monitoring wells (BH1-BH3). Boreholes BH1-BH3 were drilled to depths ranging from approximately 9.91 m to 10.11 m below the existing ground surface and terminated within the bedrock, whereas boreholes BH4-BH6 were drilled to depths ranging from approximately 1.22 m to 2.24 m below the existing ground surface and terminated 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:

- Volatile Organic Compounds (VOCs);
- Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F_1-F_4);
- Polycyclic Aromatic Hydrocarbons (PAHs).

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 Paleozoic bedrock and organic deposits, with an overburden thickness ranging from approximately 0 m to 2 m.

Groundwater is anticipated to be encountered within the bedrock and flow in an easterly direction. It should be noted that local groundwater flow may be potentially influenced by dewatering activities carried out by the neighbouring quarry operations to the west of the subject site.

Water Bodies

No water bodies are present on the subject site. The nearest named water body with respect to the subject site is the Jock River, located approximately 10 km to the southeast.

Areas of Natural and Scientific Interest

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

Existing Buildings and Structures

The subject site is currently occupied with a one (1) storey residential dwelling, currently configured for office purposes. A portable office building, in addition to several temporary storage buildings are also present on the subject site.

Drinking Water Wells

Based on the lack of municipal services, drinking water wells are expected to be present within the Phase I study area, particularly in association with the residences along Flewellyn Road.

Neighbouring Land Use

Neighbouring land use within the Phase I study area consists mainly of residential properties, vacant land, and a quarry operation.

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:

- An automobile wrecking and salvage operations, located throughout the northern half of the subject site;
- Three aboveground fuel storage tanks, used for fuelling on-site vehicles, located in the northern portion of the subject site;
- Six aboveground fluid storage tanks, used for storing waste automobile fluids, located in the north-central portion of the subject site;

- An automobile fluid draining station, located in the north-central portion of 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 inferred down-gradient or cross-gradient orientation with respect to anticipated groundwater flow.

Contaminants of Potential Concern

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

- Volatile Organic Compounds (VOCs);
- Petroleum Hydrocarbons, fractions 1 – 4 (PHCs F_1-F_4);
- Polycyclic Aromatic Hydrocarbons (PAHs).

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

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation for this assessment was conducted on May 21 and May 25, 2021, and consisted of drilling six boreholes (BH1-BH6) throughout the subject site, three of which were instrumented with groundwater monitoring wells (BH1-BH3). Boreholes BH1-BH3 were drilled to depths ranging from approximately 9.91 m to 10.11 m below the existing ground surface and terminated within the bedrock, whereas boreholes BH4-BH6 were drilled to depths ranging from approximately 1.22 m to 2.24 m below the existing ground surface and terminated on practical refusal to augering on inferred bedrock.

Three previously installed groundwater monitoring wells (MW1-MW3), drilled as part of a previous subsurface investigation by CM3 Environmental Inc. (CM3) in December 2020, were also located and utilized as part of this subsurface investigation.

Under the full-time supervision of Paterson personnel, the boreholes were drilled using a low-clearance drill rig provided by George Downing Estate Drilling of Hawkesbury, Ontario. The locations of the boreholes are illustrated on Drawing PE5254-3 – 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.

A total of twelve 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 thin layer of brown silty sand with gravel and rock fragments, over top of interbedded limestone, dolostone, and shale bedrock.

4.3 Field Screening Measurements

All soil samples collected were subjected to a preliminary screening procedure, which included a visual screening for colour and evidence of metals.

Due to the shallow nature of the soil profile encountered at BH1-BH3 (less than 0.2 m of overburden), as well as the poor recovery of any surficial soils (mostly rock fragments), no soil samples were screened for vapour concentrations or submitted for laboratory analysis.

4.4 Groundwater Monitoring Well Installation

Three 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 well volumes being removed from the wells at the time of installation. The wells were developed until the appearance of the water was noted to have stabilized. In addition, the ground surface elevations of each borehole were subsequently surveyed with respect to a known geodetic elevation.

Table 1
Monitoring Well Construction Details

Well ID	Ground Surface Elevation (m ASL)	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH1	129.19	9.91	6.91-9.91	6.40-9.91	0.30-6.40	Stick-Up
BH2	129.38	10.11	7.11-10.11	6.53-10.11	0.30-6.53	Stick-Up
BH3	128.16	10.06	7.06-10.06	6.71-10.06	0.30-6.71	Stick-Up

4.5 Field Measurement of Water Quality Parameters

Groundwater monitoring and sampling was conducted at BH1-BH3 and MW2 on June 3, 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

Due to the shallow nature of the soil profile encountered at BH1-BH3 (less than 0.2 m of overburden), as well as the poor recovery of any surficial soils (mostly rock fragments), no soil samples were submitted for laboratory analysis.

The following groundwater samples were submitted for laboratory analysis:

Table 2
Testing Parameters for Submitted Groundwater Samples

Sample ID	Screened Interval & Stratigraphic Unit	Parameters Analyzed			Rationale
		VOCs	PHCs (F_1-F_4)	PAHs	
BH1-21-GW1	6.91 - 9.91 m Bedrock	X	X		To assess for potential impacts resulting from an on-site automobile fluid draining station, as well as from six on-site aboveground waste fluid storage tanks.
BH2-21-GW1	7.11 - 10.11 m Bedrock	X	X		To assess for potential impacts resulting from three on-site aboveground fuel storage tanks.
BH3-21-GW1	7.06 - 10.06 m Bedrock	X	X		To assess for potential impacts resulting from an on-site salvage yard operation.
MW2-GW2	12.69 - 15.69 m Bedrock	X	X	X	For confirmatory analysis of previously identified contaminant parameter concentrations detected in excess of the selected MECP Table 6 commercial standards.
DUP1[1]	7.11 - 10.11 m Bedrock	X			For laboratory QA/QC purposes.

1 – Duplicate sample of BH2-21-GW1

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

4.8 Residue Management

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

4.9 Elevation Surveying

The ground surface elevations at each borehole location were surveyed using a GPS device by Paterson personnel and referenced to a geodetic datum.

4.10 Quality Assurance and Quality Control Measures

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

5.0 REVIEW AND EVALUATION

5.1 Geology

In general, the subsurface soil profile encountered at the borehole locations consists of a thin (0.15 m) layer of brown silty sand with gravel and rock fragments. Bedrock, consisting of interbedded limestone, dolostone, and shale, was encountered in BH1-BH3 at depths ranging from approximately 0.15 m to 0.20 m below the existing ground surface. Practical refusal to augering on inferred bedrock was encountered in BH4-BH6 at depths ranging from approximately 1.22 m to 2.24 m below the existing ground surface. Site geology details are provided in the Soil Profile and Test Data Sheets in Appendix 1.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured using an electronic water level meter at boreholes BH1-BH3 and MW2 on June 3, 2021. The groundwater levels are summarized below in Table 3.

Table 3
Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1	129.19	5.76	123.43	June 3, 2021
BH2	129.38	0.95	128.43	
BH3	128.16	2.04	126.12	
MW2	-	8.13	-	

The groundwater at the subject site was generally encountered within the bedrock at depths ranging from approximately 0.95 m to 8.13 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 PE5254-3 – Test Hole Location Plan in the appendix, the groundwater flow on the subject site is interpreted to be in an easterly direction. A horizontal hydraulic gradient of approximately 0.014 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

Due to the shallow nature of the soil profile encountered at BH1-BH3 (less than 0.2 m of overburden), as well as the poor recovery of any surficial soils (mostly rock fragments), no soil samples were screened for organic vapour concentrations.

5.5 Soil Quality

As part of the previous subsurface investigation, completed by CM3 Environmental Inc. in December 2020, three soil samples were submitted for laboratory analysis of BTEX, PHCs F_1-F_4, and VOCs. The results of the analytical testing are presented below in Tables 4 and 5, as well as on the laboratory certificates of analysis included in Appendix 1.

Table 4
Analytical Test Results – Soil
(BTEX & PHCs F_1-F_4)

Parameter	MDL (µg/g)	Soil Samples (µg/g)			MECP Table 6 Commercial Soil Standards (µg/g)
		Sept. 25, 2020	Sept. 24, 2020	Sept. 25, 2020	
		MW1-SA1	MW2-SA1	MW3-SA1	
Benzene	0.02	nd	nd	nd	0.32
Ethylbenzene	0.05	nd	nd	nd	1.1
Toluene	0.05	nd	nd	nd	6.4
Xylenes	0.05	nd	nd	nd	26
PHC F_1	7	nd	nd	nd	55
PHC F_2	4	nd	nd	nd	230
PHC F_3	8	**2,950**	47	151	1,700
PHC F_4	6	764	190	153	3,300

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

The concentration of PHCs F_3 in soil sample MW1-SA1 is in excess of the selected MECP Table 6 commercial soil standards.

Table 5
Analytical Test Results – Soil
VOCs

Parameter	MDL (µg/g)	Soil Samples (ug/g)			MECP Table 6 Commercial Soil Standards (µg/g)
		Sept. 25, 2020	Sept. 24, 2020	Sept. 25, 2020	
		MW1-SA1	MW2-SA1	MW3-SA1	
Acetone	0.50	nd	nd	nd	16
Benzene	0.02	nd	nd	nd	0.32
Bromodichloromethane	0.05	nd	nd	nd	1.5
Bromoform	0.05	nd	nd	nd	0.61
Bromomethane	0.05	nd	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	nd	0.21
Chlorobenzene	0.05	nd	nd	nd	2.4
Chloroform	0.05	nd	nd	nd	0.47
Dibromochloromethane	0.05	nd	nd	nd	2.3
Dichlorodifluoromethane	0.05	nd	nd	nd	16
1,2-Dichlorobenzene	0.05	nd	nd	nd	1.2
1,3-Dichlorobenzene	0.05	nd	nd	nd	9.6
1,4-Dichlorobenzene	0.05	nd	nd	nd	0.2
1,1-Dichloroethane	0.05	nd	nd	nd	0.47
1,2-Dichloroethane	0.05	nd	nd	nd	0.05
1,1-Dichloroethylene	0.05	nd	nd	nd	0.064
cis-1,2-Dichloroethylene	0.05	nd	nd	nd	1.9
trans-1,2-Dichloroethylene	0.05	nd	nd	nd	1.3
1,2-Dichloropropane	0.05	nd	nd	nd	0.16
1,3-Dichloropropene	0.05	nd	nd	nd	0.059
Ethylbenzene	0.05	nd	nd	nd	1.1
Ethylene Dibromide	0.05	nd	nd	nd	0.05
Hexane	0.05	nd	nd	nd	46
Methyl Ethyl Ketone	0.50	nd	nd	nd	70
Methyl Isobutyl Ketone	0.50	nd	nd	nd	31
Methyl tert-butyl ether	0.05	nd	nd	nd	1.6
Methylene Chloride	0.05	nd	nd	nd	1.6
Styrene	0.05	nd	nd	nd	34
1,1,1,2-Tetrachloroethane	0.05	nd	nd	nd	0.087
1,1,2,2-Tetrachloroethane	0.05	nd	nd	nd	0.05
Tetrachloroethylene	0.05	nd	nd	nd	1.9
Toluene	0.05	nd	nd	nd	6.4
1,1,1-Trichloroethane	0.05	nd	nd	nd	6.1
1,1,2-Trichloroethane	0.05	nd	nd	nd	0.05
Trichloroethylene	0.05	nd	nd	nd	0.55
Trichlorofluoromethane	0.05	nd	nd	nd	4
Vinyl Chloride	0.02	nd	nd	nd	0.032
Xylenes	0.05	nd	nd	nd	26

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

All VOC parameters were non-detect in the soil samples analyzed. The results are in compliance with the MECP Table 6 commercial soil standards.

Due to the shallow nature of the soil profile encountered at BH1-BH3 (less than 0.2 m of overburden), as well as the poor recovery of any surficial soils (mostly rock fragments), no soil samples were submitted for laboratory analysis as part of the current subsurface investigation.

Table 6
Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Sample ID	Depth Interval (m BGS)
PHC F_3	**2,950**	MW1-SA1	0.00 – 0.60 m
PHC F_4	764	MW1-SA1	0.00 – 0.60 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

As part of the previous subsurface investigation, completed by CM3 Environmental Inc. in September 2020, three groundwater samples were recovered from the monitoring wells installed in MW1-MW3 and submitted for laboratory analysis of BTEX, PHCs F_1-F_4, VOCs, PAHs, metals, and PCBs. The results of the analytical testing are presented below in Tables 7 to 11, as well as on the laboratory certificates of analysis included in Appendix 1.

Table 7
Analytical Test Results – Groundwater
BTEX & PHCs (F_1-F_4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 6 Potable Groundwater Standards (µg/L)
		Oct. 6, 2020	Nov. 6, 2020	Oct. 6, 2020	
		MW1	MW2	MW3	
Benzene	0.5	nd	nd	nd	0.5
Ethylbenzene	0.5	nd	nd	nd	2.4
Toluene	0.5	nd	nd	0.9	24
Xylenes	0.5	nd	nd	0.8	72
PHC F_1	25	nd	nd	nd	420
PHC F_2	100	nd	nd	nd	150
PHC F_3	100	nd	nd	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 were in compliance with the selected MECP Table 6 potable groundwater standards.

Table 8
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (ug/L)			MECP Table 6 Potable Groundwater Standards (µg/L)
		Oct. 6, 2020	Nov. 6, 2020	Oct. 6, 2020	
		MW1	MW2	MW3	
Acetone	5.0	nd	nd	nd	2,700
Benzene	0.5	nd	nd	nd	0.5
Bromodichloromethane	0.5	nd	nd	nd	16
Bromoform	0.5	nd	nd	nd	5
Bromomethane	0.5	nd	nd	nd	0.89
Carbon Tetrachloride	0.2	nd	nd	nd	0.2
Chlorobenzene	0.5	nd	nd	nd	30
Chloroform	0.5	nd	nd	nd	2
Dibromochloromethane	0.5	nd	nd	nd	25
Dichlorodifluoromethane	1.0	nd	nd	nd	590
1,2-Dichlorobenzene	0.5	nd	nd	nd	3
1,3-Dichlorobenzene	0.5	nd	nd	nd	59
1,4-Dichlorobenzene	0.5	nd	nd	nd	0.5
1,1-Dichloroethane	0.5	nd	nd	nd	5
1,2-Dichloroethane	0.5	nd	nd	nd	0.5
1,1-Dichloroethylene	0.5	nd	nd	nd	0.5
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	0.58
1,3-Dichloropropene	0.5	nd	nd	nd	0.5
Ethylbenzene	0.5	nd	nd	nd	2.4
Ethylene Dibromide	0.2	nd	nd	nd	0.2
Hexane	1.0	nd	nd	nd	5
Methyl Ethyl Ketone	5.0	nd	nd	nd	1,800
Methyl Isobutyl Ketone	5.0	nd	nd	nd	640
Methyl tert-butyl ether	2.0	nd	nd	nd	15
Methylene Chloride	5.0	nd	nd	nd	26
Styrene	0.5	nd	nd	nd	5.4
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	1.1
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	0.5
Tetrachloroethylene	0.5	nd	nd	nd	0.5
Toluene	0.5	nd	nd	0.9	24
1,1,1-Trichloroethane	0.5	nd	nd	nd	23
1,1,2-Trichloroethane	0.5	nd	nd	nd	0.5
Trichloroethylene	0.5	nd	nd	nd	0.5
Trichlorofluoromethane	1.0	nd	nd	nd	150
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	0.8	72

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

All detected VOC parameter concentrations were in compliance with the selected MECP Table 6 potable groundwater standards.

Table 9
Analytical Test Results – Groundwater
PAHs

Parameter	MDL (µg/L)	Groundwater Samples (ug/L)			MECP Table 6 Potable Groundwater Standards (µg/L)
		Oct. 6, 2020	Nov. 6, 2020	Oct. 6, 2020	
		MW1	MW2	MW3	
Acenaphthene	0.05	nd	0.09	nd	4.1
Acenaphthylene	0.05	nd	nd	nd	1
Anthracene	0.01	nd	0.04	nd	1
Benzo[a]anthracene	0.01	nd	0.07	nd	1
Benzo[a]pyrene	0.01	nd	**0.09**	nd	0.01
Benzo[b]fluoranthene	0.05	nd	**0.11**	nd	0.1
Benzo[g,h,i]perylene	0.05	nd	0.12	nd	0.2
Benzo[k]fluoranthene	0.05	nd	0.09	nd	0.1
Chrysene	0.05	nd	**0.11**	nd	0.1
Dibenzo[a,h]anthracene	0.05	nd	0.08	nd	0.2
Fluoranthene	0.01	0.06	0.22	0.04	0.41
Fluorene	0.05	nd	0.08	nd	120
Indeno[1,2,3-cd]pyrene	0.05	nd	0.11	nd	0.2
1-Methylnaphthalene	0.05	nd	nd	nd	3.2
2-Methylnaphthalene	0.05	nd	nd	nd	3.2
Methylnaphthalene (1&2)	0.10	nd	nd	nd	3.2
Naphthalene	0.05	nd	nd	0.06	7
Phenanthrene	0.05	nd	0.11	nd	1
Pyrene	0.01	0.07	0.21	0.05	4.1

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

The concentrations of benzo[a]pyrene, benzo[b]fluoranthene, and chrysene in the groundwater sample recovered from MW2 were in excess of the selected MECP Table 6 potable groundwater standards.

Table 10
Analytical Test Results – Groundwater
Metals

Parameter	MDL (µg/L)	Groundwater Samples (ug/L)			MECP Table 6 Potable Groundwater Standards (µg/L)
		Oct. 6, 2020	Nov. 6, 2020	Oct. 6, 2020	
		MW1	MW2	MW3	
Antimony	0.1	nd	0.6	3.2	6
Arsenic	0.5	nd	2	5	25
Barium	1.0	118	109	42	1,000
Beryllium	1.0	nd	nd	nd	4
Boron	0.5	961	3,350	1,840	5,000
Cadmium	10	nd	nd	nd	2.1
Chromium	1	nd	nd	nd	50
Chromium (VI)	10	nd	nd	nd	110
Cobalt	0.5	3	2.5	nd	3.8
Copper	0.5	1.2	nd	4	69
Lead	0.1	0.2	nd	nd	10
Mercury	0.1	nd	nd	nd	0.1
Molybdenum	0.5	1.3	5.4	12.3	70
Nickel	1	10	9	2	100
Selenium	1	nd	nd	nd	10
Silver	0.1	nd	nd	nd	1.2
Sodium	200	48,000	354,000	204,000	490,000
Thallium	0.1	0.2	nd	0.1	2
Uranium	0.1	0.6	3.5	1.9	20
Vanadium	0.5	0.8	0.6	0.9	6.2
Zinc	5	nd	nd	nd	890

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

All detected metal parameter concentrations were in compliance with the selected MECP Table 6 potable groundwater standards.

Table 11
Analytical Test Results – Groundwater
PCBs

Parameter	MDL (µg/L)	Groundwater Samples (ug/L)			MECP Table 6 Potable Groundwater Standards (µg/L)
		Oct. 6, 2020	Nov. 6, 2020	Oct. 6, 2020	
		MW1	MW2	MW3	
PCBs, total	0.05	nd	nd	nd	0.2

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

All PCB parameter concentrations were non-detect in the groundwater samples analyzed. The results are in compliance with the selected MECP Table 6 potable groundwater standards.

Groundwater samples were recovered from the monitoring wells installed in BH1-BH3 and submitted for laboratory analysis of PHCs (F_1-F_4) and VOC parameters. A groundwater sample was also recovered from a previously existing monitoring well (MW2), and submitted for laboratory analysis of VOCs, PHCs (F_1-F_4), and PAHs. The results of the analytical testing are presented below in Tables 12 to 14, as well as on the laboratory certificates of analysis included in Appendix 1.

Table 12
Analytical Test Results – Groundwater
PHCs (F_1-F_4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)				MECP Table 6 Potable Groundwater Standards (µg/L)
		June 3, 2021				
		BH1-21-GW1	BH2-21-GW1	BH3-21-GW1	MW2-GW2	
PHC F_1	25	nd	nd	nd	nd	420
PHC F_2	100	nd	nd	nd	nd	150
PHC F_3	100	nd	nd	nd	nd	500
PHC F_4	100	nd	nd	nd	nd	500

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

All PHC parameter concentrations were non-detect in the groundwater sample analyzed. The results are in compliance with the selected MECP Table 6 potable groundwater standards.

Table 13
Analytical Test Results – Groundwater
VOCs

Parameter	MDL (µg/L)	Groundwater Samples (ug/L)				MECP Table 6 Potable Groundwater Standards (µg/L)
		June 3, 2021				
		BH1-21-GW1	BH2-21-GW1	BH3-21-GW1	MW2-GW2	
Acetone	5.0	nd	nd	nd	nd	2,700
Benzene	0.5	nd	nd	nd	nd	0.5
Bromodichloromethane	0.5	nd	nd	nd	nd	16
Bromoform	0.5	nd	nd	nd	nd	5
Bromomethane	0.5	nd	nd	nd	nd	0.89
Carbon Tetrachloride	0.2	nd	nd	nd	nd	0.2
Chlorobenzene	0.5	nd	nd	nd	nd	30
Chloroform	0.5	nd	nd	nd	nd	2
Dibromochloromethane	0.5	nd	nd	nd	nd	25
Dichlorodifluoromethane	1.0	nd	nd	nd	nd	590
1,2-Dichlorobenzene	0.5	nd	nd	nd	nd	3
1,3-Dichlorobenzene	0.5	nd	nd	nd	nd	59
1,4-Dichlorobenzene	0.5	nd	nd	nd	nd	0.5
1,1-Dichloroethane	0.5	nd	nd	nd	nd	5
1,2-Dichloroethane	0.5	nd	nd	nd	nd	0.5
1,1-Dichloroethylene	0.5	nd	nd	nd	nd	0.5
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	nd	0.58
1,3-Dichloropropene	0.5	nd	nd	nd	nd	0.5
Ethylbenzene	0.5	nd	nd	nd	nd	2.4
Ethylene Dibromide	0.2	nd	nd	nd	nd	0.2
Hexane	1.0	nd	nd	nd	nd	5
Methyl Ethyl Ketone	5.0	nd	nd	nd	nd	1,800
Methyl Isobutyl Ketone	5.0	nd	nd	nd	nd	640
Methyl tert-butyl ether	2.0	nd	nd	nd	nd	15
Methylene Chloride	5.0	nd	nd	nd	nd	26
Styrene	0.5	nd	nd	nd	nd	5.4
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	nd	1.1
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	nd	0.5
Tetrachloroethylene	0.5	nd	nd	nd	nd	0.5
Toluene	0.5	nd	nd	nd	nd	24
1,1,1-Trichloroethane	0.5	nd	nd	nd	nd	23
1,1,2-Trichloroethane	0.5	nd	nd	nd	nd	0.5
Trichloroethylene	0.5	nd	nd	nd	nd	0.5
Trichlorofluoromethane	1.0	nd	nd	nd	nd	150
Vinyl Chloride	0.5	nd	nd	nd	nd	0.5
Xylenes	0.5	1.7	nd	nd	nd	72

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

All detected VOC parameter concentrations are in compliance with the selected MECP Table 6 potable groundwater standards.

Table 14
Analytical Test Results – Groundwater
PAHs

Parameter	MDL (µg/L)	Groundwater Sample (µg/L)	MECP Table 6 Potable Groundwater Standards (µg/L)
		June 3, 2021	
		MW2-GW2	
Acenaphthene	0.05	nd	4.1
Acenaphthylene	0.05	nd	1
Anthracene	0.01	nd	1
Benzo[a]anthracene	0.01	nd	1
Benzo[a]pyrene	0.01	nd	0.01
Benzo[b]fluoranthene	0.05	nd	0.1
Benzo[g,h,i]perylene	0.05	nd	0.2
Benzo[k]fluoranthene	0.05	nd	0.1
Chrysene	0.05	nd	0.1
Dibenzo[a,h]anthracene	0.05	nd	0.2
Fluoranthene	0.01	0.02	0.41
Fluorene	0.05	nd	120
Indeno[1,2,3-cd]pyrene	0.05	nd	0.2
1-Methylnaphthalene	0.05	nd	3.2
2-Methylnaphthalene	0.05	nd	3.2
Methylnaphthalene (1&2)	0.10	nd	3.2
Naphthalene	0.05	nd	7
Phenanthrene	0.05	nd	1
Pyrene	0.01	0.07	4.1

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

All detected PAH parameter concentrations in the groundwater sample analyzed are in compliance with the selected MECP Table 6 potable groundwater standards.

It is suspected that the original October and November 2020 groundwater test results, which reported elevated concentrations of PAHs, were not fully representative of the actual groundwater conditions on the subject site. It may have been that the wells were not properly developed prior to the initial groundwater sampling event. As a result, the more recent groundwater are considered to be more indicative of the overall groundwater conditions on-site.

Table 15
Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Sample ID	Depth Interval (m BGS)
Toluene	0.9	MW3	5.70 – 14.80
Xylenes	1.7	BH1-21-GW1	6.91 – 9.91
Fluoranthene	0.02	MW2-GW2	5.70 – 14.80
Pyrene	0.07	MW2-GW2	5.70 – 14.80
Antimony	0.6	MW2	5.70 – 14.80
Arsenic	5	MW3	5.70 – 14.80
Barium	118	MW1	5.70 – 14.80
Boron	3,350	MW2	5.70 – 14.80
Cobalt	3	MW1	5.70 – 14.80
Copper	4	MW3	5.70 – 14.80
Lead	0.2	MW1	5.70 – 14.80
Molybdenum	12.3	MW3	5.70 – 14.80
Nickel	10	MW1	5.70 – 14.80
Sodium	354,000	MW2	5.70 – 14.80
Thallium	0.2	MW1	5.70 – 14.80
Uranium	3.5	MW2	5.70 – 14.80
Vanadium	0.9	MW3	5.70 – 14.80

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 groundwater sample was obtained from sample BH2-21-GW1 and submitted for laboratory analysis of VOC parameters. No VOC parameter concentrations were detected in either the original or the duplicate samples. As a result, the quality of the field data collected during this Phase II ESA is considered to be sufficient to meet the overall objectives of this assessment.

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

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

5.8 Phase II Conceptual Site Model

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

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

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 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 three aboveground fuel storage tanks, located within the northern portion of the subject site, and six aboveground automobile waste fluid storage tanks, located within the north-central portion of the subject site.

- *Item 49: "Salvage Yard, Including Automobile Wrecking"*

This PCA was identified as a result of the presence of automobile wrecking and salvage operations, located throughout the northern half of the subject site.

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

This PCA was identified as a result of the presence of an automobile fluid draining station, located within the north-central portion of the subject site.

Contaminants of Potential Concern

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

- Volatile Organic Compounds (VOCs);
- Petroleum Hydrocarbons, fractions 1 - 4 (PHCs F_1-F_4);
- Polycyclic Aromatic Hydrocarbons (PAHs).

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 a fibre optic cable, a private water well, and a private septic system.

Physical Setting

Site Stratigraphy

The stratigraphy of the subject site generally consists of:

- Topsoil (southern part of subject site); extending to depths ranging from approximately 0.30 m to 0.60 m below the existing ground surface (BH4-BH6);
- Brown silty sand with gravel and rock fragments; extending to depths of approximately 0.15 m to 0.20 m below the existing ground surface (BH1-BH3) or encountered at a depth of approximately 0.30 m to 0.60 m below the existing ground surface (BH4-BH6);
- Interbedded limestone, dolostone, and shale bedrock; encountered in BH1-BH3 at depths ranging from approximately 0.15 m to 0.20 m below the existing ground surface. Practical refusal to augering on inferred bedrock was encountered in BH4-BH6 at depths ranging from approximately 1.22 m to 2.24 m below the existing ground surface.

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

Hydrogeological Characteristics

The groundwater at the subject site was encountered within the bedrock at depths ranging from approximately 0.95 m to 8.13 m below the existing ground surface. Based on the measured groundwater levels, the groundwater is interpreted to flow in an easterly direction.

It should be noted that local groundwater flow may be potentially influenced by dewatering activities carried out by the neighbouring quarry operations to the west of the subject site.

Approximate Depth to Bedrock

Bedrock, consisting of interbedded limestone, dolostone, and shale, was encountered in BH1-BH3 at depths ranging from approximately 0.15 m to 0.20 m below the existing ground surface.

Practical refusal to augering on inferred bedrock was encountered in BH4-BH6 at depths ranging from approximately 1.22 m to 2.24 m below the existing ground surface.

Approximate Depth to Water Table

The depth to the water table is approximately 0.95 m to 8.13 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 apply to the subject site, since the bedrock is situated at depths greater than 2 m below ground surface, and thus is considered to be a shallow soil property.

Existing Buildings and Structures

The subject site is currently occupied with a one (1) storey residential dwelling, currently configured for office purposes. A portable office building, in addition to several temporary storage buildings are also present on the subject site.

Water Bodies

No water bodies are present on the subject site. The nearest named water body with respect to the subject site is the Jock River, located approximately 10 km to the southeast.

Areas of Natural and Scientific Interest

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

Proposed Buildings and Other Structures

It is our understanding that the property is to be formally rezoned to allow for the construction of a permanent auto garage structure, in addition to allow for the expansion of the salvage yard operations within the central portion of the subject site.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of this Phase II ESA, as well as the previous investigation completed by CM3 Environmental Inc. in December 2020, some PHC impacted soil was identified in the vicinity of MW1, located in the northwestern corner of the subject site.

It should be noted that, while the previous investigation by CM3 did identify some minor PAH contamination in the recovered groundwater sample from MW2, a resampling of this well, carried out as part of this current investigation, did not identify any PAH contaminants at concentrations exceeding the selected MECP Table 6 potable groundwater standards. As a result, the groundwater at this location is not considered to be contaminated. No other contaminant concentrations exceeding the selected MECP Table 6 potable groundwater standards were identified in any of the other groundwater samples recovered from the monitoring wells installed on the subject site.

Types of Contaminants

Based on the findings of this Phase II ESA, as well as the previous investigation completed by CM3 Environmental Inc., the concentration of petroleum hydrocarbons, fraction 3 (PHCs F_3) identified in the soil at MW1 is in excess of the selected MECP Table 6 commercial soil standards.

Contaminated Media

Based on the findings of this Phase II ESA, as well as the previous investigation completed by CM3 Environmental Inc., the soil located in the vicinity of MW1 is considered to be contaminated with PHCs.

What Is Known About Areas Where Contaminants Are Present

Based on the findings of this Phase II ESA, as well as the previous investigation completed by CM3 Environmental Inc., the soil located in the vicinity of MW1 is considered to be contaminated with PHCs. This area is located in the northwestern portion of the subject site and is currently being utilized as part of the on-site salvage yard operations.

Distribution and Migration of Contaminants

Based on the findings of this Phase II ESA, as well as the previous investigation completed by CM3 Environmental Inc., the soil located in the vicinity of MW1 is considered to be contaminated with PHCs. Based on its low mobility, the shallow nature of the overburden soils in this area, as well as the clean groundwater test results from this monitoring well, it is anticipated that the PHC contaminants are contained within the soil in this portion of the subject site.

Discharge of Contaminants

Based on the findings of this Phase II ESA, as well as the previous investigation completed by CM3 Environmental Inc., the soil located in the vicinity of MW1 is considered to be contaminated with PHCs. The source of these contaminants is considered likely to have been the result of a discharge of engine oil as part of regular salvage yard operations in this portion of the subject site.

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 of contaminants is not considered to have affected contaminant distribution at the subject site, due to the shallow nature of the overburden soils as well as the clean groundwater test results. Fluctuations in the groundwater level and flow are also not considered to have affected any contaminant distribution based on the depth of the water table within the bedrock, well below the shallow overburden soils.

Potential for Vapour Intrusion

Given the location of the PHC impacted soil in the shallow soil outside of any building footprint, as well as the relatively low-volatility of PHC F_3, the potential for vapours to be present within any structures or site office trailers are considered to be low and do not pose a safety hazard to the current occupants.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the property addressed 7628 Flewellyn 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 May 21 and May 25, 2021, and consisted of drilling six boreholes (BH1-BH6) throughout the subject site, three of which were instrumented with groundwater monitoring wells (BH1-BH3). Boreholes BH1-BH3 were drilled to depths ranging from approximately 9.91 m to 10.11 m below the existing ground surface and terminated within the bedrock, whereas boreholes BH4-BH6 were drilled to depths ranging from approximately 1.22 m to 2.24 m below the existing ground surface and terminated on practical refusal to augering on inferred bedrock. Three previously installed groundwater monitoring wells (MW1-MW3) were also located and utilized as part of this subsurface investigation.

In general, the subsurface soil profile encountered at the borehole locations consists of a thin (0.15 m) layer of brown silty sand with gravel and rock fragments, over top of interbedded limestone, dolostone, and shale bedrock.

Due to the shallow nature of the soil profile encountered at BH1-BH3 (less than 0.2 m of overburden), as well as the poor recovery of any surficial soils (mostly rock fragments), no soil samples were submitted for laboratory analysis.

As part of the previous subsurface investigation, completed by CM3 Environmental Inc. in December 2020, three soil samples were submitted for laboratory analysis of BTEX, PHCs F_1-F_4, and VOC parameters. Based on the analytical test results, the concentration of PHCs F_3 detected in the soil at MW1 was in excess of the selected MECP Table 6 commercial soil standards.

Groundwater samples were recovered from the monitoring wells installed in BH1-BH3 and submitted for laboratory analysis of VOCs and PHCs (F_1-F_4) parameters. Based on the analytical test results, all detected parameter concentrations in the groundwater samples analyzed are in compliance with the selected MECP Table 6 potable groundwater standards.

As part of the previous subsurface investigation, completed by CM3 Environmental Inc. in December 2020, three groundwater samples were recovered from the monitoring wells installed in MW1-MW3 and submitted for laboratory analysis of BTEX, PHCs (F_1-F_4), VOCs, PAHs, metals, and PCB parameters. Based on the analytical test results, the concentrations of several PAHs detected in the groundwater sample recovered from MW2 were marginally in excess of the selected MECP Table 6 potable groundwater standards.

As part of this current investigation, a resampling of this well was carried out, which included the recovery and submission of a groundwater sample for laboratory analysis of VOCs, PHCs (F_1-F_4), and PAHs parameters. Based on the analytical test results, all detected parameter concentrations are in compliance with the selected MECP Table 6 potable groundwater standards. Based on this, it is our opinion that the previous PAH results were not representative of the actual groundwater quality in this well.

Recommendations

Soil

Based on the findings of this assessment, as well as the previous subsurface investigation completed by CM3 Environmental Inc. in September 2020, PHC contaminated soil was identified in the vicinity of MW1. While this soil possesses no risk to the use of the subject site, considerations should be given to remediating this soil at the time of future site redevelopment. 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.

Monitoring Wells

If the groundwater monitoring wells installed on-site are not going to be used in the future, or will be destroyed during future construction activities, then they must be decommissioned according to Ontario Regulation 903 (Ontario Water Resources Act), however, we recommend that the wells be maintained for future sampling purposes if practical to do so. 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 Cash for Trash Canada. Permission and notification from Cash for Trash Canada 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:

- Cash for Trash Canada
- Paterson Group Inc.

FIGURES

FIGURE 1 – KEY PLAN

DRAWING PE5254-3 – TEST HOLE LOCATION PLAN

DRAWING PE5254-4 – ANALYTICAL TESTING PLAN – SOIL (PHCs)

DRAWING PE5254-4A – CROSS SECTION A-A' – SOIL (PHCs)

DRAWING PE5254-4B – CROSS SECTION B-B' – SOIL (PHCs)

DRAWING PE5254-5 – ANALYTICAL TESTING PLAN – SOIL (BTEX & VOCs)

DRAWING PE5254-5A – CROSS SECTION A-A' – SOIL (BTEX & VOCs)

DRAWING PE5254-5B – CROSS SECTION B-B' – SOIL (BTEX & VOCs)

DRAWING PE5254-6 – ANALYTICAL TESTING PLAN – GROUNDWATER

DRAWING PE5254-6A – CROSS SECTION A-A' – GROUNDWATER

DRAWING PE5254-6B – CROSS SECTION B-B' – GROUNDWATER

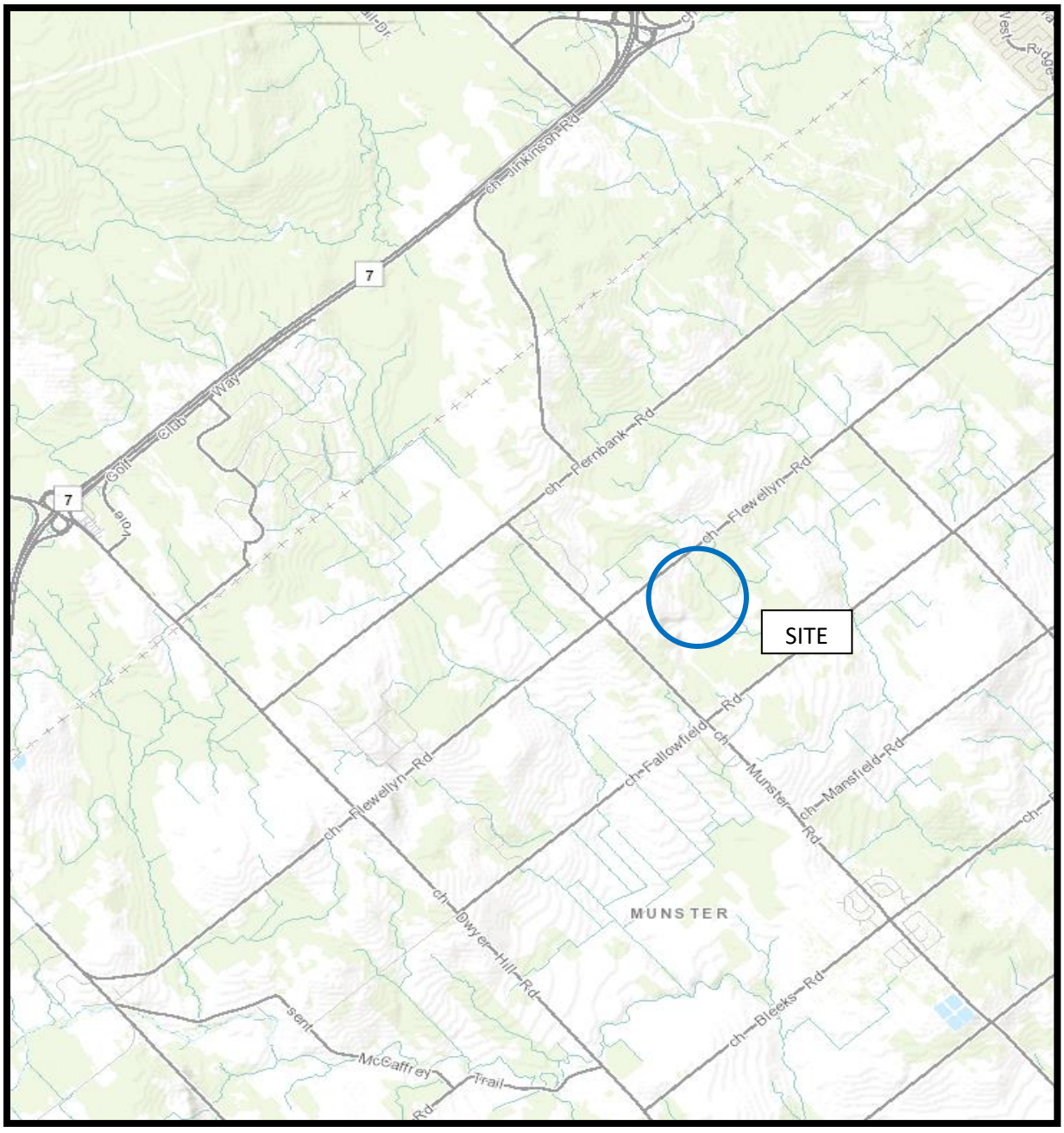
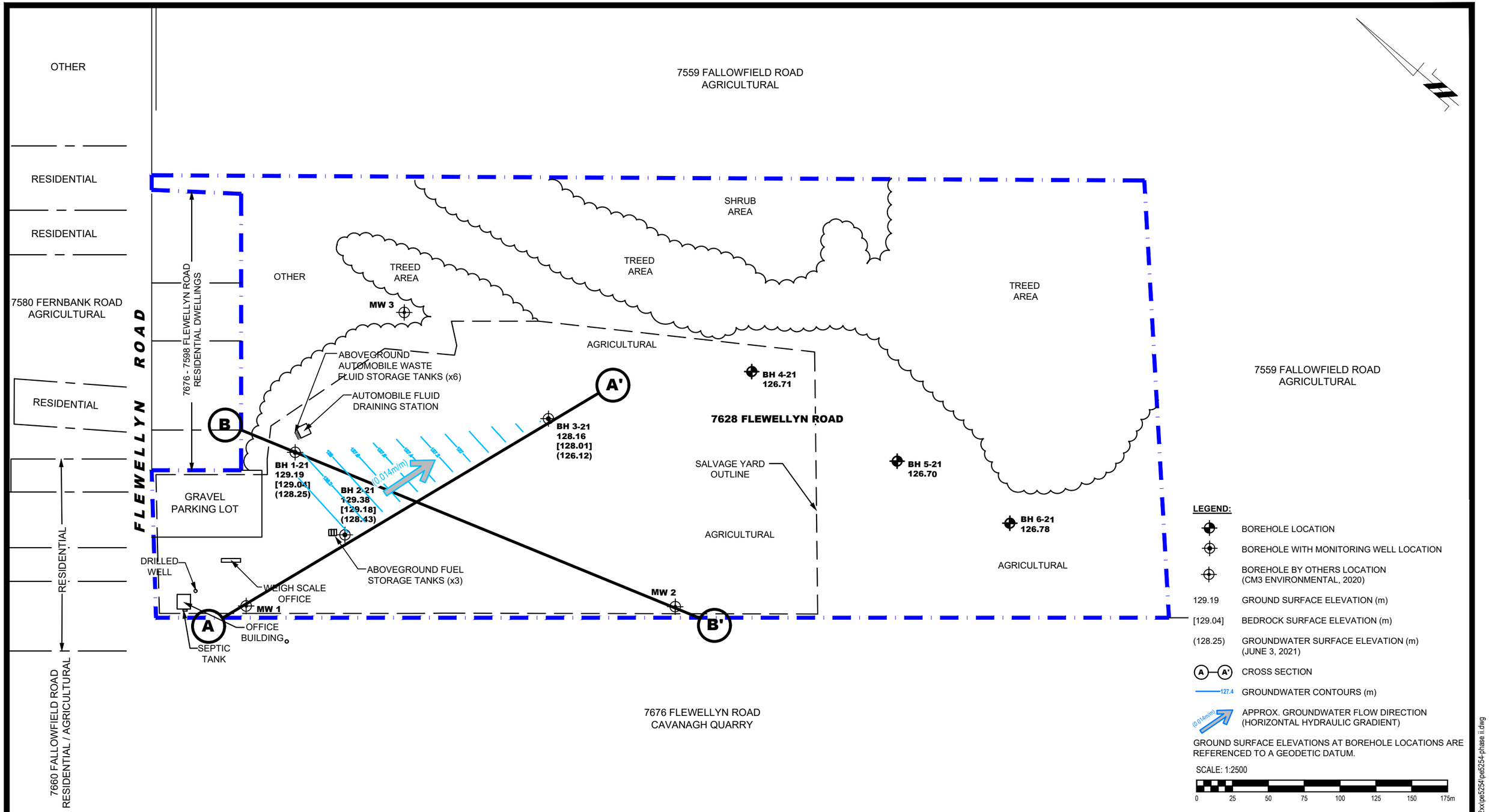


FIGURE 1

KEY PLAN



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NO.	REVISIONS	DATE	INITIAL

CASH FOR TRASH CANADA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
7628 FLEWELLYN ROAD

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:2500	Date: 07/2021
Drawn by: JM	Report No.: PE5254-2
Checked by: NS	Dwg No.: PE5254-3
Approved by: MSD	Revision No.:

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OTHER

7559 FALLOWFIELD ROAD
AGRICULTURAL

MW3-SA1 0.00-0.10 m Sept. 25, 2020
PHCs comply with MECP Table 6 Standards

RESIDENTIAL

RESIDENTIAL

7580 FERNBANK ROAD
AGRICULTURAL

RESIDENTIAL

RESIDENTIAL

RESIDENTIAL

7676 - 7598 FLEWELLYN ROAD
RESIDENTIAL DWELLINGS

FLEWELLYN ROAD

OTHER

TREED AREA

SHRUB AREA

TREED AREA

TREED AREA

MW 3

AGRICULTURAL

ABOVEGROUND AUTOMOBILE WASTE FLUID STORAGE TANKS (x6)

AUTOMOBILE FLUID DRAINING STATION

BH 4-21
126.71

7628 FLEWELLYN ROAD

A'

B

BH 3-21
128.16
[128.01]
(126.12)

BH 1-21
129.19
[129.04]
(128.25)

BH 2-21
129.38
[129.18]
(128.43)

SALVAGE YARD OUTLINE

BH 5-21
126.70

BH 6-21
126.78

AGRICULTURAL

AGRICULTURAL

GRAVEL PARKING LOT

DRILLED WELL

ABOVEGROUND FUEL STORAGE TANKS (x3)

WEIGH SCALE OFFICE

MW 1

MW 2

A

B'

OFFICE BUILDING

SEPTIC TANK

7559 FALLOWFIELD ROAD
AGRICULTURAL

RESIDENTIAL

ALLOWFIELD ROAD
TIAL / AGRICULTURAL

MW1-SA1	0.00-0.60 m	Sept. 25, 2020
Parameter	Result (µg/g)	Standard(µg/g)
PHCs F3	2,950	1,700
Remaining PHCs comply with MECP Table 6 Standards		

MW2-SA1 0.00-0.20 m Sept. 24, 2020
PHCs comply with MECP Table 6 Standards

7676 FLEWELLYN ROAD
CAVANAGH QUARRY

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE BY OTHERS LOCATION (CM3 ENVIRONMENTAL, 2020)
- 129.19 GROUND SURFACE ELEVATION (m)
- [129.04] BEDROCK SURFACE ELEVATION (m)
- (128.25) GROUNDWATER SURFACE ELEVATION (m) (JUNE 3, 2021)
- A—A' CROSS SECTION

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

SCALE: 1:2500

0 25 50 75 100 125 150 175m

SOIL RESULT COMPLIES WITH MECP TABLE 6 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 6 STANDARDS

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CASH FOR TRASH CANADA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
7628 FLEWELLYN ROAD

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (PHCs)

Scale: 1:2500	Date: 07/2021
Drawn by: JM	Report No.: PE5254-2
Checked by: NS	Dwg No.: PE5254-4
Approved by: MSD	Revision No.:

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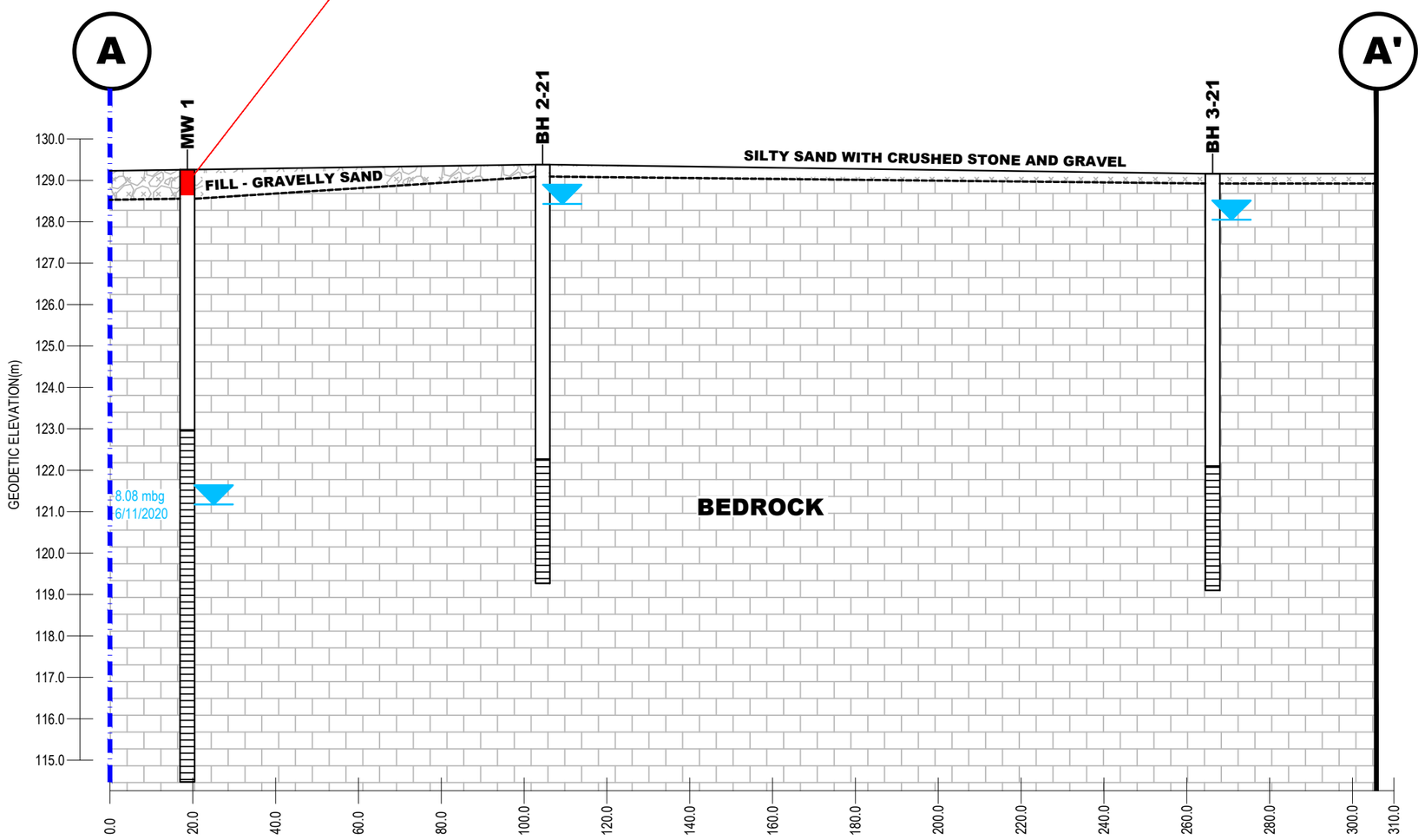
MW1-SA1	0.00-0.60 m	Sept. 25, 2020
Parameter	Result (µg/g)	Standard(µg/g)
PHCs F3	2,950	1,700

Remaining PHCs comply with MECP Table 6 Standards



LEGEND:

GROUNDWATER LEVEL

MONITORING WELL SCREEN

SOIL RESULT COMPLIES WITH MECP TABLE 6 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 6 STANDARDS

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CASH FOR TRASH CANADA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
7628 FLEWELLYN ROAD

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A' - SOIL (PHCs)

Scale: AS SHOWN	Date: 07/2021
Drawn by: RCG	Report No.: PE5254-2
Checked by: NS	Dwg No.: PE5254-4A
Approved by: MSD	Revision No.:

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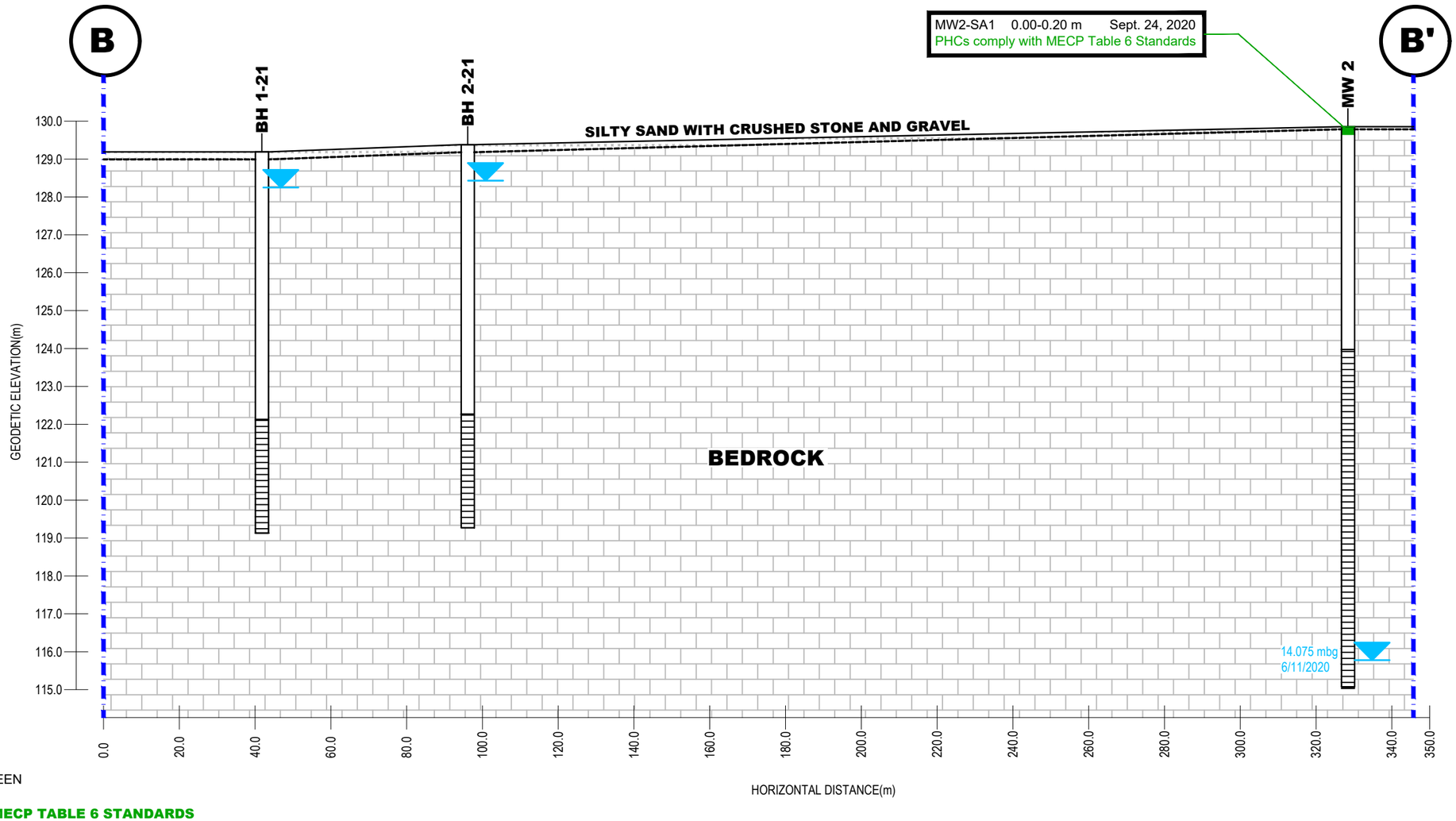

LEGEND:

GROUNDWATER LEVEL

MONITORING WELL SCREEN

SOIL RESULT COMPLIES WITH MECP TABLE 6 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 6 STANDARDS

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CASH FOR TRASH CANADA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
7628 FLEWELLYN ROAD

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL (PHCs)

Scale: AS SHOWN	Date: 07/2021
Drawn by: RCG	Report No.: PE5254-2
Checked by: NS	Dwg No.: PE5254-4B
Approved by: MSD	Revision No.:

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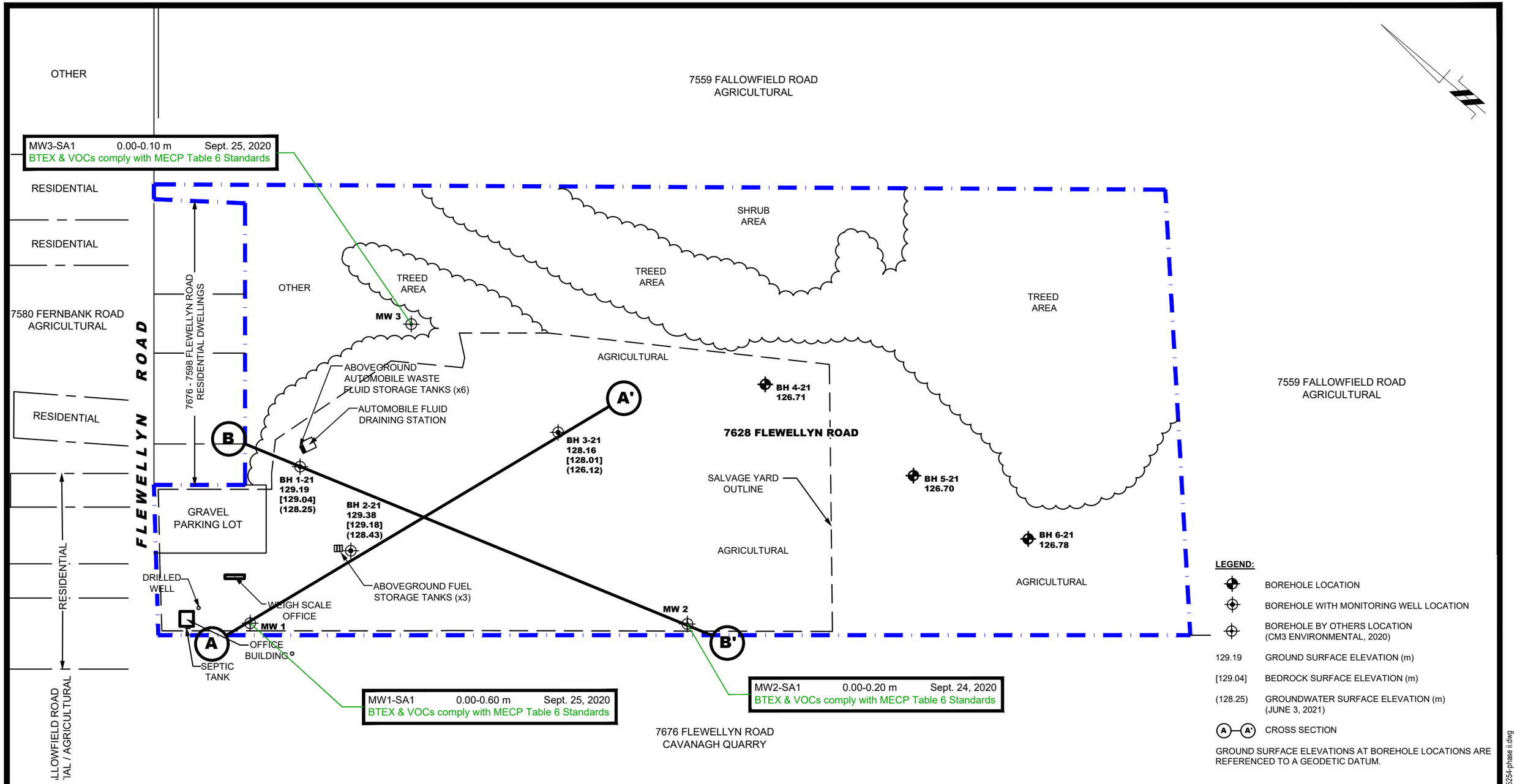

SOIL RESULT COMPLIES WITH MECP TABLE 6 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 6 STANDARDS

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CASH FOR TRASH CANADA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
7628 FLEWELLYN ROAD

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (BTEX, VOCs)

Scale: 1:2500	Date: 07/2021
Drawn by: JM	Report No.: PE5254-2
Checked by: NS	Dwg No.: PE5254-5
Approved by: MSD	Revision No.:

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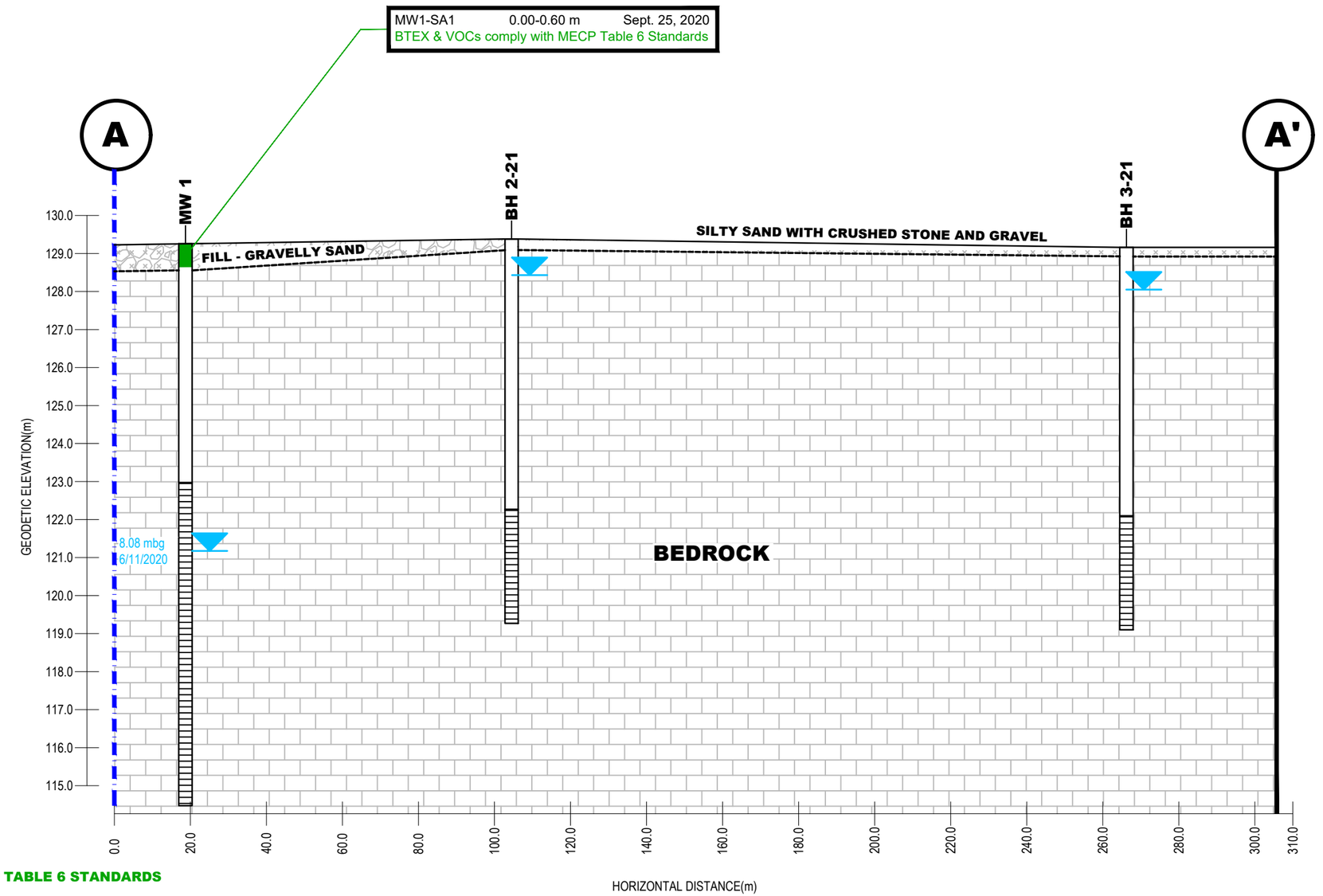

LEGEND:

GROUNDWATER LEVEL

MONITORING WELL SCREEN

SOIL RESULT COMPLIES WITH MECP TABLE 6 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 6 STANDARDS

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CASH FOR TRASH CANADA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
7628 FLEWELLYN ROAD

OTTAWA, ONTARIO

Title:

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

Scale: AS SHOWN	Date: 07/2021
Drawn by: RCG	Report No.: PE5254-2
Checked by: NS	Dwg No.: PE5254-5A
Approved by: MSD	Revision No.:

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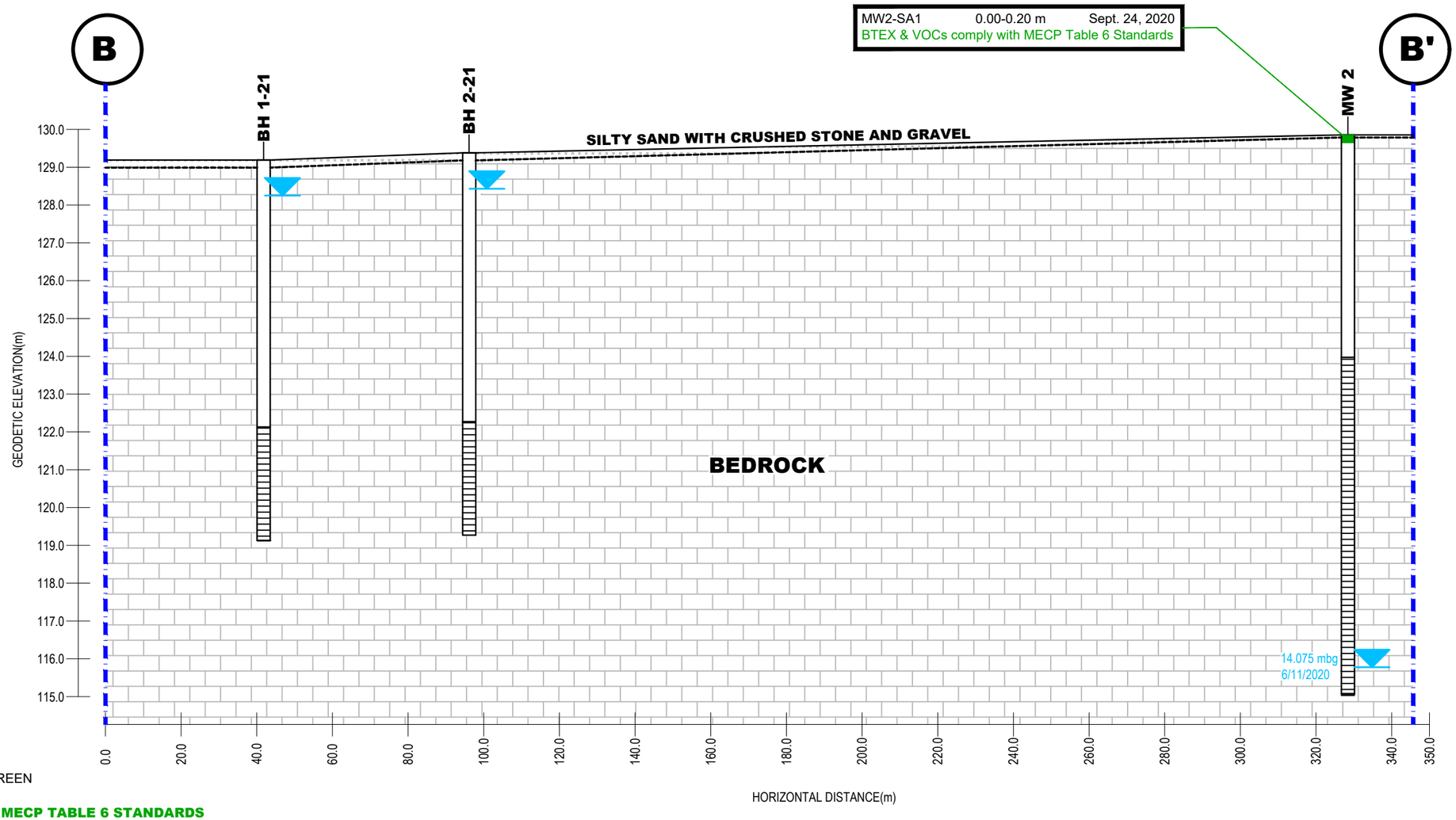

LEGEND:

GROUNDWATER LEVEL

MONITORING WELL SCREEN

SOIL RESULT COMPLIES WITH MECP TABLE 6 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 6 STANDARDS

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CASH FOR TRASH CANADA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
7628 FLEWELLYN ROAD

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - SOIL (BTEX, VOCs)

Scale: AS SHOWN	Date: 07/2021
Drawn by: RCG	Report No.: PE5254-2
Checked by: NS	Dwg No.: PE5254-5B
Approved by: MSD	Revision No.:

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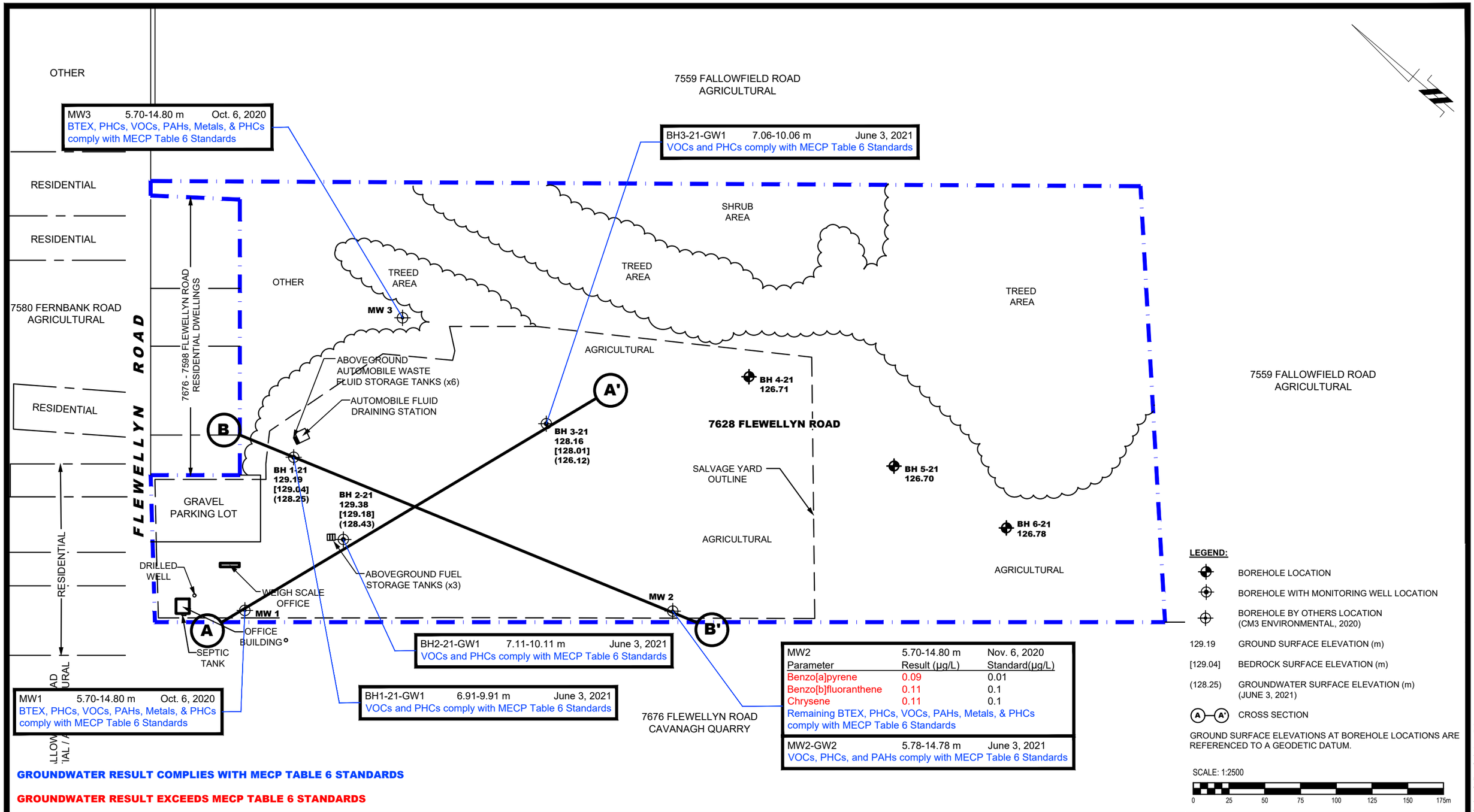

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CASH FOR TRASH CANADA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
7628 FLEWELLYN ROAD

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - GROUNDWATER (BTEX, VOCs, METALS, PHCs, PAHs)

Scale: 1:2500	Date: 07/2021
Drawn by: JM	Report No.: PE5254-2
Checked by: NS	Dwg No.: PE5254-6
Approved by: MSD	Revision No.:

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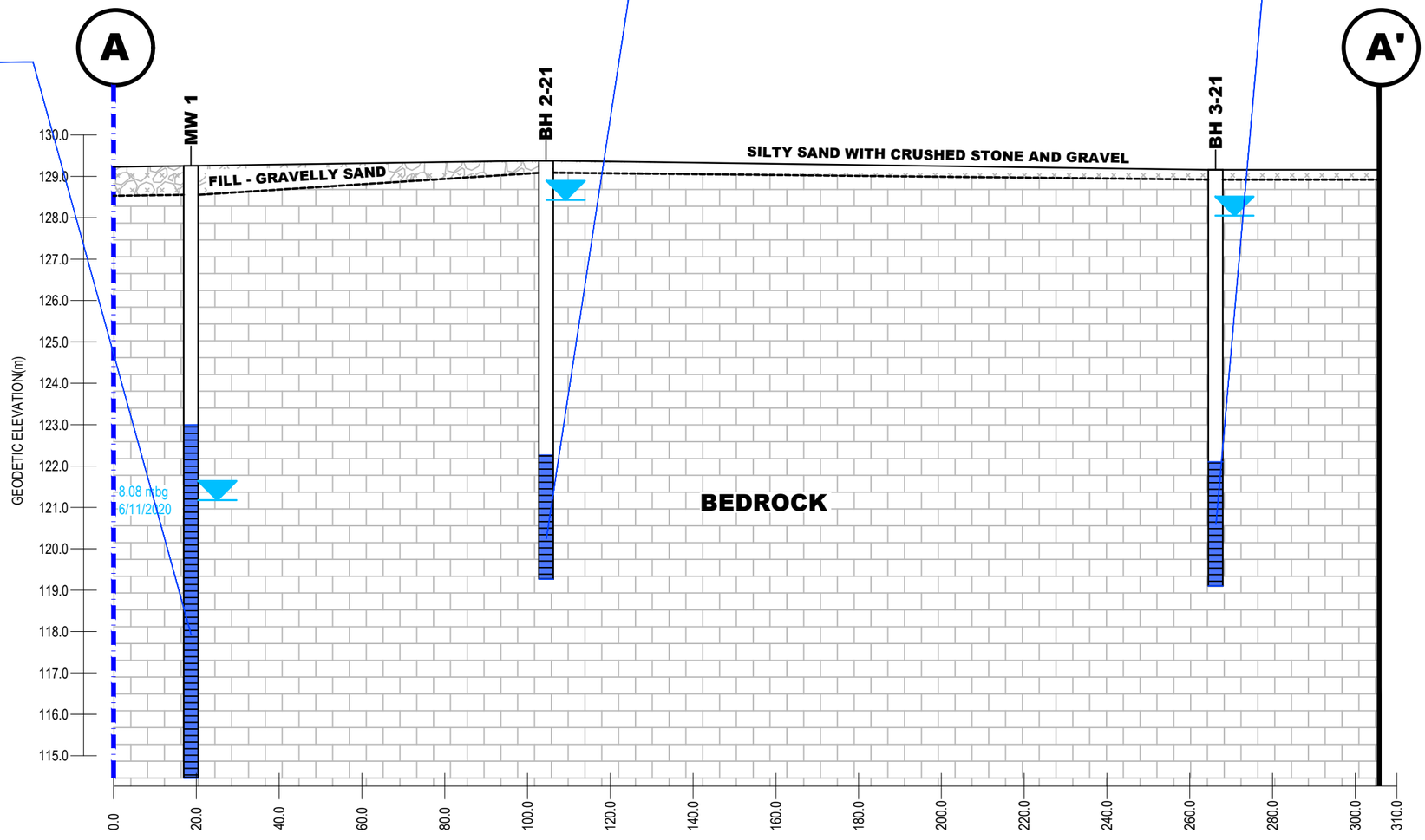
MW1 5.70-14.80 m Oct. 6, 2020
BTEX, PHCs, VOCs, PAHs, Metals, & PHCs comply with MECP Table 6 Standards

BH2-21-GW1 7.11-10.11 m June 3, 2021
VOCs and PHCs comply with MECP Table 6 Standards

BH3-21-GW1 7.06-10.06 m June 3, 2021
VOCs and PHCs comply with MECP Table 6 Standards



LEGEND:

GROUNDWATER LEVEL

MONITORING WELL SCREEN

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 6 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 6 STANDARDS

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CASH FOR TRASH CANADA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
7628 FLEWELLYN ROAD

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 07/2021
Drawn by: RCG	Report No.: PE5254-2
Checked by: NS	Dwg No.: PE5254-6A
Approved by: MSD	Revision No.:

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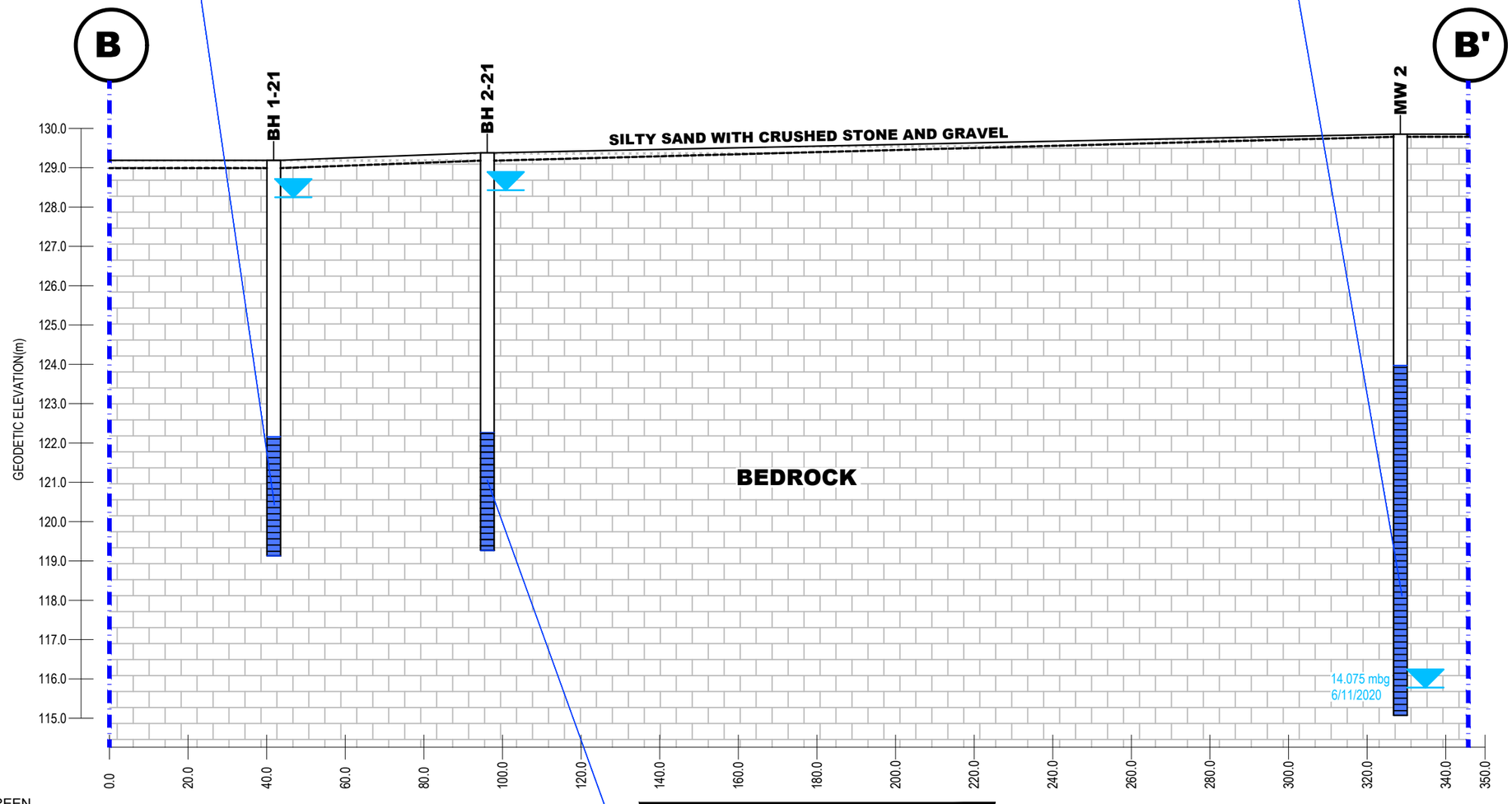
MW2	5.70-14.80 m	Nov. 6, 2020
Parameter	Result (µg/L)	Standard(µg/L)
Benzo[a]pyrene	0.09	0.01
Benzo[b]fluoranthene	0.11	0.1
Chrysene	0.11	0.1

Remaining BTEX, PHCs, VOCs, PAHs, Metals, & PHCs comply with MECP Table 6 Standards

MW2-GW2 5.78-14.78 m June 3, 2021
VOCs, PHCs, and PAHs comply with MECP Table 6 Standards

BH1-21-GW1 6.91-9.91 m June 3, 2021
VOCs and PHCs comply with MECP Table 6 Standards



BH2-21-GW1 7.11-10.11 m June 3, 2021
VOCs and PHCs comply with MECP Table 6 Standards

LEGEND:

GROUNDWATER LEVEL

MONITORING WELL SCREEN

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 6 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 6 STANDARDS

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CASH FOR TRASH CANADA

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
7628 FLEWELLYN ROAD

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B' - GROUNDWATER (BTEX, VOCs, METALS, PHCs, PAHs)

Scale: AS SHOWN	Date: 07/2021
Drawn by: RCG	Report No.: PE5254-2
Checked by: NS	Dwg No.: PE5254-6B
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

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Sampling & Analysis Plan

Phase II – Environmental Site Assessment
7628 Flewellyn Road
Ottawa, Ontario

Prepared For

Cash for Trash Canada

May 1, 2021

Report: PE5254-SAP

TABLE OF CONTENTS

1.0 SAMPLING PROGRAM 1
2.0 ANALYTICAL TESTING PROGRAM 2
3.0 STANDARD OPERATING PROCEDURES 3
3.1 Environmental Drilling Procedure 3
3.2 Monitoring Well Installation Procedure 6
3.3 Monitoring Well Sampling Procedure 7
4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC) 8
5.0 DATA QUALITY OBJECTIVES 9
6.0 PHYSICAL IMPEDIMENTS 10

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Cash for Trash Canada, to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for the property addressed 7628 Flewellyn 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	Northern portion of the subject site; to assess for potential impacts resulting from the presence of an automobile waste fluid draining station as well as six aboveground waste fluid storage tanks.	9-11 m; to intercept the groundwater table for the purposes of installing a monitoring well.
BH2	Northern portion of the subject site; to assess for potential impacts resulting from the presence of three aboveground fuel storage tanks.	9-11 m; to intercept the groundwater table for the purposes of installing a monitoring well.
BH3	North-central portion of the subject site; to assess for potential impacts resulting from the presence of an automobile wrecking and salvage yard.	9-11 m; to intercept the groundwater table for the purposes of installing a monitoring well.
BH4-BH6	Southern portion of the subject site; for geotechnical and general coverage purposes.	0-2 m; for geotechnical and general coverage purposes.

Borehole locations are shown on Drawing PE5254-3 – Test Hole Location Plan, appended to the main report.

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

Following the borehole drilling, groundwater monitoring wells will be installed in BH1-BH3 for the collection of groundwater samples.

2.0 ANALYTICAL TESTING PROGRAM

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

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

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

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

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

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

Drilling Procedure

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

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

Spoon Washing Procedure

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

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

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

Screening Procedure

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

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

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

3.2 Monitoring Well Installation Procedure

Equipment

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

Procedure

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

3.3 Monitoring Well Sampling Procedure

Equipment

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

Sampling Procedure

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

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

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

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

5.0 DATA QUALITY OBJECTIVES

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

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

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

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

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

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS

Physical impediments to the Sampling and Analysis plan may include:

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

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

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
7628 Flewellyn Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5254

REMARKS

HOLE NO. BH 1-21

BORINGS BY Track-Mount Power Auger **DATE** May 21, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	129.19
FILL: Brown silty sand with gravel and rock fragments 0.15		SS	1	100	50+		
		RC	1	100	31	1	128.19
		RC	2	100	65	2	127.19
		RC	3	100	100	3	126.19
BEDROCK: Poor to excellent quality, grey limestone interbedded with grey dolostone and shale						4	125.19
		RC	4	100	72	5	124.19
		RC	5	100	57	6	123.19
- vertical seams from 6.45 to 6.8m and 7.7 to 8.0m depths						7	122.19
		RC	6	100	68	8	121.19
		RC	7	100	88	9	120.19
10.06 End of Borehole						10	119.19
(GWL @ 0.94m - June 3, 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
7628 Flewellyn Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5254

REMARKS

HOLE NO. BH 2-21

BORINGS BY Track-Mount Power Auger **DATE** May 21, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	129.38
FILL: Brown silty sand with crushed stone		SS	1		50+		
0.20							
		RC	1	100	35	1	128.38
		RC	2	100	40	2	127.38
		RC	3	100	88	3	126.38
BEDROCK: Poor to excellent quality, grey limestone interbedded with grey dolostone and shale		RC	4	100	92	4	125.38
		RC	5	100	66	5	124.38
		RC	6	100	25	6	123.38
		RC	7	100	72	7	122.38
						8	121.38
						9	120.38
10.11						10	119.38
End of Borehole							
(GWL @ 0.94m - June 3, 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
7628 Flewellyn Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5254

REMARKS

HOLE NO. BH 3-21

BORINGS BY Track-Mount Power Auger **DATE** May 25, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	128.16
FILL: Brown silty sand with gravel and rock fragments		SS	1	75	50+		
0.15							
		RC	1	100	81	1	127.16
		RC	2	100	80	2	126.16
		RC	3	100	80	3	125.16
BEDROCK: Good to excellent quality, grey limestone interbedded with grey dolostone and shale		RC	4	100	63	4	124.16
		RC	5	100	76	5	123.16
		RC	6	100	89	6	122.16
		RC	7	100	97	7	121.16
						8	120.16
						9	119.16
10.06						10	118.16
End of Borehole							
(GWL @ 2.04m - June 3, 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
7628 Flewellyn Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5254

REMARKS

HOLE NO. BH 4-21

BORINGS BY Track-Mount Power Auger **DATE** May 25, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
TOPSOIL 0.10		AU	1			0	126.71		
GLACIAL TILL: Brown silty sand with gravel, cobbles and boulders, trace clay		SS	2		50+	1	125.71		
1.22									
End of Borehole									
Practical refusal to augering at 1.22m depth									
(BH dry upon completion)									

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

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
7628 Flewellyn Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5254

REMARKS

HOLE NO. BH 5-21

BORINGS BY Track-Mount Power Auger **DATE** May 25, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
TOPSOIL 0.10		AU	1			0	126.70		
GLACIAL TILL: Brown silty sand, some gravel, cobbles and boulders, trace clay		SS	2	33	9	1	125.70		
1.45									
End of Borehole									
Practical refusal to augering at 1.45m depth									
(BH dry upon completion)									

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

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
7628 Flewellyn Road
Ottawa, Ontario

DATUM Geodetic

FILE NO. PE5254

REMARKS

HOLE NO. BH 6-21

BORINGS BY Track-Mount Power Auger **DATE** May 25, 2021

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: ● Volatile Organic Rdg. (ppm) / ○ Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
FILL: Brown silty sand with gravel, trace organics		AU	1			0	126.78		
0.25									
TOPSOIL		AU	2						
0.60									
GLACIAL TILL: Brown silty sand, some gravel, cobbles and boulders, trace clay		SS	2	58	9	1	125.78		
		SS	3	0	36	2	124.78		
2.23									
End of Borehole									
Practical refusal to augering at 2.23m depth									
(BH dry upon completion)									

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

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

CONSOLIDATION TEST

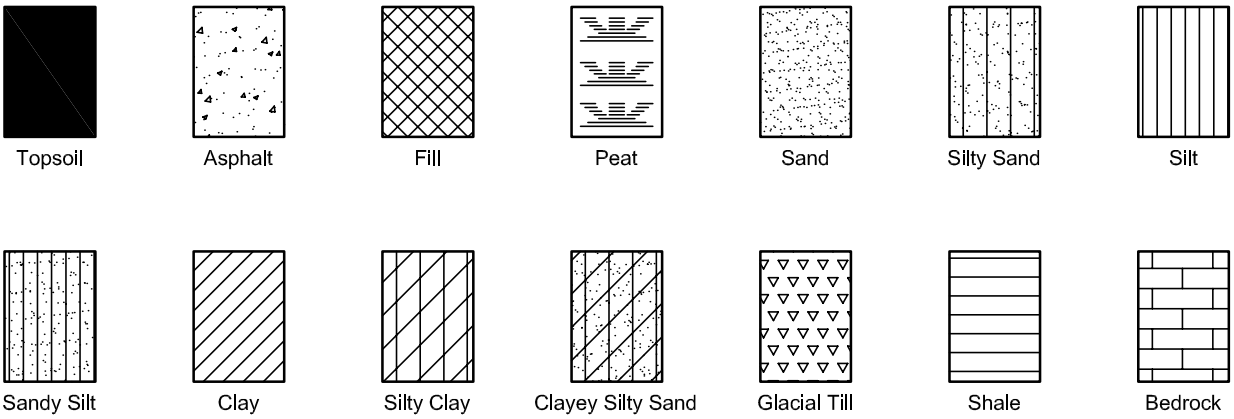
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

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

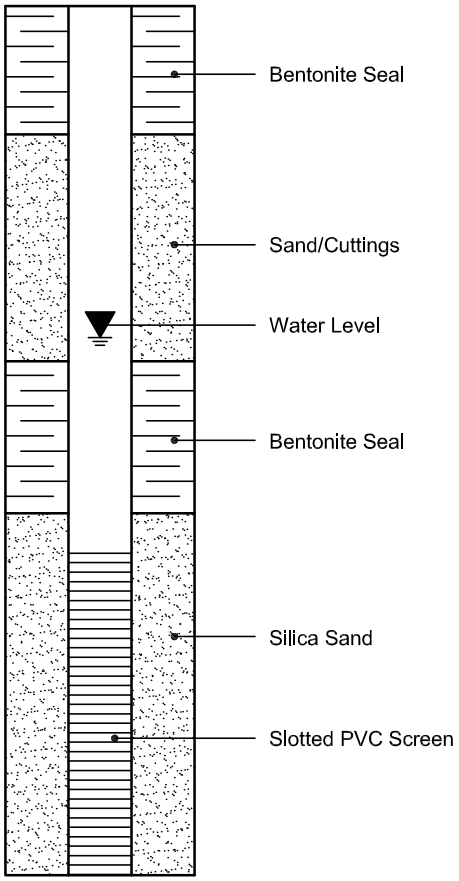
SYMBOLS AND TERMS (continued)

STRATA PLOT

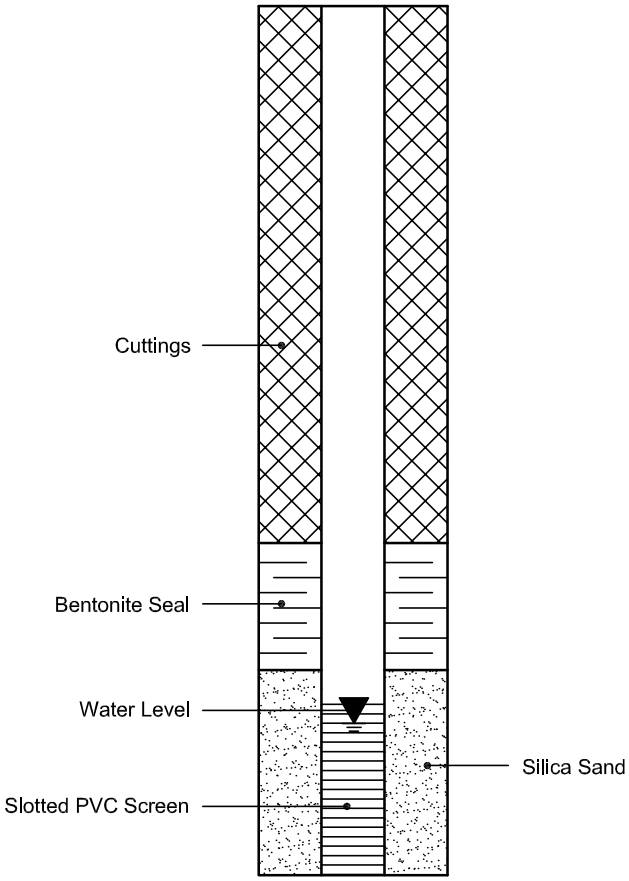


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 32223
Project: PE5254
Custody: 131355

Report Date: 11-Jun-2021
Order Date: 4-Jun-2021

Order #: 2123617

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

Paracel ID	Client ID
2123617-01	BH1-21-GW1
2123617-02	BH2-21-GW1
2123617-03	BH3-21-GW1
2123617-04	MW2-GW2
2123617-05	DUP 1

Approved By:

Dale Robertson, BSc
Laboratory Director

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	7-Jun-21	8-Jun-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	8-Jun-21	10-Jun-21
REG 153: PAHs by GC-MS	EPA 625 - GC-MS, extraction	8-Jun-21	9-Jun-21
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	7-Jun-21	8-Jun-21

Certificate of Analysis

Report Date: 11-Jun-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 4-Jun-2021

Client PO: 32223

Project Description: PE5254

	Client ID:	BH1-21-GW1	BH2-21-GW1	BH3-21-GW1	MW2-GW2
	Sample Date:	03-Jun-21 09:00	03-Jun-21 09:00	03-Jun-21 09:00	03-Jun-21 09:00
	Sample ID:	2123617-01	2123617-02	2123617-03	2123617-04
	MDL/Units	Water	Water	Water	Water
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	<0.2
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	<2.0
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	<5.0
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5

Certificate of Analysis

Report Date: 11-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 4-Jun-2021

Client PO: 32223

Project Description: PE5254

	Client ID:	BH1-21-GW1	BH2-21-GW1	BH3-21-GW1	MW2-GW2
	Sample Date:	03-Jun-21 09:00	03-Jun-21 09:00	03-Jun-21 09:00	03-Jun-21 09:00
	Sample ID:	2123617-01	2123617-02	2123617-03	2123617-04
	MDL/Units	Water	Water	Water	Water
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	<1.0
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	<0.5
m,p-Xylenes	0.5 ug/L	1.7	<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	1.7	<0.5	<0.5	<0.5
4-Bromofluorobenzene	Surrogate	89.9%	82.5%	80.3%	82.6%
Dibromofluoromethane	Surrogate	111%	112%	100%	124%
Toluene-d8	Surrogate	85.8%	86.4%	86.9%	81.0%
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	<100	<100	<100
F4 PHCs (C34-C50)	100 ug/L	<100	<100	<100	<100
Semi-Volatiles					
Acenaphthene	0.05 ug/L	-	-	-	<0.05
Acenaphthylene	0.05 ug/L	-	-	-	<0.05
Anthracene	0.01 ug/L	-	-	-	<0.01
Benzo [a] anthracene	0.01 ug/L	-	-	-	<0.01
Benzo [a] pyrene	0.01 ug/L	-	-	-	<0.01
Benzo [b] fluoranthene	0.05 ug/L	-	-	-	<0.05
Benzo [g,h,i] perylene	0.05 ug/L	-	-	-	<0.05
Benzo [k] fluoranthene	0.05 ug/L	-	-	-	<0.05
Chrysene	0.05 ug/L	-	-	-	<0.05
Dibenzo [a,h] anthracene	0.05 ug/L	-	-	-	<0.05
Fluoranthene	0.01 ug/L	-	-	-	0.02
Fluorene	0.05 ug/L	-	-	-	<0.05
Indeno [1,2,3-cd] pyrene	0.05 ug/L	-	-	-	<0.05
1-Methylnaphthalene	0.05 ug/L	-	-	-	<0.05
2-Methylnaphthalene	0.05 ug/L	-	-	-	<0.05
Methylnaphthalene (1&2)	0.10 ug/L	-	-	-	<0.10
Naphthalene	0.05 ug/L	-	-	-	<0.05
Phenanthrene	0.05 ug/L	-	-	-	<0.05
Pyrene	0.01 ug/L	-	-	-	0.07
2-Fluorobiphenyl	Surrogate	-	-	-	87.6%
Terphenyl-d14	Surrogate	-	-	-	101%

Certificate of Analysis

Report Date: 11-Jun-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 4-Jun-2021

Client PO: **32223**

Project Description: **PE5254**

	Client ID:	DUP 1	-	-	-
	Sample Date:	03-Jun-21 09:00	-	-	-
	Sample ID:	2123617-05	-	-	-
	MDL/Units	Water	-	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Ethylene dibromide (dibromoethane, 1	0.2 ug/L	<0.2	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-

Certificate of Analysis

Report Date: 11-Jun-2021

Client: **Paterson Group Consulting Engineers**

Order Date: 4-Jun-2021

Client PO: **32223**

Project Description: PE5254

	Client ID:	DUP 1	-	-	-
	Sample Date:	03-Jun-21 09:00	-	-	-
	Sample ID:	2123617-05	-	-	-
	MDL/Units	Water	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	80.3%	-	-	-
Dibromofluoromethane	Surrogate	119%	-	-	-
Toluene-d8	Surrogate	87.4%	-	-	-

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						
Semi-Volatiles									
Acenaphthene	ND	0.05	ug/L						
Acenaphthylene	ND	0.05	ug/L						
Anthracene	ND	0.01	ug/L						
Benzo [a] anthracene	ND	0.01	ug/L						
Benzo [a] pyrene	ND	0.01	ug/L						
Benzo [b] fluoranthene	ND	0.05	ug/L						
Benzo [g,h,i] perylene	ND	0.05	ug/L						
Benzo [k] fluoranthene	ND	0.05	ug/L						
Chrysene	ND	0.05	ug/L						
Dibenzo [a,h] anthracene	ND	0.05	ug/L						
Fluoranthene	ND	0.01	ug/L						
Fluorene	ND	0.05	ug/L						
Indeno [1,2,3-cd] pyrene	ND	0.05	ug/L						
1-Methylnaphthalene	ND	0.05	ug/L						
2-Methylnaphthalene	ND	0.05	ug/L						
Methylnaphthalene (1&2)	ND	0.10	ug/L						
Naphthalene	ND	0.05	ug/L						
Phenanthrene	ND	0.05	ug/L						
Pyrene	ND	0.01	ug/L						
Surrogate: 2-Fluorobiphenyl	*21.2*		*ug/L*		*106*	*50-140*			
Surrogate: Terphenyl-d14	*24.1*		*ug/L*		*120*	*50-140*			
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*61.8*		*ug/L*		*77.2*	*50-140*			
Surrogate: Dibromofluoromethane	*68.4*		*ug/L*		*85.5*	*50-140*			
Surrogate: Toluene-d8	*75.9*		*ug/L*		*94.8*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*63.9*		*ug/L*		*79.9*	*50-140*			
Surrogate: Dibromofluoromethane	*91.9*		*ug/L*		*115*	*50-140*			
Surrogate: Toluene-d8	*66.4*		*ug/L*		*83.0*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1720	25	ug/L	ND	86.2	68-117			
F2 PHCs (C10-C16)	1360	100	ug/L	ND	85.2	60-140			
F3 PHCs (C16-C34)	3410	100	ug/L	ND	87.1	60-140			
F4 PHCs (C34-C50)	2200	100	ug/L	ND	88.8	60-140			
Semi-Volatiles									
Acenaphthene	5.35	0.05	ug/L	ND	107	50-140			
Acenaphthylene	4.50	0.05	ug/L	ND	90.0	50-140			
Anthracene	4.67	0.01	ug/L	ND	93.4	50-140			
Benzo [a] anthracene	4.57	0.01	ug/L	ND	91.4	50-140			
Benzo [a] pyrene	5.04	0.01	ug/L	ND	101	50-140			
Benzo [b] fluoranthene	5.58	0.05	ug/L	ND	112	50-140			
Benzo [g,h,i] perylene	4.16	0.05	ug/L	ND	83.1	50-140			
Benzo [k] fluoranthene	4.78	0.05	ug/L	ND	95.6	50-140			
Chrysene	5.15	0.05	ug/L	ND	103	50-140			
Dibenzo [a,h] anthracene	4.38	0.05	ug/L	ND	87.6	50-140			
Fluoranthene	4.31	0.01	ug/L	ND	86.2	50-140			
Fluorene	4.25	0.05	ug/L	ND	84.9	50-140			
Indeno [1,2,3-cd] pyrene	4.20	0.05	ug/L	ND	84.0	50-140			
1-Methylnaphthalene	4.68	0.05	ug/L	ND	93.5	50-140			
2-Methylnaphthalene	5.16	0.05	ug/L	ND	103	50-140			
Naphthalene	5.19	0.05	ug/L	ND	104	50-140			
Phenanthrene	4.55	0.05	ug/L	ND	91.0	50-140			
Pyrene	4.46	0.01	ug/L	ND	89.1	50-140			
Surrogate: 2-Fluorobiphenyl	*20.8*		*ug/L*		*104*	*50-140*			
Surrogate: Terphenyl-d14	*27.2*		*ug/L*		*136*	*50-140*			
Volatiles									
Acetone	109	5.0	ug/L	ND	109	50-140			
Benzene	41.8	0.5	ug/L	ND	104	60-130			
Bromodichloromethane	39.7	0.5	ug/L	ND	99.2	60-130			
Bromoform	42.9	0.5	ug/L	ND	107	60-130			
Bromomethane	40.3	0.5	ug/L	ND	101	50-140			
Carbon Tetrachloride	39.8	0.2	ug/L	ND	99.4	60-130			
Chlorobenzene	43.3	0.5	ug/L	ND	108	60-130			
Chloroform	42.1	0.5	ug/L	ND	105	60-130			
Dibromochloromethane	37.1	0.5	ug/L	ND	92.8	60-130			
Dichlorodifluoromethane	39.5	1.0	ug/L	ND	98.7	50-140			
1,2-Dichlorobenzene	35.4	0.5	ug/L	ND	88.6	60-130			
1,3-Dichlorobenzene	34.8	0.5	ug/L	ND	86.9	60-130			
1,4-Dichlorobenzene	33.8	0.5	ug/L	ND	84.4	60-130			
1,1-Dichloroethane	43.7	0.5	ug/L	ND	109	60-130			
1,2-Dichloroethane	41.0	0.5	ug/L	ND	102	60-130			
1,1-Dichloroethylene	37.2	0.5	ug/L	ND	93.0	60-130			
cis-1,2-Dichloroethylene	37.6	0.5	ug/L	ND	94.1	60-130			
trans-1,2-Dichloroethylene	38.6	0.5	ug/L	ND	96.6	60-130			
1,2-Dichloropropane	41.6	0.5	ug/L	ND	104	60-130			
cis-1,3-Dichloropropylene	39.6	0.5	ug/L	ND	99.0	60-130			
trans-1,3-Dichloropropylene	40.5	0.5	ug/L	ND	101	60-130			
Ethylbenzene	41.9	0.5	ug/L	ND	105	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Ethylene dibromide (dibromoethane, 1,2-	38.4	0.2	ug/L	ND	96.0	60-130			
Hexane	38.2	1.0	ug/L	ND	95.6	60-130			
Methyl Ethyl Ketone (2-Butanone)	82.2	5.0	ug/L	ND	82.2	50-140			
Methyl Isobutyl Ketone	126	5.0	ug/L	ND	126	50-140			
Methyl tert-butyl ether	118	2.0	ug/L	ND	118	50-140			
Methylene Chloride	42.2	5.0	ug/L	ND	105	60-130			
Styrene	38.8	0.5	ug/L	ND	97.0	60-130			
1,1,1,2-Tetrachloroethane	40.9	0.5	ug/L	ND	102	60-130			
1,1,2,2-Tetrachloroethane	45.9	0.5	ug/L	ND	115	60-130			
Tetrachloroethylene	36.8	0.5	ug/L	ND	92.0	60-130			
Toluene	43.2	0.5	ug/L	ND	108	60-130			
1,1,1-Trichloroethane	41.5	0.5	ug/L	ND	104	60-130			
1,1,2-Trichloroethane	40.6	0.5	ug/L	ND	101	60-130			
Trichloroethylene	42.4	0.5	ug/L	ND	106	60-130			
Trichlorofluoromethane	38.5	1.0	ug/L	ND	96.3	60-130			
Vinyl chloride	41.8	0.5	ug/L	ND	105	50-140			
m,p-Xylenes	83.7	0.5	ug/L	ND	105	60-130			
o-Xylene	43.6	0.5	ug/L	ND	109	60-130			
Surrogate: 4-Bromofluorobenzene	*58.3*		*ug/L*		*72.9*	*50-140*			
Surrogate: Dibromofluoromethane	*79.9*		*ug/L*		*99.9*	*50-140*			
Surrogate: Toluene-d8	*63.5*		*ug/L*		*79.3*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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

PARACEL LABORATORIES LTD

Paracel ID: 2123617

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2123617	№ 132355

Client Name: Paterson Group	Project Ref: PE5254
Contact Name: Nick Sullivan	Quote #:
Address: 154 Colonnade Rd. S.	PO #: 32223
Telephone: 613-226-7381	E-mail: nsullivan@patersongroup.ca

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Turnaround Time

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

Regulation 153/04	Other Regulation
☐ Table 1 ☐ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO
☐ Table 2 ☒ Ind/Comm ☒ Coarse	☐ CCME ☐ MISA
☐ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm
☒ Table 6	Mun:
For RSC: ☐ Yes ☐ No	☐ Other:

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
1	BH1-21-GW1	GW		3	June 3/21		X	X					
2	BH2-21-GW1			3			X	X					
3	BH3-21-GW1			3			X	X					
4	MW2-GW2			4			X	X	X				
5	DUP1			2				X					
6													
7													
8													
9													
10													

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): N. Sullivan	Received By Driver/Depot: A. Jeause	Received at Lab: Jumeyam Dohrmi	Verified By:
Relinquished By (Print): Nick Sullivan	Date/Time: 04/06/21 3:15	Date/Time: June 04, 2021 04:43	Date/Time: June 4th, 2021 17:15
Date/Time: June 4/2021	Temperature: °C	Temperature: 9.9 °C	pH Verified: ☐ By: