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Phase II - Environmental Site Assessment

70 Richmond Road & 376 Island Park Drive
Ottawa, Ontario

Prepared For

Devtrin (Island Park) Inc.

July 14, 2021

Report: PE4525-2R

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the property addressed 70 Richmond Road and 376 Island Park Drive, in the City of Ottawa, Ontario. The purpose of the Phase II ESA is to address the areas of environmental concern (APECs) that were identified on the Phase II Property during the Phase I ESA.

The Phase II ESA consisted of drilling three (3) boreholes on the Phase II Property, all of which were instrumented with groundwater monitoring wells installed in the bedrock.

The soil profile generally consisted of an asphaltic concrete structure, underlain by fill material consisting of reworked silty sand and crushed stone (gravel), followed by native silty sand-gravel (modified till), underlain by limestone bedrock. The boreholes were terminated in bedrock, which was encountered at depths of 5.51 to 6.15 mbgs. Soil samples were obtained from the boreholes and screened based on visual observation and sample intervals (depths).

Based on the screening results in combination with sample depth and location, soil samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX) and petroleum hydrocarbons (PHCs, F_1-F_4). Based on these recent analytical results, PHCs (F1-F4) concentrations in the upper/shallower samples were in excess of the MECP Table 3 Residential Standards.

Groundwater samples were recovered and analyzed for BTEX, PHCs and/or VOCs. No free-phase product was observed on the groundwater surface at any of the monitoring well locations during the groundwater sampling events. All groundwater results comply with the MECP Table 3 Standards, with the exception of hexane and xylenes in MW3.

Recommendations

As noted in this report, the Phase II Property will be redeveloped for residential land use and as such, the subject property will require a Record of Site Condition (RSC).

Soil

Based on the 2012 to 2021 analytical result, the fill material and underlying native soil on the northeastern portion of the Phase II Property is impacted with VOCs, PHCs, BTEX and/or PAHs in excess of the Table 3 Residential Standards.

To obtain an RSC, the impacted soil material will need to be removed. The excavation of the soil from the property should be monitored and confirmed by Paterson. Soil/fill in excess of Table 3, will need to be removed and disposed of at an approved waste disposal facility.

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

Groundwater

Remediation of the groundwater using a licenced hauling company pumping from the excavation may be a viable option, depending upon the groundwater level at the time of the remediation, however, if a significant volume of water is anticipated, a pump and treat system would likely be more economical. Depending upon the methodology selected, post remediation groundwater monitoring will be required for up to 12 months prior to filing an RSC.

Monitoring Wells

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

1.0 INTRODUCTION

At the request of Mr. Rossi Sas of Devtrin (Island Park) Inc., Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the property addressed 70 Richmond Road and 376 Island Park Drive, in the City of Ottawa, Ontario, herein referred to as the Phase II Property. The purpose of this Phase II ESA was to address areas of potential environmental concern (APECs) identified on the Phase II Property, during the Phase I ESA conducted by Paterson.

1.1 Site Description

Address:	70 Richmond Road, Ottawa, Ontario; 376 Island Park Drive, Ottawa, Ontario.
Legal Description:	Part of Lot 33, Concession 1, Ottawa Front, in the Township of Nepean, now in the City of Ottawa.
Location:	The Phase I Property is located at the southwest corner of the Richmond Road and Island Park Drive intersection, in the City of Ottawa, Ontario, which is shown on Figure 1 - Key Plan, in the Figures section following the text.
Latitude and Longitude:	45° 23’ 48.63" N, 75° 44' 32.65" W
Configuration:	Irregular
Area:	1,500 m^2 (approximately)
Zoning:	TM –Traditional Mainstreet Zone; R1 – Residential First Density Zone.

1.2 Property Ownership

Paterson was retained to complete this Phase II ESA by Mr. Rossi Sas of Trinity Group, in partnership with Devtrin (Island Park) Inc. The head office of Trinity Group is located at 77 Bloor Street West, Toronto, Ontario.

1.3 Current and Proposed Future Uses

The Phase II Property is currently leased to the owner of 72 Richmond Road for commercial use, specifically for the purpose of parking used cars for sale. The southwestern portion of the property is occupied by a vacant commercial slab-on-grade building that was formerly used as an automotive repair garage. The property addressed 376 Island Park Drive is currently occupied with a residential dwelling.

It is our understanding that the proposed site redevelopment for the Phase II Property consists of residential land use.

1.4 Applicable Site Condition Standard

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

- ❑ Coarse-grained soil conditions
- ❑ Full depth generic site condition
- ❑ Non-Potable groundwater conditions
- ❑ Residential land use

Section 35 of O.Reg. 153/04 does apply to the Phase II Property in that the property is serviced using municipal water.

Section 41 of O.Reg. 153/04 does not apply to the Phase II Property, as the property is not within 30m of an environmentally sensitive area.

Section 43.1 of O.Reg. 153/04 does not apply to the Phase II Property in that the property is not a Shallow Soil property and the property is not within 30m of a water body.

The proposed use of the Phase II ESA property is residential; therefore, the Residential standards are selected for the purpose of this Phase II ESA.

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is situated in an urban setting consisting of commercial and residential land use. Neighbouring land use in the area consists of commercial, residential, community and institutional.

The Phase II Property is occupied by a residential dwelling and a vacant single storey commercial building previously used as an automotive service garage and auto sales office constructed circa 1934. The remainder of the site consists of asphaltic concrete or landscaped areas. Stormwater runoff flows towards catch basins located along Island Park Drive to the east and Richmond Road to the north. The site is relatively flat with the surrounding topography sloping down to the northwest towards the Ottawa River.

The Phase II Property is shown on Drawing PE4525-1R – Site Plan, of the Phase I ESA report.

2.2 Past Investigations

A Phase I-ESA was completed by Paterson in August of 2020 in general accordance with the Ontario Regulation (O.Reg.) 153/04, as amended. The Phase I ESA identified PCAs, as per Table 2 of the O.Reg 153/04, that resulted in areas of potential environmental concern (APECs) on the Phase I Property:

- ❒ APEC 1: Resulting from the former presence of a retail fuel outlet on the central portion of the Phase I Property (PCA 28).
- ❒ APEC 2: Resulting from the former presence of an automotive repair garage on the southwestern portion of the Phase II Property (PCA 52).
- ❒ APEC 3: Resulting from the former presence of an automotive repair garage and current retail fuel outlet at 369 Island Park Drive (PCA 28 and 52).
- ❒ APEC 4: Resulting from a former automotive repair garage and former furnace oil tank leak at 72 Richmond Road (PCA 52 and 28).

These APECs were verified through the historical review, an ERIS search, site visit and personal interview. A Phase II ESA was recommended to address the aforementioned APECs on the Phase I Property.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was conducted on July 27, 2020, while a previous investigation was conducted in February 2018. The field program consisted of drilling three (3) boreholes, all of which were instrumented with groundwater monitoring wells for environmental purposes. Boreholes were drilled to a maximum depth of 10.06 m below the ground surface (mbgs).

A supplemental groundwater sampling program was also carried out on June 21, 2021 at two previously installed groundwater monitoring wells (MW1 and MW3).

3.2 Media Investigated

During the subsurface investigation, soil samples and groundwater samples were obtained and submitted for laboratory analysis. The rationale for sampling and analyzing this media is based on the Contaminants of Potential Concern (CPCs) identified in the Phase I ESA. These CPCs include benzene, toluene, ethylbenzene, xylenes (BTEX), petroleum hydrocarbons (PHC, F_1-F_4), polycyclic aromatic hydrocarbons (PAHs), and volatile organic compounds (VOCs) in soil and/or groundwater.

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

According to the Geological Survey of Canada website, the bedrock in the area of the Phase I Property is reported to consist of limestone of the Gull River Formation. The overburden is reported to consist of glacial till of depths ranging from 3 to 5 m over the entire site. This information is generally consistent with the previous subsurface investigations completed at the subject site.

The regional topography slopes down towards the northwest. Groundwater is inferred to flow in a northwesterly direction towards the Ottawa River.

Drinking Water Wells

No drinking water wells are located on the Phase I Property. All properties within the Phase I Study Area are municipally serviced, and no active drinking water wells are considered to be present.

Existing Buildings and Structures

The Phase I Property is occupied by a residential dwelling and a vacant slab-on-grade commercial building that was formerly used as an automotive repair garage constructed in 1934.

Subsurface Structures and Utilities

The Phase I Property is situated in a municipally serviced area. Underground utility services on the property include natural gas, water and sewer services. Water and sewer services enter the Phase I Property from Richmond Road and Island Park Drive.

Water Bodies and Areas of Natural Significance

No water bodies or areas of natural significance were identified in the Phase I Study Area.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area is commercial, residential, community and institutional. Land use is shown on Drawing PE4525-2R - Surrounding Land Use Plan.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 7.2 of the Phase I ESA report, several PCAs are considered to result APECs on the Phase I Property. These APECs are summarized in Table 1, along with their respective locations and contaminants of potential concern (CPCs).

TABLE 1: Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I Property	Potentially Contaminating Activity, as per Table 2, O.Reg 153/04	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1: Former retail fuel outlet	Central portion of subject property	PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	On-site	PHCs/BETX/ VOCs/PAHs	Soil and groundwater

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APEC 2: Former automotive service garage	Garage and AST area	PCA 52 – Storage, maintenance, fuelling and repair of equipment, vehicles, and materials used to maintain transportation systems	On-site	PHCs/BETX/ VOCs/PAHs	Soil and groundwater
APEC 3: Former automotive service garage and current retail fuel outlet at 369 Island Park Drive	Eastern Portion of Subject Property	PCA 52 – Storage, maintenance, fuelling and repair of equipment, vehicles, and materials used to maintain transportation systems PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	Off-site	PHCs/VOCs/ BETX	Groundwater
APEC 4: Former automotive repair garage and furnace oil release at 72 Richmond Road	Eastern Portion of Subject Property	PCA 52 – Storage, maintenance, fuelling and repair of equipment, vehicles, and materials used to maintain transportation systems PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	PHCs/VOCs/ BETX	Groundwater

As previously discussed in Section 7.2 of the Phase I ESA report, the remaining off-site PCAs were considered not to represent APECs on the Phase I Property, based on the significant separation distances relative to the subject land.

Contaminants of Potential Concern

Based on the APECs identified on the Phase I Property, the contaminants of potential concern (CPCs) are:

- Benzene, Toluene, Ethylbenzene and Xylenes (BTEXs);
- Petroleum Hydrocarbons (PHCs, F_1-F_4);
- Polycyclic Aromatic Hydrocarbons (PAHs);
- Volatile Organic Compounds (VOCs); and

The CPCs are expected to be present in the soil and/or groundwater of the Phase I Property.

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

3.4 Deviations from Sampling and Analysis Plan

Groundwater levels were the only field parameters measured during the sampling event in August 2020 and June 2021. The Sampling and Analysis Plan for this project is included in Appendix 1 of this report.

3.5 Impediments

No physical impediments were encountered during the Phase II ESA program, aside from existing building and utility structures.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was conducted on July 27, 2020. The field program consisted of drilling three (3) boreholes on the Phase II Property.

The boreholes were drilled to a maximum depth of 10.06 mbgs. All of the boreholes were completed as groundwater monitoring wells to access the groundwater table.

BH7-20 through BH9-20 were placed to address the aforementioned APECs as presented in Table 1. All boreholes were completed using a track mounted drill rig provided by Downing Drilling Ltd. of Hawkesbury, Ontario, under the full-time supervision of Paterson personnel. The borehole locations are indicated on the attached Drawing PE4525-3R – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

A total of twenty-five (25) soil samples were obtained from the boreholes by means of grab sampling from auger flights and split spoon sampling. Split spoon samples were taken at approximate 0.76 m intervals. The depths at which auger samples and split spoon samples were obtained from the boreholes are shown as "**AU**" and "**SS**" on the Soil Profile and Test Data Sheets appended to this report.

The soil stratigraphy at the borehole locations consisted of an asphaltic concrete layer, overlying fill material, followed by silty sand with gravel (modified till), underlain by limestone bedrock. All boreholes were terminated in bedrock at depths ranging from 9.07 to 10.08 mbgs.

It should be noted that previous boreholes drilled on-site were terminated on suspected boulders in the till, not on bedrock as initially inferred.

4.3 Field Screening Measurements

All soil samples collected were subjected to a preliminary screening procedure, which included visual screening for colour and evidence of metals, as well as soil vapour screening with a MiniRAE 2000 Portable VOC Monitor.

The technical protocol was obtained from Appendix C of the MECP document entitled "Interim Guidelines for the Remediation of Petroleum Contamination at Operating Retail and Private Fuel Outlets in Ontario", dated March 1992.

Soil samples recovered at the time of sampling were placed immediately into airtight plastic bags with nominal headspace. All lumps of soil inside the bags were broken by hand, and the soil was allowed to come to ambient temperature prior to conducting the vapour survey. Allowing the samples to stabilize to ambient temperature ensures consistency of readings between samples.

The soil vapours were measured by inserting the analyzer probe into the nominal headspace above the soil sample. Samples were then agitated/manipulated

gently as the measurements were taken. The peak reading registered within the first 15 seconds was recorded as the vapour measurement.

The vapour readings were found to range from 0.8 ppm to 772.7 ppm. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

Soil samples were selected based on a combination of the results of the vapour screening, visual and olfactory screening, sample depth and/or sample location.

4.4 Groundwater Monitoring Well Installation

Three (3) groundwater monitoring wells were installed on the Phase II Property as part of the subsurface investigation. The monitoring wells consisted of 35 mm diameter, Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed below in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

TABLE 2: Monitoring Well Construction Details

Well ID	Ground Surface Elevation	Total Depth (m BGS)	Screened Interval (m BGS)	Sand Pack (m BGS)	Bentonite Seal (m BGS)	Casing Type
BH7-20	67.43	10.06	6.74-9.74	6.25-9.74	0.15-6.25	Flushmount
BH8-20	67.27	10.08	7.08-10.08	6.60-10.08	0.15-6.60	Flushmount
BH9-20	67.20	9.07	6.07-9.07	5.80-9.07	0.15-5.80	Flushmount

4.5 Field Measurement of Water Quality Parameters

Groundwater samples were collected on August 26, 2020 and June 21, 2021. The water levels were the only parameter measured in the field during the August sampling events.

4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MECP document entitled “Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario”, dated May 1996. Groundwater samples were obtained from each monitoring well, using dedicated sampling equipment. Standing water was purged from each well prior to sampling.

Samples were stored in coolers to reduce analyte volatilization during transportation. Details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan in Appendix 1.

4.7 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan in Appendix 1, the soil and groundwater samples submitted for analytical testing are presented in Tables 3 and 4.

TABLE 3: Soil Samples Submitted and Analyzed Parameters

Sample ID	Sample Depth (m) and Stratigraphic Unit	Parameters Analyzed		Rationale
		BTEX	PHCs (F1-F4)	
July 27, 2020				
BH7-20-SS3	1.52-2.13 Fill	X	X	Assess the potential impact due to APEC 3.
BH7-20-SS7	4.57-5.18 Till	X	X	Assess the potential impact due to APEC 3.
BH8-20-AU1	0.0-0.05 Fill	X	X	Assess the potential impact due to APEC 1 and 4.
BH8-20-SS7	4.57-5.18 Till	X	X	Assess the potential impact due to APEC 1 and 4.
BH9-20-SS3	1.52-2.13 Till	X	X	Assess the potential impact due to APEC 2.
BH9-20-SS7	4.57-5.18 Till	X	X	Assess the potential impact due to APEC 2.
DUP (BH8-20-AU1)	0.0-0.05 Fill	X	X	Duplicate sample.

TABLE 4: Groundwater Samples Submitted and Analyzed Parameters					
Sample ID	Screened Interval (m) and Stratigraphy Unit	Parameters Analyzed			Rationale
		BTEX	PHCs (F1-F4)	VOCs	
August 26, 2020					
BH7-20-GW	6.74-9.74 Bedrock	X	X	X	Assess the potential groundwater impact.
BH8-20-GW	7.08-10.08 Bedrock	X	X	X	Assess the potential groundwater impact.
BH9-20-GW	6.07-9.07 Bedrock	X	X	X	Assess the potential groundwater impact.
June 21, 2021					
MW1-GW1	3.02-4.52 Overburden		X	X	Assess the potential groundwater impact.
MW3-GW1	2.91-4.41 Overburden		X	X	Assess the potential groundwater impact.
DUP-1	3.02-4.52 Overburden			X	Duplicate sample

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

4.8 Residue Management

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

4.9 Elevation Surveying

The borehole locations were selected by Paterson for both environmental and geotechnical purposes. Boreholes were located and surveyed in the field by Paterson using a benchmark of a top spindle of a fire hydrant located on the north side of Richmond Road, appropriately 25 m west of the property boundary. The geodetic elevation was measured to be 68.31 m.

The locations and elevations of the boreholes are presented on Drawing PE4525-3R – Test Hole Location Plan, appended to this report.

4.10 Quality Assurance and Quality Control Measures

A summary of quality assurance and quality control (QA/QC) measures, including sampling containers, preservation, labelling, handling, and custody, equipment cleaning procedures, and field quality control measurements is provided in the Sampling and Analysis Plan in Appendix 1.

5.0 REVIEW AND EVALUATION

5.1 Geology

The soil profile encountered consisted of a layer of asphaltic concrete underlain by a layer of granular fill underlain by native glacial till. The fill consisted of silty sand gravel. The fill depth ranged from 2.1 to 2.2 m below ground surface. The specific details of the soil profile at each test hole location are presented on the attached Soil Profile and Test Data Sheets provided in Appendix 1.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling event on August 26, 2020 and June 21, 2021, using an electronic water level meter. Groundwater levels are summarized below in Table 5.

TABLE 5: Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH7-20	67.43	5.13	62.30	August 26, 2020
BH8-20	67.27	4.17	63.10	August 26, 2020
BH9-20	67.20	4.37	62.83	August 26, 2020
MW1	~67.68	4.14	~63.54	June 21, 2021
MW3	~67.17	3.90	~63.27	June 21, 2021

Based on the groundwater elevations measured during the February 2012 and August 2020 sampling event, a groundwater contour plan was completed. The groundwater contour mapping is shown on Drawing PE4525-3R – Groundwater Contour Plan. Based on the contour mapping, groundwater flow beneath the Phase II Property is in a north-easterly direction. A horizontal hydraulic gradient of approximately 0.03 m/m was calculated.

5.3 Fine-Course Soil Texture

No grain size analysis was completed for the subject site. Coarse grained standards were chosen for the site.

5.4 Soil: Field Screening

A hydrocarbon odour was noted in soil samples BH9-20-SS3 and BH9-20-SS6 during the field program. Soil samples were selected based on a combination of the results of the vapour screening, visual and olfactory screening, sample depth and/or sample location.

The vapour readings were found to range from 0 to 772.8 ppm. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

5.5 Soil Quality

Five (5) soil samples, plus a duplicate were submitted for BTEX and PHC (F_1-F_4) analyses. The results of the analytical testing are presented in Table 6. The laboratory certificate of analysis is provided in Appendix 1.

TABLE 6: Analytical Test Results – Soil – BTEX and PHC (F_1-F_4)

Parameter	MDL (µg/g)	Soil Samples (µg/g) July 27, 2020			MECP Table 3 Residential Standards (µg/g)
		BH7-20-SS3	BH7-20-SS7	BH8-20-AU1	
Benzene	0.02	nd	nd	nd	3.1
Ethylbenzene	0.05	nd	nd	0.14	0.21
Toluene	0.05	nd	nd	nd	2
Xylenes	0.05	nd	nd	0.52	3.1
PHC F_1	7	8	nd	17	55
PHC F_2	4	73	nd	<40	98
PHC F_3	8	57	nd	**377**	300
PHC F_4	6	35	nd	1180	2800
PHC F_4 (gravimetric)	50	NA	NA	**4660**	2800

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – Parameter not analyzed
- **Bold and underlined** – Parameter exceeds selected MECP Standards

TABLE 6 Continued: Analytical Test Results – Soil – BTEX and PHC (F_1-F_4)						
Parameter	MDL (µg/g)	Soil Samples (µg/g) July 27, 2020				MECP Table 3 Residential Standards (µg/g)
		BH8-20-SS7	BH9-20-SS3	BH9-20-SS7	DUP (BH8-20-AU1)	
Benzene	0.02	nd	nd	nd	nd	3.1
Ethylbenzene	0.05	nd	0.05	nd	0.09	0.21
Toluene	0.05	nd	0.05	nd	nd	2
Xylenes	0.05	nd	0.20	nd	0.50	3.1
PHC F_1	7	nd	**84**	7	15	55
PHC F_2	4	nd	**153**	8	<40	98
PHC F_3	8	21	**466**	37	**936**	300
PHC F_4	6	nd	498	19	2370	2800
PHC F_4 (gravimetric)	50	NA	1260	NA	**3540**	2800

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – Parameter not analyzed
- **Bold and underlined** – Parameter exceeds selected MECP Standards

BTEX concentrations identified in the soil samples analyzed comply with the selected MECP Table 3 Residential Standards. PHCs, (F_1-F_4) concentrations were identified in the shallower soil samples in excess of the selected standards.

The analytical results for BTEX and PHCs in soil with respect to borehole locations are shown on Drawings PE4525-4R, 4AR and 4BR.

The maximum concentrations of analyzed parameters in the soil from the current data only are summarized in Table 7.

TABLE 7: Maximum Concentrations – Soil			
Parameter	Maximum Concentration (µg/g)	Soil Sample	Depth Interval (m BGS)
Ethylbenzene	0.14	BH8-20-AU1	0.0-0.05, Fill
Toluene	0.05	BH9-20-SS3	1.52-2.13m, Fill
Xylenes	0.52	BH8-20-AU1	0.0-0.05, Fill
PHC F_1	**84**	BH9-20-SS3	1.52-2.13m, Till
PHC F_2	**153**	BH9-20-SS3	1.52-2.13m, Till
PHC F_3	**936**	DUP	0.0-0.05, Fill
PHC F_4	2370	DUP	0.0-0.05, Fill
PHC F_4 (gravimetric)	**4660**	BH8-20-AU1	0.0-0.05, Fill

Notes:
- **Bold and Underlined** – Parameter exceeds selected MECP Table 3 Residential Standards

The remaining parameters were not detected above the laboratory method detection limits.

5.6 Groundwater Quality

Groundwater samples were submitted for laboratory analysis of BTEX, PHC (F_1-F_4) and/or VOCs. The groundwater samples were obtained from the screened intervals noted in Table 2.

The results of the analytical testing are presented in Tables 8 to 11. The laboratory certificates of analysis are provided in Appendix 1.

TABLE 8: Analytical Test Results – Groundwater – BTEX and PHCs

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)					MECP Table 3 Standards (µg/L)
		August 26, 2020			June 21, 2021		
		BH7-20-GW	BH8-20-GW	BH9-20-GW	MW1-GW1	MW3-GW1	
Benzene	0.5	nd	nd	nd	0.7	3.8	44
Ethylbenzene	1.0	nd	nd	nd	0.7	1030	2300
Toluene	0.5	nd	nd	nd	nd	52.3	18000
Xylenes	0.5	nd	nd	10.3	0.8	**5210**	4200
PHC F_1	250	nd	nd	nd	nd	nd	750
PHC F_2	100	nd	nd	nd	nd	nd	150
PHC F_3	100	nd	nd	nd	nd	nd	500
PHC F_4	100	nd	nd	nd	nd	nd	500

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

The concentration of xylenes in the groundwater sample obtained from MW3 is in excess of the MECP Table 3 standards. All remaining BTEX and PHCs parameter concentrations are in compliance with the MECP Table 3 standards.

TABLE 9: Analytical Test Results – Groundwater – VOC

Parameter	MDL (µg/L)	Groundwater Samples (µg/L) August 26, 2020					MECP Table 3 Standards (µg/L)
		BH7-20-GW	BH8-20-GW	BH9-20-GW	MW1-GW1	MW3-GW1	
Acetone	5	nd	nd	nd	nd	nd	130000
Benzene	0.5	nd	nd	nd	0.7	3.8	44
Bromodichloromethane	0.5	nd	nd	nd	nd	nd	85000
Bromoform	0.5	nd	nd	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	0.8	2.7	630
Chloroform	0.5	nd	nd	nd	nd	nd	2.4
Dibromochloromethane	0.5	nd	nd	nd	nd	nd	82000
Dichlorodifluoromethane	1	nd	nd	nd	nd	nd	4400
1,2-Dichlorobenzene	0.5	nd	nd	nd	nd	nd	4600
1,3-Dichlorobenzene	0.5	nd	nd	nd	nd	nd	9600
1,4-Dichlorobenzene	0.5	nd	nd	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	nd	nd	16
1,3-Dichloropropene, total	0.5	nd	nd	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	0.7	1030	2300
Ethylene dibromide	2	nd	nd	nd	nd	nd	0.25
Hexane	1	nd	nd	17.8	nd	**89.5**	51
Methyl Ethyl Ketone (2-Butanone)	5	nd	nd	nd	nd	nd	470000
Methyl Isobutyl Ketone	2	nd	nd	nd	nd	nd	140000
Methyl tert-butyl ether	2	nd	nd	nd	nd	nd	190
Methylene Chloride	5	nd	nd	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	nd	nd	1300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	nd	nd	3.3
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	nd	nd	1.6
Toluene	0.5	nd	nd	nd	nd	52.3	18000
1,1,1-Trichloroethane	0.5	nd	nd	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	nd	nd	1.6
Trichlorofluoromethane	1	nd	nd	nd	nd	nd	2500
Vinyl Chloride	0.5	nd	nd	nd	nd	nd	0.5
Xylenes, total	0.5	nd	nd	10.3	0.8	**5210**	4200

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

The concentrations of hexane and xylenes in groundwater sample MW3-GW are in excess of the MECP Table 3 standards.

Analytical results of BTEX, PHCs and VOCs in the groundwater with respect to borehole locations are shown on Drawing PE4525-5R - Analytical Testing Plan – Groundwater.

The maximum concentrations identified in groundwater from the current data only are presented in Table 10.

TABLE 10: Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Groundwater Sample	Screened Interval (m BGS)
Benzene	3.8	MW3-GW1	2.91-4.41
Chlorobenzene	2.7	MW3-GW1	2.91-4.41
Ethylbenzene	1030	MW3-GW1	2.91-4.41
Hexane	**89.5**	MW3-GW1	2.91-4.41
Toluene	52.3	MW3-GW1	2.91-4.41
Xylenes	**5210**	MW3-GW1	2.91-4.41

No other parameter concentrations in groundwater were detected above the laboratory method detection limits.

5.7 Quality Assurance and Quality Control Results

All samples submitted as part of the July 27 and August 26, 2020 sampling events were handled in accordance with the Analytical Protocol with respect to preservation method, storage requirement, and container type.

As per the sampling and analysis plan, a duplicate soil sample (DUP) was obtained from BH8-20-AU1 and analyzed for BTEX and PHCs. Test results for the duplicate soil sample and RPD calculations are provided below in Table 11.

TABLE 11: QA/QC Results – Soil (BTEX and PHCs)

Parameter	BH8-20-AU1	DUP	RPD (%)	QA/QC Results
Ethylbenzene	0.14	0.09	43	Outside the acceptable range
Xylenes, total	0.52	0.50	4	Within the acceptable range
PHC F_2	17	15	13	Within the acceptable range
PHC F_3	377	936	85	Outside the acceptable range
PHC F_4	1180	2370	67	Outside the acceptable range
PHC F_4 (gravimetric)	4660	3540	27	Outside the acceptable range

The majority of the RPD results are outside the acceptable range, with the exception of a couple of parameters. It is not uncommon that very small or very high concentrations or values will yield higher RPD values, and as such, the RPD value is not an accurate measure in these cases. Additionally, both the original and duplicate sample contain parameter concentrations in excess of the MECP Table 3 standards, which therefore does not have a material effect on our conclusions.

A duplicated groundwater sample was obtained from the monitoring well installed in MW1 and analyzed for VOCs. The results are provided below in Table 12:

TABLE 12: QA/QC Results – Groundwater (VOCs)

Parameter	MW1-GW1	DUP-1	RPD (%)	QA/QC Results
Acetone	nd	nd	0	Within the acceptable range
Benzene	0.7	0.7	0	Within the acceptable range
Bromodichloromethane	nd	nd	0	Within the acceptable range
Bromoform	nd	nd	0	Within the acceptable range
Bromomethane	nd	nd	0	Within the acceptable range
Carbon Tetrachloride	nd	nd	0	Within the acceptable range
Chlorobenzene	0.8	0.7	13.3	Within the acceptable range
Chloroform	nd	nd	0	Within the acceptable range
Dibromochloromethane	nd	nd	0	Within the acceptable range
Dichlorodifluoromethane	nd	nd	0	Within the acceptable range
1,2-Dichlorobenzene	nd	nd	0	Within the acceptable range
1,3-Dichlorobenzene	nd	nd	0	Within the acceptable range
1,4-Dichlorobenzene	nd	nd	0	Within the acceptable range
1,1-Dichloroethane	nd	nd	0	Within the acceptable range
1,2-Dichloroethane	nd	nd	0	Within the acceptable range
1,1-Dichloroethylene	nd	nd	0	Within the acceptable range
cis-1,2-Dichloroethylene	nd	nd	0	Within the acceptable range
trans-1,2-Dichloroethylene	nd	nd	0	Within the acceptable range
1,2-Dichloropropane	nd	nd	0	Within the acceptable range
1,3-Dichloropropene, total	nd	nd	0	Within the acceptable range
Ethylbenzene	0.7	0.9	25	Outside the acceptable range
Ethylene dibromide	nd	nd	0	Within the acceptable range
Hexane	nd	nd	0	Within the acceptable range
Methyl Ethyl Ketone (2-Butanone)	nd	nd	0	Within the acceptable range
Methyl Isobutyl Ketone	nd	nd	0	Within the acceptable range
Methyl tert-butyl ether	nd	nd	0	Within the acceptable range
Methylene Chloride	nd	nd	0	Within the acceptable range
Styrene	nd	nd	0	Within the acceptable range
1,1,1,2-Tetrachloroethane	nd	nd	0	Within the acceptable range
1,1,2,2-Tetrachloroethane	nd	nd	0	Within the acceptable range
Tetrachloroethylene	nd	nd	0	Within the acceptable range
Toluene	nd	nd	0	Within the acceptable range
1,1,1-Trichloroethane	nd	nd	0	Within the acceptable range
1,1,2-Trichloroethane	nd	nd	0	Within the acceptable range
Trichloroethylene	nd	nd	0	Within the acceptable range
Trichlorofluoromethane	nd	nd	0	Within the acceptable range
Vinyl Chloride	nd	nd	0	Within the acceptable range
Xylenes, total	0.8	1.2	40	Outside the acceptable range

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

The majority of the RPD results are well within the acceptable range, with the exception of a couple of parameters. It is not uncommon that very small or very high concentrations or values will yield higher RPD values, and as such, the RPD value is not an accurate measure in these cases.

Based on the analytical laboratory results, it is our opinion that the overall quality of the field data collected during this Phase II-ESA is considered to be sufficient to meet the overall objectives of this assessment.

5.8 Phase II Conceptual Site Model

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

Site Description

Potentially Contaminating Activity and Areas of Potential Environmental Concern

As indicated in Table 1 of Section 2.2 of this report, PCAs were identified on the Phase II Property, resulting in APECs:

TABLE 13: Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern with respect to Phase I Property	Potentially Contaminating Activity, as per Table 2, O.Reg 153/04	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1: Former retail fuel outlet	Central portion of subject property	PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	On-site	PHCs/BETX/ VOCs/PAHs	Soil and groundwater
APEC 2: Former automotive service garage	Garage and AST area	PCA 52 – Storage, maintenance, fuelling and repair of equipment, vehicles, and materials used to maintain transportation systems	On-site	PHCs/BETX/ VOCs/PAHs	Soil and groundwater

TABLE 13: Areas of Potential Environmental Concern					
Area of Potential Environmental Concern	**Location of Area of Potential Environmental Concern with respect to Phase I Property**	**Potentially Contaminating Activity, as per Table 2, O.Reg 153/04**	**Location of PCA (on-site or off-site)**	**Contaminants of Potential Concern**	**Media Potentially Impacted (Groundwater, Soil, and/or Sediment)**
APEC 3: Former automotive service garage and current retail fuel outlet at 369 Island Park Drive	Eastern Portion of Subject Property	PCA 52 – Storage, maintenance, fuelling and repair of equipment, vehicles, and materials used to maintain transportation systems PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	Off-site	PHCs/VOCs/ BETX	Groundwater
APEC 4: Former automotive repair garage and furnace oil release at 72 Richmond Road	Eastern Portion of Subject Property	PCA 52 – Storage, maintenance, fuelling and repair of equipment, vehicles, and materials used to maintain transportation systems PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks	Off-Site	PHCs/VOCs/ BETX	Groundwater

Contaminants of Potential Concern

Based on the APECs identified on the Phase II Property, the contaminants of potential concern (CPCs) are:

- Benzene, Toluene, Ethylbenzene and Xylenes (BTEXs);
- Petroleum Hydrocarbons (PHCs, Fractions F_1-F_4);
- Polycyclic Aromatic Hydrocarbons (PAHs);

- Volatile organic compounds (VOCs).

Subsurface Structures and Utilities

The Phase II Property is situated in a municipally serviced area. Underground utility services on the property include natural gas, water and sewer services. Water and sewer services enter the Phase II Property from Richmond Road and Island Park Drive.

Physical Setting

Site Stratigraphy

The site stratigraphy, from ground surface to the deepest aquifer or aquitard investigated, is illustrated on Drawings PE4525-4AR and PE4525-4BR. The site stratigraphy consists of:

- An asphaltic concrete structure approximately 0.08 m thick overlying fill material consisting of silty sand with crushed stone and gravel, extending to depths of approximately 1.37 to 3.05 mbgs. Groundwater was not encountered in this layer.
- Sandy silt/sily sand-gravel (modified till) was encountered and extended at depths ranging from 4.42 to 6.15 mbgs. Groundwater was not encountered in this layer. Groundwater was encountered in this layer in BH7-20, BH8-20 and BH9-20.
- Limestone bedrock was encountered beneath the native silty sand-gravel in BH7-20, BH8-20 and BH9-20 and terminated at depths of 10.06, 9.07 and 10.08 mbgs, respectively.

Hydrogeological Characteristics

Groundwater at the Phase II Property was generally encountered in the native soil at BH7-20, BH8-20 and BH9-20 ranging at depths of approximately 4.17 to 5.13 mbgs.

Groundwater flow was measured in a north easterly direction with a hydraulic gradient of 0.03 m/m. Groundwater contours are shown on Drawing PE4525-3R – Test Hole Location Plan.

Approximate Depth to Water Table

Depth to the water table at the subject site varies between approximately 4.13 to 5.13 mbgs.

Approximate Depth to Bedrock

Bedrock was confirmed during the drilling program at approximately 5.51 to 6.12 mbgs.

Sections 35, 41 and 43.1 of the Regulation

Section 35 of O.Reg. 153/04 does apply to the Phase II Property in that the property is serviced using municipal water.

Section 41 of O.Reg. 153/04 does not apply to the Phase II Property, as the property is not within 30m of an environmentally sensitive area.

Section 43.1 of O.Reg. 153/04 does not apply to the Phase II Property in that the property is not a Shallow Soil property and the property is not within 30m of a water body.

Fill Placement

Based on the findings of the subsurface investigation, the fill material encountered consisted of a mixture of reworked native silty sand with crushed stone (gravel).

Existing Buildings and Structures

The southern portion of the Phase II Property is occupied by a two-storey residential dwelling, whereas the northern portion is occupied by a vacant slab-on-grade commercial building that was formerly used as an automotive repair garage constructed in 1934.

Proposed Buildings and Other Structures

The proposed development for the Phase II Property includes a residential development. The footprint of the development will cover the majority of the site.

Drinking Water Wells

There are no potable water wells on the Phase II Property.

Water Bodies and Areas of Natural Significance

No water bodies or areas of natural significance were identified within a 250 m search radius.

Environmental Condition

Areas Where Contaminants are Present

Based on the analytical results from 2012 to 2021, BTEX, PHCs, VOCs and PAHs concentrations identified in the soil are in excess of the selected MECP Table 3 Residential Standards. These contaminants are present in the fill material and native soil in the northeastern portion of the Phase II Property. Soil results are shown on Drawings PE4525-4R to PE4525-7R.

Hexane, PHCs and BTEX concentrations were identified in the shallow groundwater in excess of the MECP Table 3 Standards beneath the northeastern portion of the Phase II Property. No PAH impact was identified in the groundwater. No contaminant concentrations identified greater than the standards were present in the bedrock groundwater.

It is expected that the PAH impact in soil is confined to the upper native soil layer. Groundwater results from 2012 to 2021 are shown on Drawings PE4525-8R to PE4525-11R.

Types of Contaminants

Based on the analytical results for soil, the contaminants of concern are VOCs, BTEX, PAHs and PHCs (F_1 to F_4).

Based on the analytical results for groundwater, the contaminants of concern in are Hexane, PHCs and BTEX.

Contaminated Media

Based on the findings of the Phase II ESA, the fill material and underlying native soil are impacted with BTEX, PHCs, VOCs and/or PAHs. Shallow groundwater beneath the Phase II Property is impacted with hexane (VOC), PHCs and BTEX.

What Is Known About Areas Where Contaminants Are Present

Based on the subsurface investigation, the soil and groundwater in the immediate area of the former UST and pump island are impacted by VOCs, BTEX, PHCs and/or PAHs.

Distribution and Migration of Contaminants

Based on the findings of the previous Phase II ESAs and the most current, some distribution or migration of contaminants is considered to have occurred from soil impact to localized groundwater contamination.

Discharge of Contaminants

The VOCs, BTEX and PHC impacts are suspected to be a result of the former UST and pump island.

Climatic and Meteorological Conditions

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

CPCs were identified in the groundwater, and as such, climatic and meteorological conditions are considered to have contributed to contaminant transport in the past.

Potential for Vapour Intrusion

The potential for vapour intrusion into the subject building on the Phase II Property is not considered a concern as the subject building is presently vacant. Additionally, the Phase II Property will be remediated during redevelopment and as such, there will be no future risk of vapour intrusion.

6.0 CONCLUSIONS

Assessment

A Phase II ESA was conducted for the property addressed 70 Richmond Road and 376 Island Park Drive, in the City of Ottawa, Ontario. The purpose of the Phase II ESA is to address the areas of environmental concern (APECs) that were identified on the Phase II Property during the Phase I ESA.

The Phase II ESA consisted of drilling three (3) boreholes on the Phase II Property, all of which were instrumented with groundwater monitoring wells installed in the bedrock.

The soil profile generally consisted of an asphaltic concrete structure, underlain by fill material consisting of reworked silty sand and crushed stone (gravel), followed by native silty sand-gravel (modified till), underlain by limestone bedrock. The boreholes were terminated in bedrock, which was encountered at depths of 5.51 to 6.15 mbgs. Soil samples were obtained from the boreholes and screened based on visual observation and sample intervals (depths).

Based on the screening results in combination with sample depth and location, soil samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX) and petroleum hydrocarbons (PHCs, F_1-F_4). Based on these recent analytical results, PHCs (F1-F4) concentrations in the upper/shallower samples were in excess of the MECP Table 3 Residential Standards.

Groundwater samples were recovered and analyzed for BTEX, PHCs and/or VOCs. No free-phase product was observed on the groundwater surface at any of the monitoring well locations during the groundwater sampling events. All groundwater results comply with the MECP Table 3 Standards, with the exception of hexane and xylenes in MW3.

Recommendations

As noted in this report, the Phase II Property will be redeveloped for residential land use and as such, the subject property will require a Record of Site Condition (RSC).

Soil

Based on the 2012 to 2021 analytical result, the fill material and underlying native soil on the northeastern portion of the Phase II Property is impacted with VOCs, PHCs, BTEX and/or PAHs in excess of the Table 3 Residential Standards.

To obtain an RSC, the impacted soil material will need to be removed. The excavation of the soil from the property should be monitored and confirmed by Paterson. Soil/fill in excess of Table 3, will need to be removed and disposed of at an approved waste disposal facility.

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

Groundwater

Remediation of the groundwater using a licenced hauling company pumping from the excavation may be a viable option, depending upon the groundwater level at the time of the remediation, however, if a significant volume of water is anticipated, a pump and treat system would likely be more economical. Depending upon the methodology selected, post remediation groundwater monitoring will be required for up to 12 months prior to filing an RSC.

Based on the recent groundwater test results, it is recommended that additional groundwater testing be completed before site remediation/redevelopment commences.

Monitoring Wells

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

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared in general accordance with O.Reg. 153/04, as amended, and meets the requirements of CSA Z769-00. The conclusions presented herein are based on information gathered from a limited sampling and testing program. The test results represent conditions at specific test locations at the time of the field program.

The client should be aware that any information pertaining to soils and all test hole logs are furnished as a matter of general information only and test hole descriptions or logs are not to be interpreted as descriptive of conditions at locations other than those of the test holes themselves.

Should any conditions be encountered at the subject site and/or historical information that differ from our findings, we request that we be notified immediately in order to allow for a reassessment.

This report was prepared for the sole use of Devtrin (Island Park) Inc. Notification from Devtrin (Island Park) Inc. and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.

Nick Sullivan, B.Sc.

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

Report Distribution:

- Devtrin (Island Park) Inc.
- Paterson Group Inc.

FIGURES

FIGURE 1 – KEY PLAN

Drawing PE4525-3R – Test Hole Location Plan and Groundwater Contour Plan

Drawing PE4525-4R – Analytical Testing Plan – Soil (VOCs)

Drawing PE4525-4AR – Cross-section A – A' – Soil (VOCs)

Drawing PE4525-4BR – Cross-section B – B' – Soil (VOCs)

Drawing PE4525-5R – Analytical Testing Plan – Soil (PHCs)

Drawing PE4525-5AR – Cross-section A – A' – Soil (PHCs)

Drawing PE4525-5BR – Cross-section B – B' – Soil (PHCs)

Drawing PE4525-6R – Analytical Testing Plan – Soil (BTEX)

Drawing PE4525-6AR – Cross-section A – A' – Soil (BTEX)

Drawing PE4525-6BR – Cross-section B – B' – Soil (BTEX)

Drawing PE4525-7R– Analytical Testing Plan – Soil (PAHs)

Drawing PE4525-7AR – Cross-section A – A' – Soil (PAHs)

Drawing PE4525-7BR – Cross-section B – B' – Soil (PAHs)

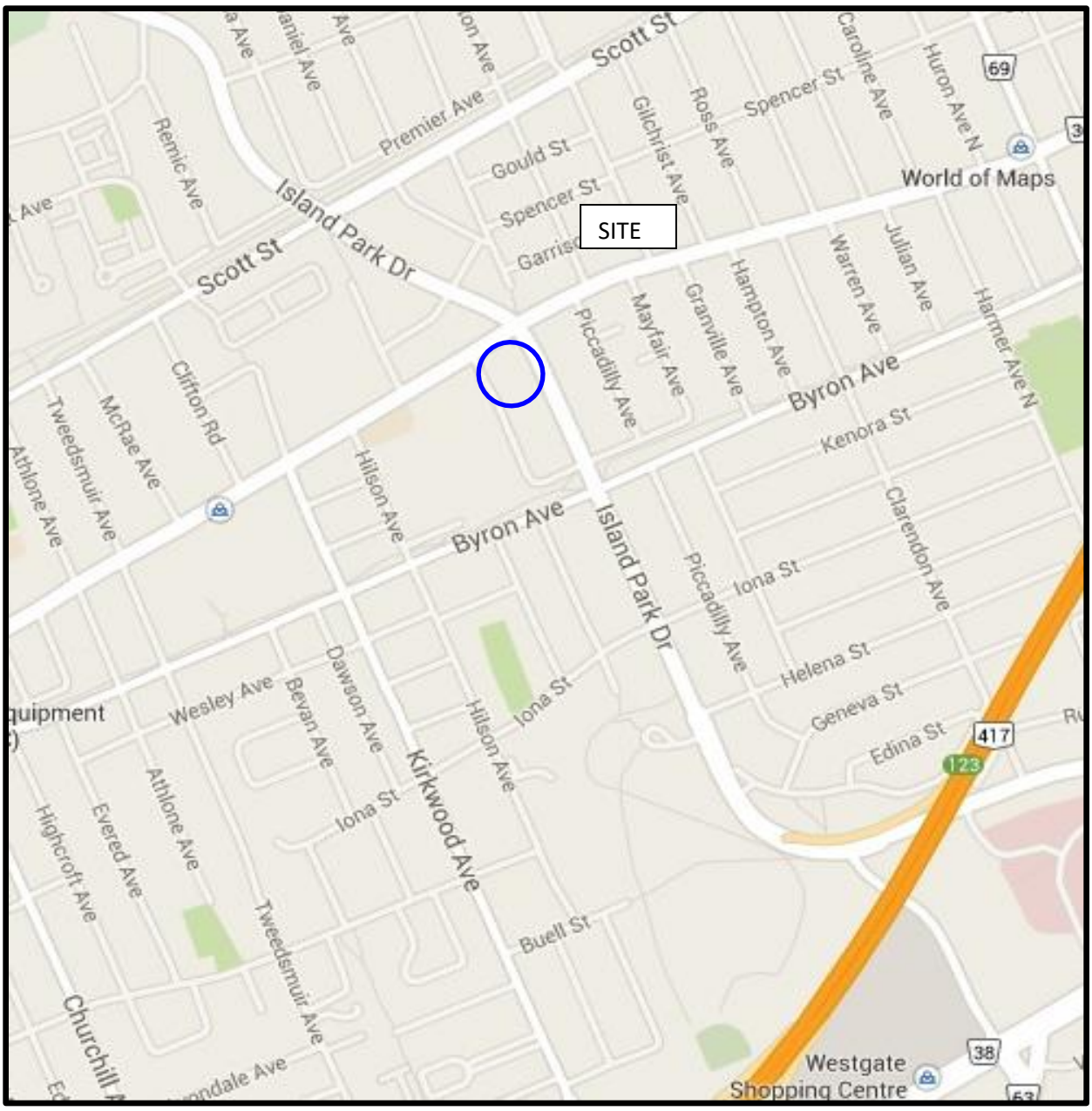
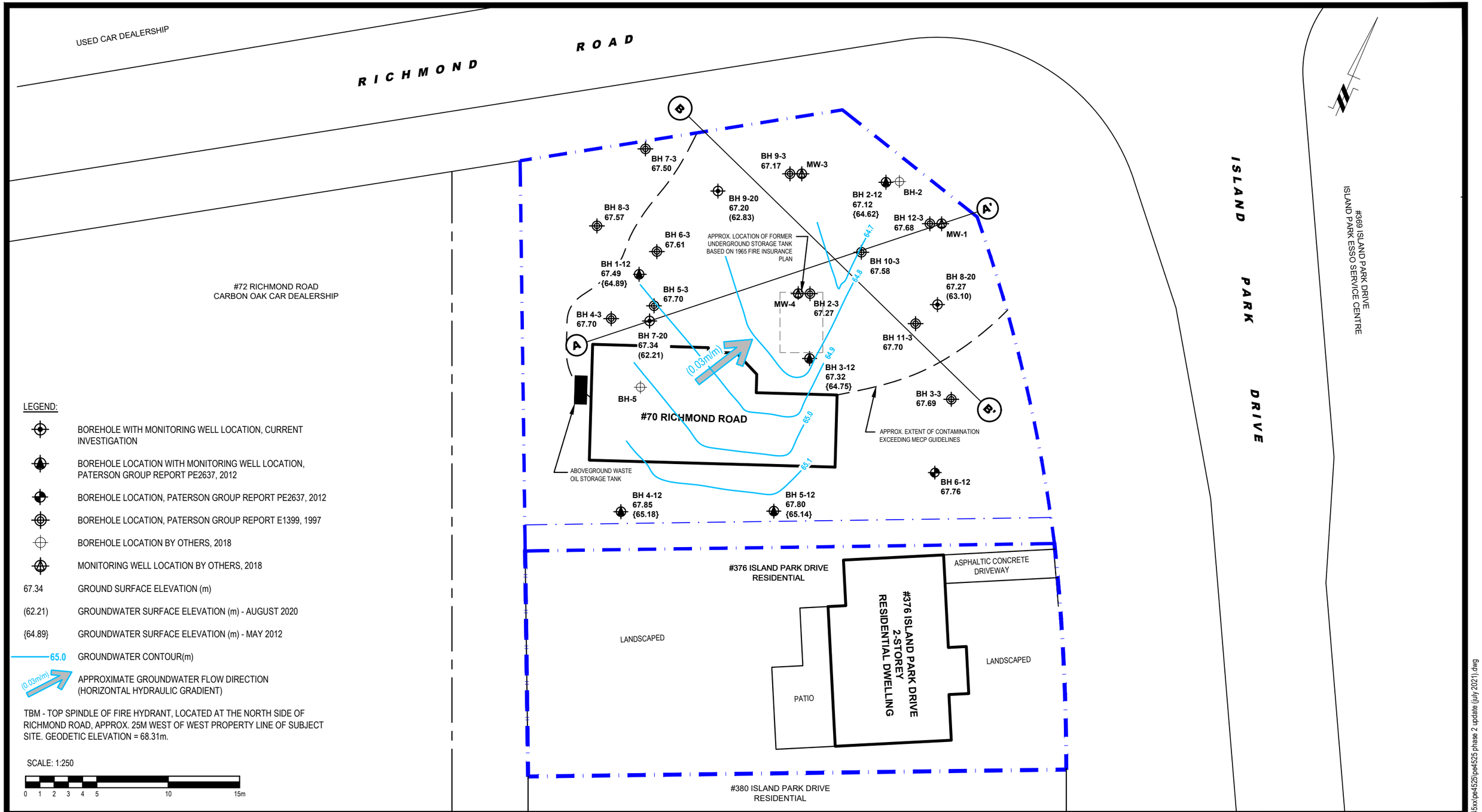


FIGURE 1

KEY PLAN



LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE2637, 2012
- BOREHOLE LOCATION, PATERSON GROUP REPORT PE2637, 2012
- BOREHOLE LOCATION, PATERSON GROUP REPORT E1399, 1997
- BOREHOLE LOCATION BY OTHERS, 2018
- MONITORING WELL LOCATION BY OTHERS, 2018
- 67.34 GROUND SURFACE ELEVATION (m)
- (62.21) GROUNDWATER SURFACE ELEVATION (m) - AUGUST 2020
- {64.89} GROUNDWATER SURFACE ELEVATION (m) - MAY 2012
- 65.0 GROUNDWATER CONTOUR(m)
- (0.03m/m) APPROXIMATE GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

TBM - TOP SPINDLE OF FIRE HYDRANT, LOCATED AT THE NORTH SIDE OF RICHMOND ROAD, APPROX. 25M WEST OF WEST PROPERTY LINE OF SUBJECT SITE. GEODETIC ELEVATION = 68.31m.

SCALE: 1:250

0 1 2 3 4 5 10 15m

patersongroup
consulting engineers

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

NO.	REVISIONS	DATE	INITIAL
0			

DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE

OTTAWA, ONTARIO

Title:

TEST HOLE LOCATION PLAN

Scale: 1:250	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-3R
Approved by: MSD	Revision No.:

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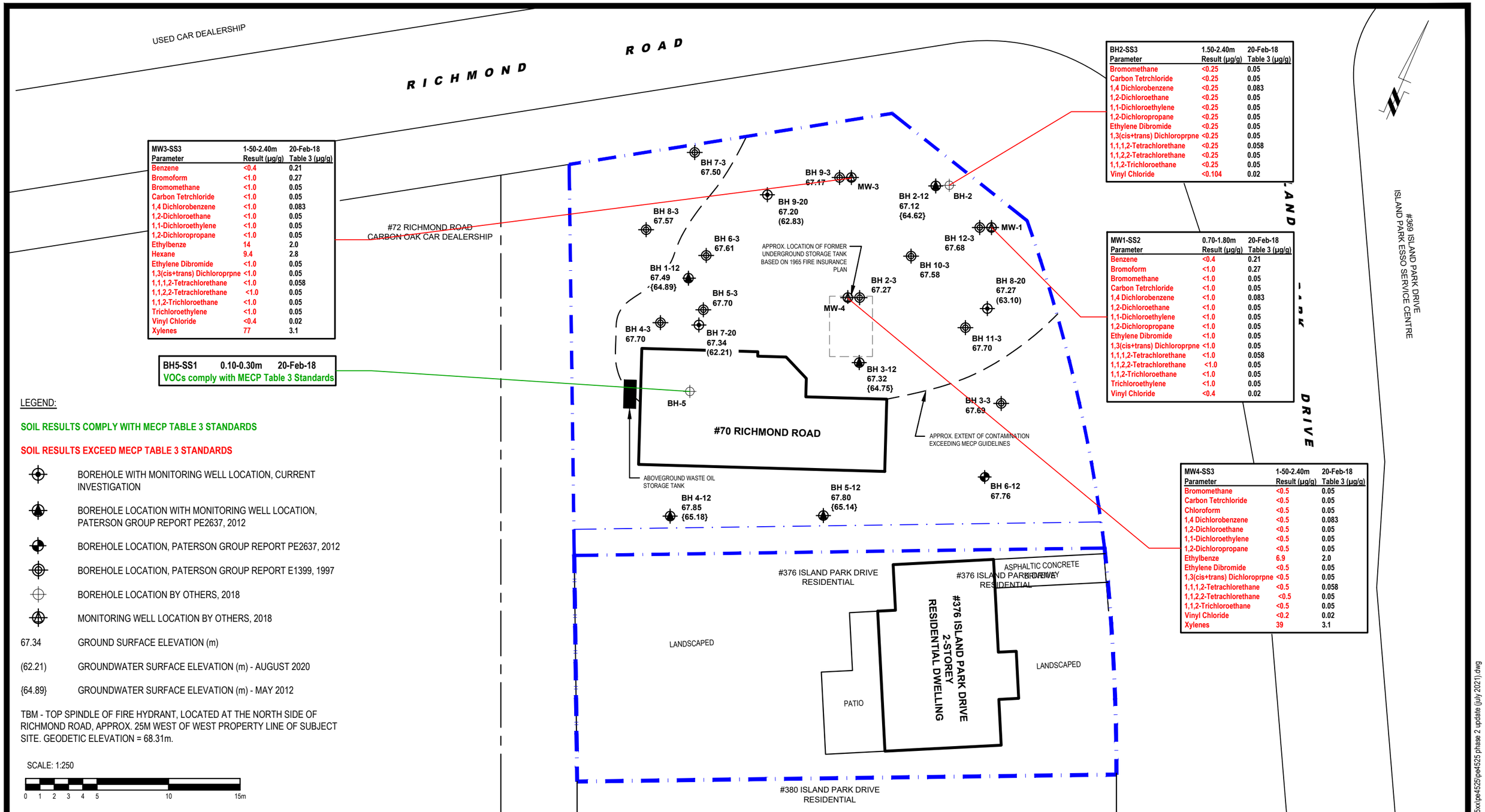
11x17



MW3-SS3 Parameter	1-50-2.40m Result (µg/g)	20-Feb-18 Table 3 (µg/g)
Benzene	<0.4	0.21
Bromoform	<1.0	0.27
Bromomethane	<1.0	0.05
Carbon Tetrchloride	<1.0	0.05
1,4 Dichlorobenzene	<1.0	0.083
1,2-Dichloroethane	<1.0	0.05
1,1-Dichloroethylene	<1.0	0.05
1,2-Dichloropropane	<1.0	0.05
Ethylbenze	14	2.0
Hexane	9.4	2.8
Ethylene Dibromide	<1.0	0.05
1,3(cis+trans) Dichloroprpne	<1.0	0.05
1,1,1,2-Tetrachlorethane	<1.0	0.058
1,1,2,2-Tetrachlorethane	<1.0	0.05
1,1,2-Trichloroethane	<1.0	0.05
Trichloroethylene	<1.0	0.05
Vinyl Chloride	<0.4	0.02
Xylenes	77	3.1

BH5-SS1 0.10-0.30m 20-Feb-18
VOCs comply with MECP Table 3 Standards

BH2-SS3 Parameter	1.50-2.40m Result (µg/g)	20-Feb-18 Table 3 (µg/g)
Bromomethane	<0.25	0.05
Carbon Tetrchloride	<0.25	0.05
1,4 Dichlorobenzene	<0.25	0.083
1,2-Dichloroethane	<0.25	0.05
1,1-Dichloroethylene	<0.25	0.05
1,2-Dichloropropane	<0.25	0.05
Ethylene Dibromide	<0.25	0.05
1,3(cis+trans) Dichloroprpne	<0.25	0.05
1,1,1,2-Tetrachlorethane	<0.25	0.058
1,1,2,2-Tetrachlorethane	<0.25	0.05
1,1,2-Trichloroethane	<0.25	0.05
Vinyl Chloride	<0.104	0.02

MW1-SS2 Parameter	0.70-1.80m Result (µg/g)	20-Feb-18 Table 3 (µg/g)
Benzene	<0.4	0.21
Bromoform	<1.0	0.27
Bromomethane	<1.0	0.05
Carbon Tetrchloride	<1.0	0.05
1,4 Dichlorobenzene	<1.0	0.083
1,2-Dichloroethane	<1.0	0.05
1,1-Dichloroethylene	<1.0	0.05
1,2-Dichloropropane	<1.0	0.05
Ethylene Dibromide	<1.0	0.05
1,3(cis+trans) Dichloroprpne	<1.0	0.05
1,1,1,2-Tetrachlorethane	<1.0	0.058
1,1,2,2-Tetrachlorethane	<1.0	0.05
1,1,2-Trichloroethane	<1.0	0.05
Trichloroethylene	<1.0	0.05
Vinyl Chloride	<0.4	0.02

MW4-SS3 Parameter	1-50-2.40m Result (µg/g)	20-Feb-18 Table 3 (µg/g)
Bromomethane	<0.5	0.05
Carbon Tetrchloride	<0.5	0.05
Chloroform	<0.5	0.05
1,4 Dichlorobenzene	<0.5	0.083
1,2-Dichloroethane	<0.5	0.05
1,1-Dichloroethylene	<0.5	0.05
1,2-Dichloropropane	<0.5	0.05
Ethylbenze	6.9	2.0
Ethylene Dibromide	<0.5	0.05
1,3(cis+trans) Dichloroprpne	<0.5	0.05
1,1,1,2-Tetrachlorethane	<0.5	0.058
1,1,2,2-Tetrachlorethane	<0.5	0.05
1,1,2-Trichloroethane	<0.5	0.05
Vinyl Chloride	<0.2	0.02
Xylenes	39	3.1

LEGEND:

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION WITH MONITORING WELL LOCATION, PATERSON GROUP REPORT PE2637, 2012
- BOREHOLE LOCATION, PATERSON GROUP REPORT PE2637, 2012
- BOREHOLE LOCATION, PATERSON GROUP REPORT E1399, 1997
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- MONITORING WELL LOCATION BY OTHERS, 2018

67.34 GROUND SURFACE ELEVATION (m)

(62.21) GROUNDWATER SURFACE ELEVATION (m) - AUGUST 2020

{64.89} GROUNDWATER SURFACE ELEVATION (m) - MAY 2012

TBM - TOP SPINDLE OF FIRE HYDRANT, LOCATED AT THE NORTH SIDE OF RICHMOND ROAD, APPROX. 25M WEST OF WEST PROPERTY LINE OF SUBJECT SITE. GEODETIC ELEVATION = 68.31m.

SCALE: 1:250

0 1 2 3 4 5 10 15m

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DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - SOIL (VOCs)

Scale: 1:250	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-4R
Approved by: MSD	Revision No.:

11x17

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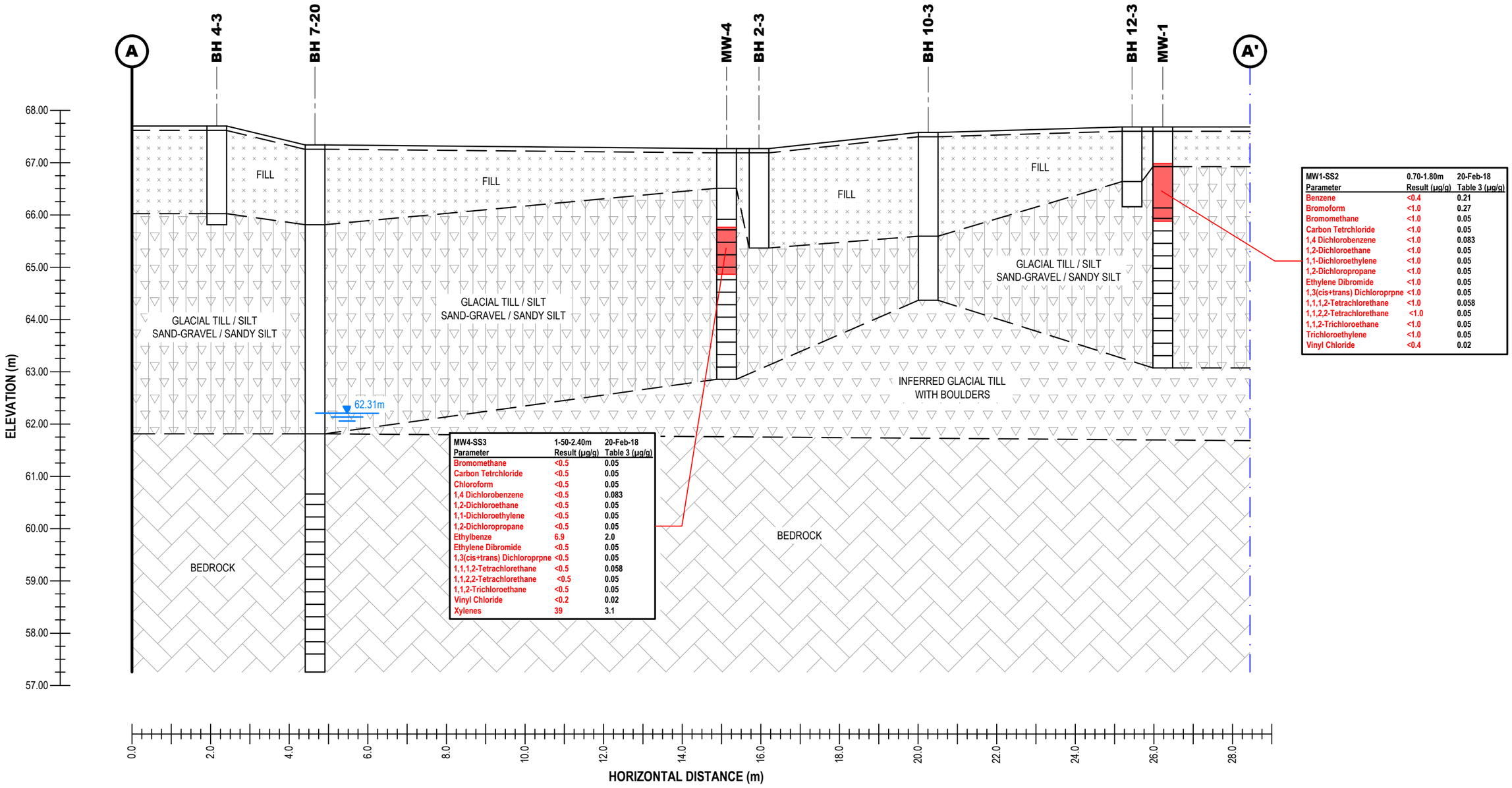

MW4-SS3	1-50-2.40m	20-Feb-18
Parameter	Result (µg/g)	Table 3 (µg/g)
Bromomethane	<0.5	0.05
Carbon Tetrchloride	<0.5	0.05
Chloroform	<0.5	0.05
1,4 Dichlorobenzene	<0.5	0.083
1,2-Dichloroethane	<0.5	0.05
1,1-Dichloroethylene	<0.5	0.05
1,2-Dichloropropane	<0.5	0.05
Ethylbenze	6.9	2.0
Ethylene Dibromide	<0.5	0.05
1,3(cis+trans) Dichloroprpne	<0.5	0.05
1,1,1,2-Tetrachlorethane	<0.5	0.058
1,1,2,2-Tetrachlorethane	<0.5	0.05
1,1,2-Trichloroethane	<0.5	0.05
Vinyl Chloride	<0.2	0.02
Xylenes	39	3.1

MW1-SS2	0.70-1.80m	20-Feb-18
Parameter	Result (µg/g)	Table 3 (µg/g)
Benzene	<0.4	0.21
Bromoform	<1.0	0.27
Bromomethane	<1.0	0.05
Carbon Tetrchloride	<1.0	0.05
1,4 Dichlorobenzene	<1.0	0.083
1,2-Dichloroethane	<1.0	0.05
1,1-Dichloroethylene	<1.0	0.05
1,2-Dichloropropane	<1.0	0.05
Ethylene Dibromide	<1.0	0.05
1,3(cis+trans) Dichloroprpne	<1.0	0.05
1,1,1,2-Tetrachlorethane	<1.0	0.058
1,1,2,2-Tetrachlorethane	<1.0	0.05
1,1,2-Trichloroethane	<1.0	0.05
Trichloroethylene	<1.0	0.05
Vinyl Chloride	<0.4	0.02

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TALBE 3 STANDARDS

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Ottawa, Ontario K2E 7J5
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0			

DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE
OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-4AR
Approved by: MSD	Revision No.:

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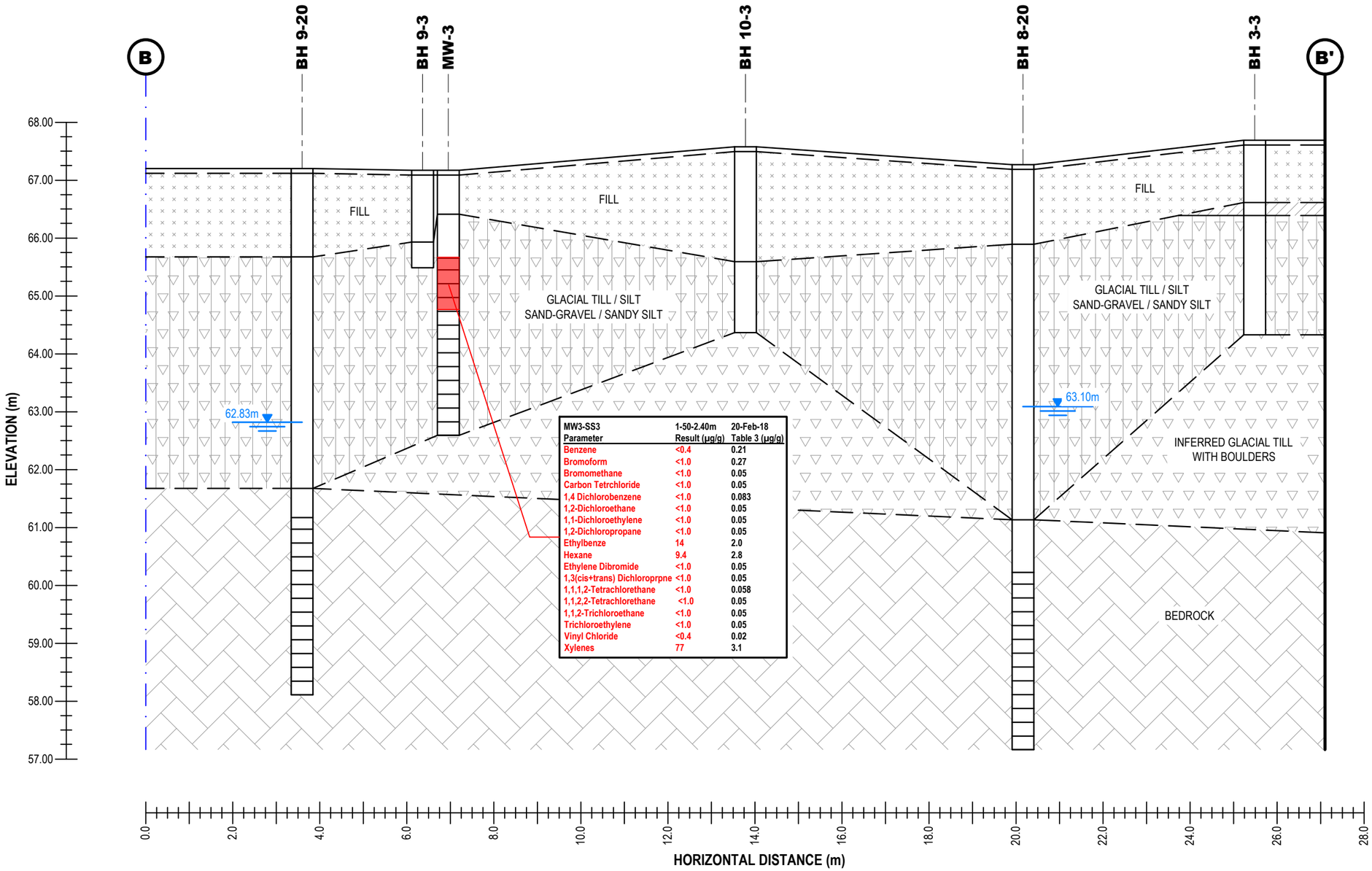

MW3-SS3	1-50-2.40m	20-Feb-18
Parameter	Result (µg/g)	Table 3 (µg/g)
Benzene	<0.4	0.21
Bromoform	<1.0	0.27
Bromomethane	<1.0	0.05
Carbon Tetrchloride	<1.0	0.05
1,4 Dichlorobenzene	<1.0	0.083
1,2-Dichloroethane	<1.0	0.05
1,1-Dichloroethylene	<1.0	0.05
1,2-Dichloropropane	<1.0	0.05
Ethylbenze	14	2.0
Hexane	9.4	2.8
Ethylene Dibromide	<1.0	0.05
1,3(cis+trans) Dichloroprpne	<1.0	0.05
1,1,1,2-Tetrachlorethane	<1.0	0.058
1,1,2,2-Tetrachlorethane	<1.0	0.05
1,1,2-Trichloroethane	<1.0	0.05
Trichloroethylene	<1.0	0.05
Vinyl Chloride	<0.4	0.02
Xylenes	77	3.1

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TALBE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL
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DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE

OTTAWA, ONTARIO

Title:

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

Scale: AS SHOWN	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-4BR
Approved by: MSD	Revision No.:

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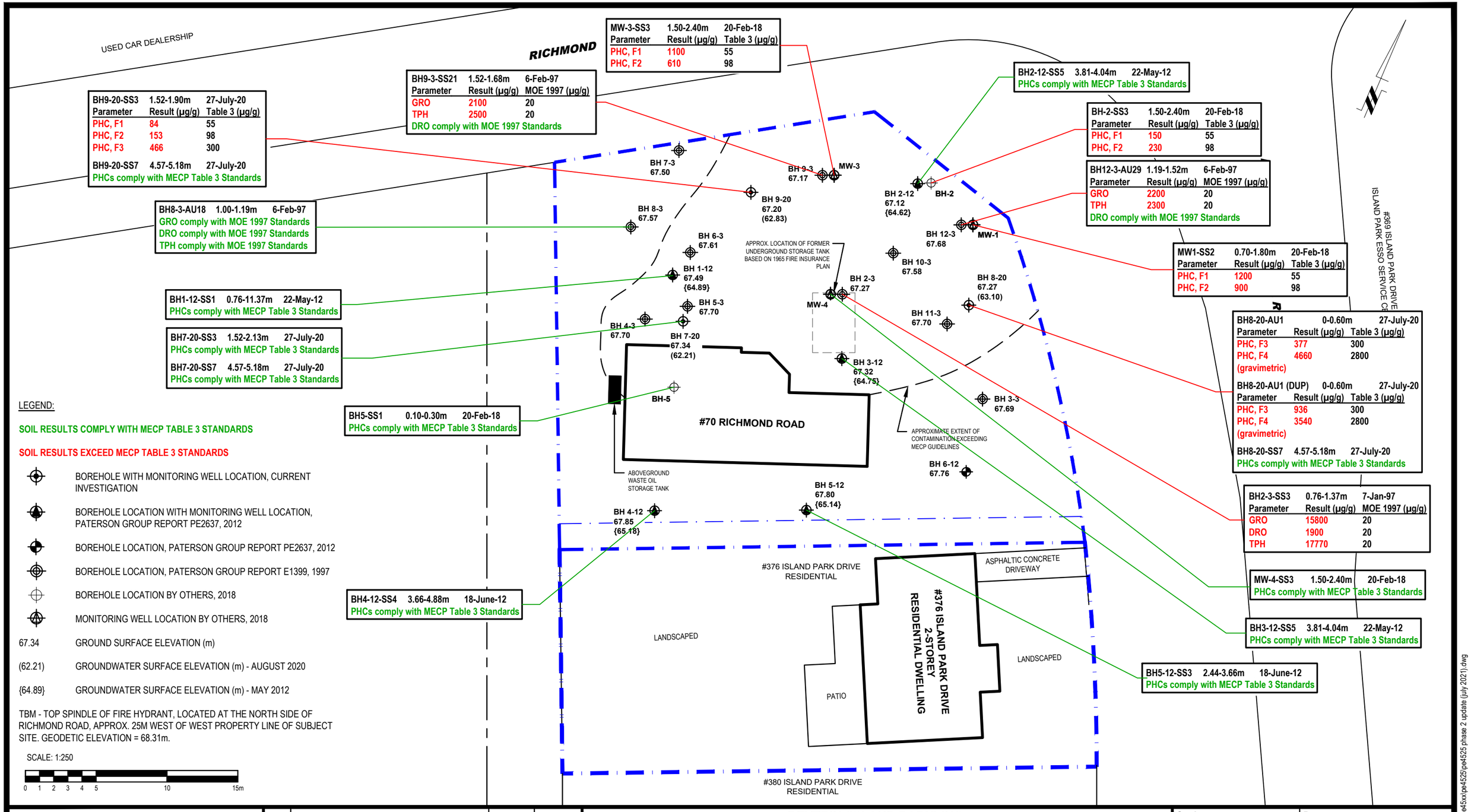

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DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (PHCs)

Scale: 1:250	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-5R
Approved by: MSD	Revision No.:

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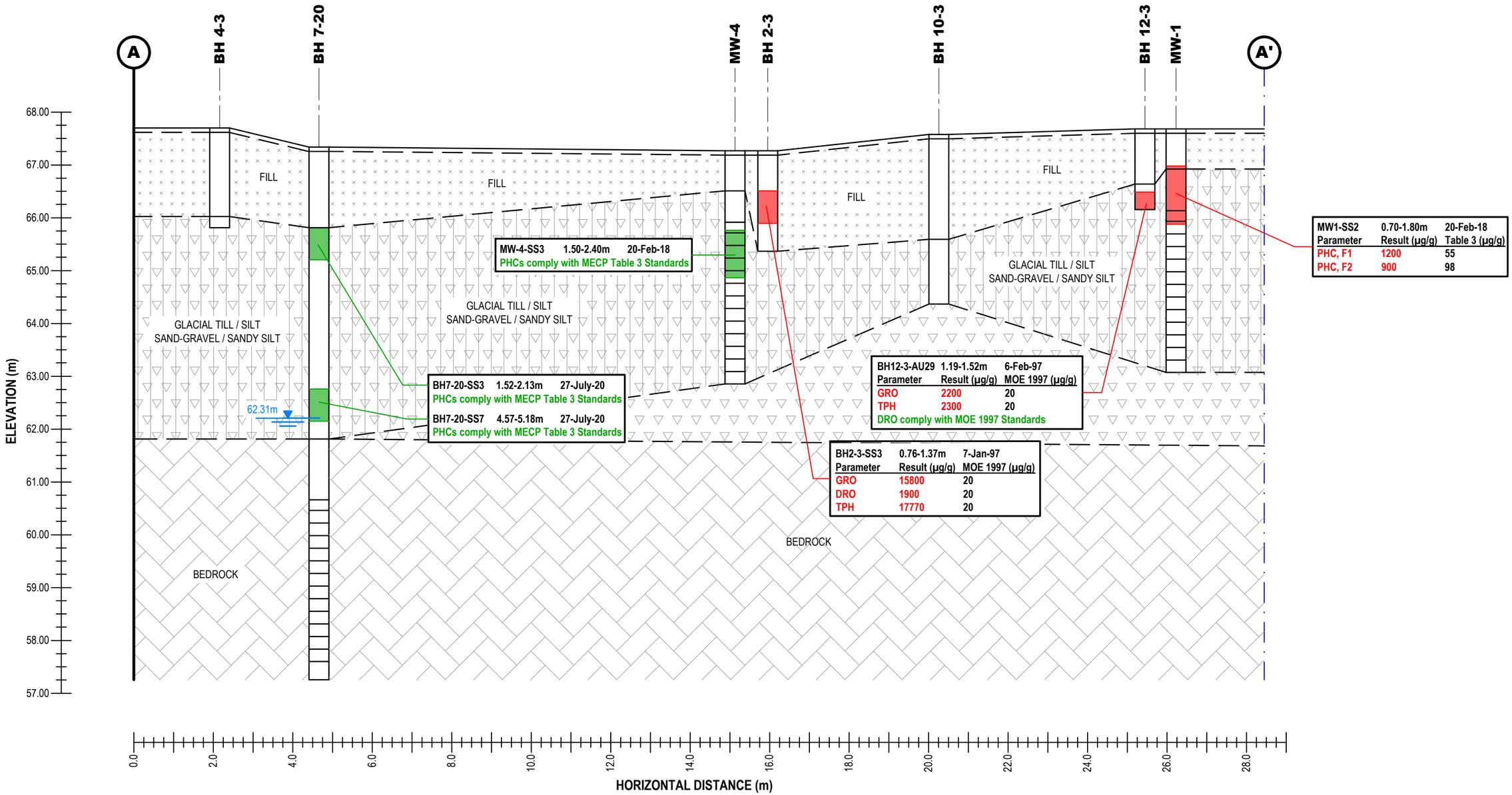

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TALBE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE
OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-5AR
Approved by: MSD	Revision No.:

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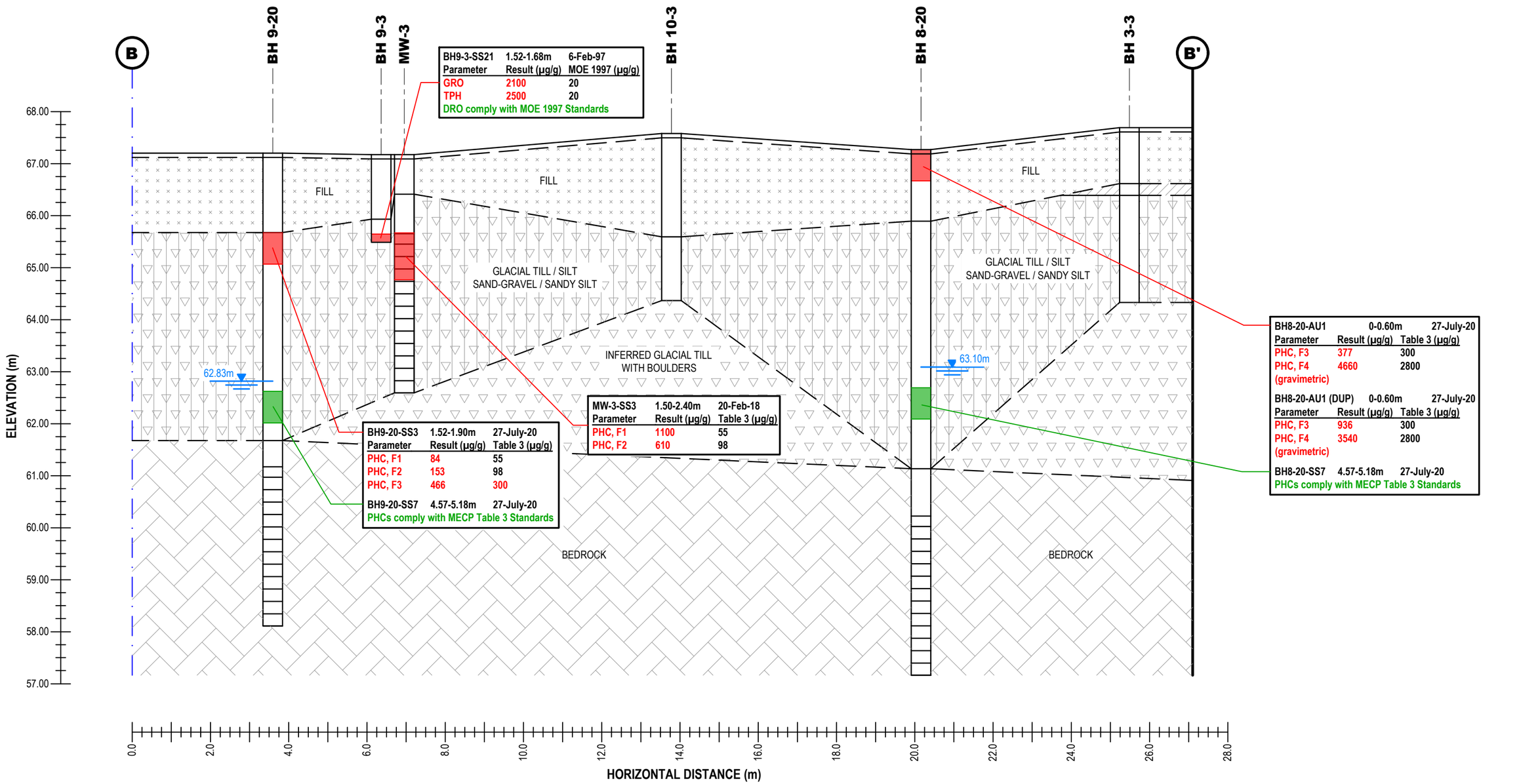

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TALBE 3 STANDARDS

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DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE
OTTAWA, ONTARIO

Title:

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

Scale: AS SHOWN	Date: 07/2021
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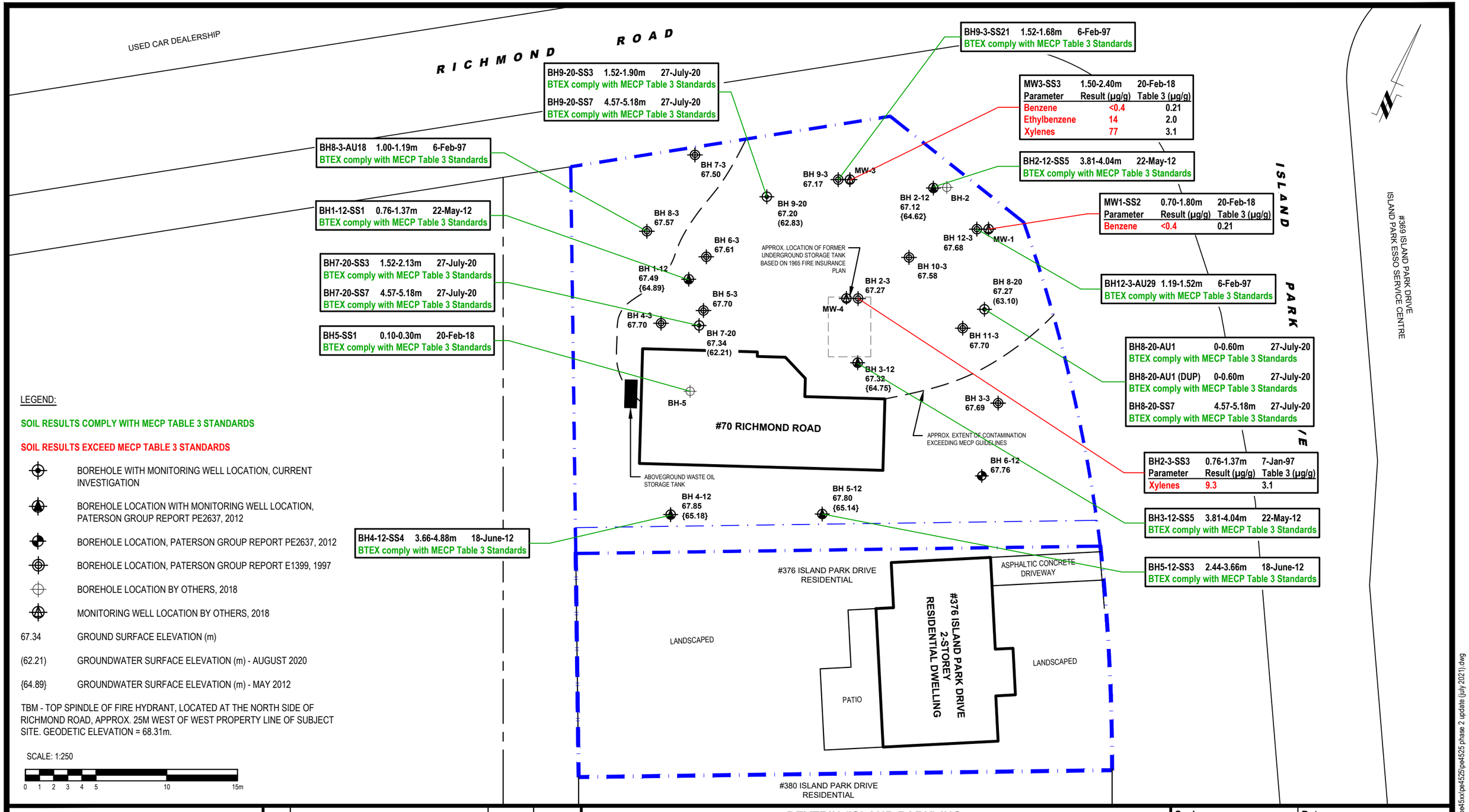

LEGEND:

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TABLE 3 STANDARDS

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67.34 GROUND SURFACE ELEVATION (m)

(62.21) GROUNDWATER SURFACE ELEVATION (m) - AUGUST 2020

{64.89} GROUNDWATER SURFACE ELEVATION (m) - MAY 2012

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SCALE: 1:250

0 1 2 3 4 5 10 15m

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DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - SOIL (BTEX)

Scale: 1:250	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-6R
Approved by: MSD	Revision No.:

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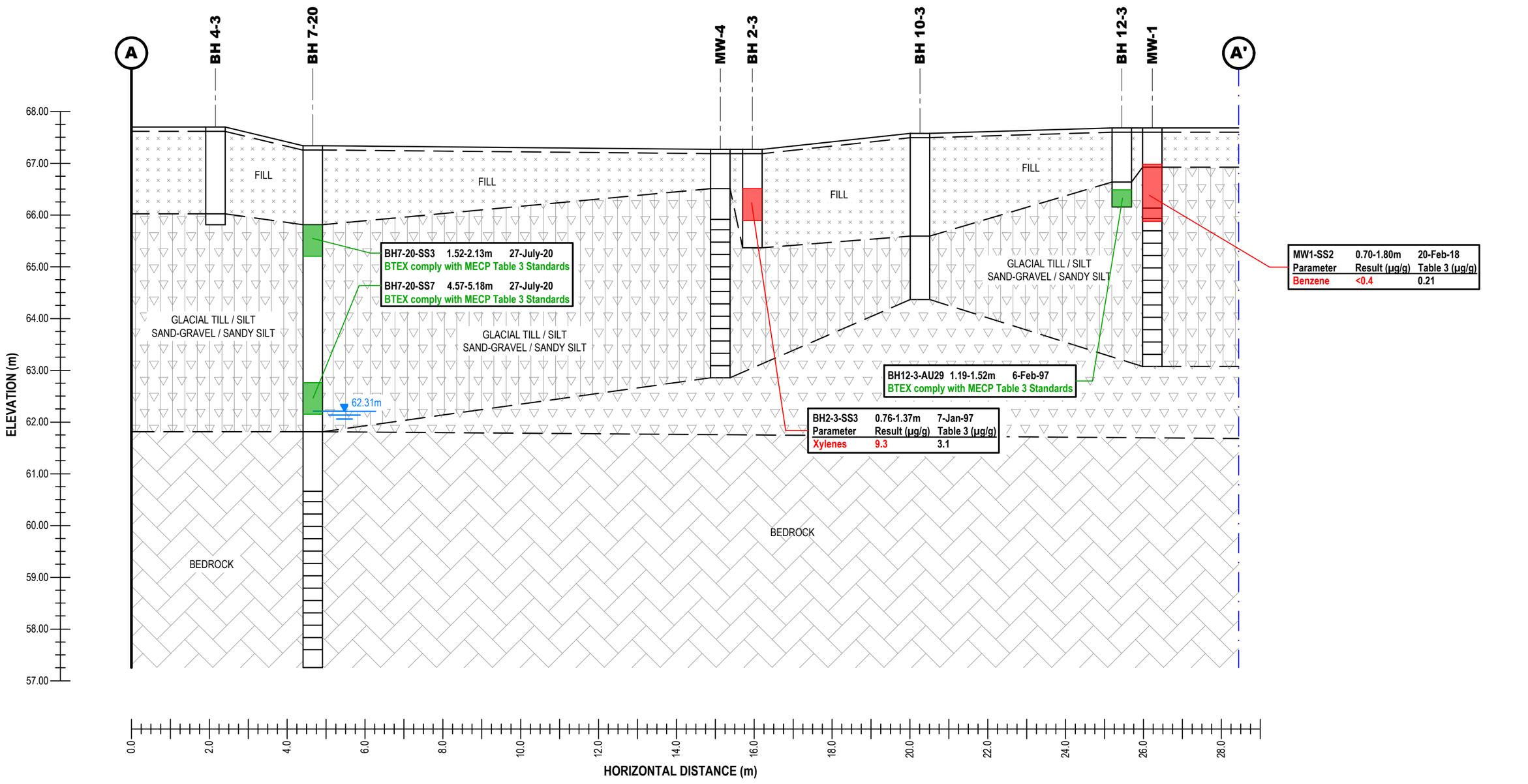

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TALBE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE

OTTAWA, ONTARIO

Title:

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

Scale: AS SHOWN	Date: 07/2021
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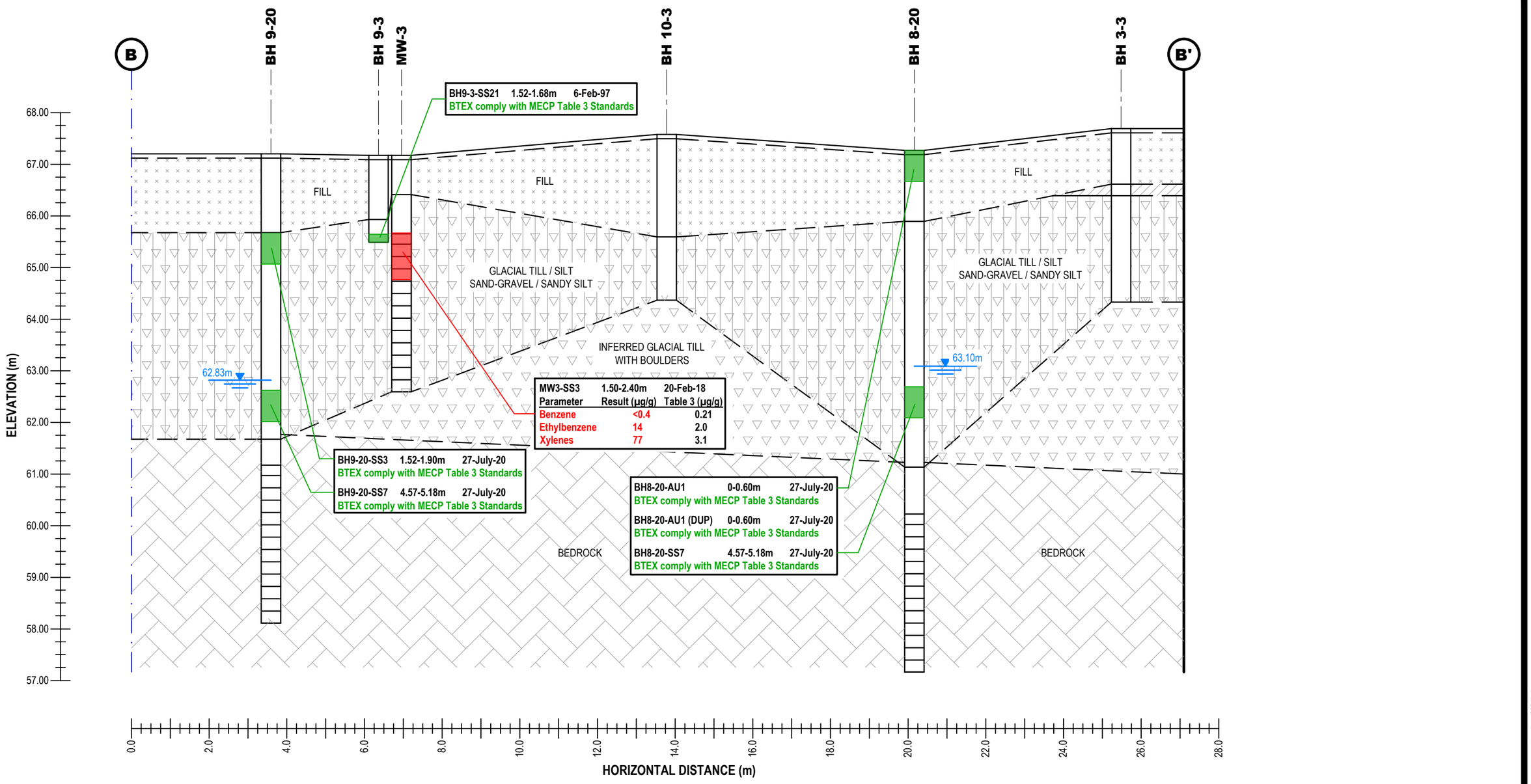

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TALBE 3 STANDARDS

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DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE

OTTAWA, ONTARIO

Title:

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

Scale: AS SHOWN	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-6BR
Approved by: MSD	Revision No.:

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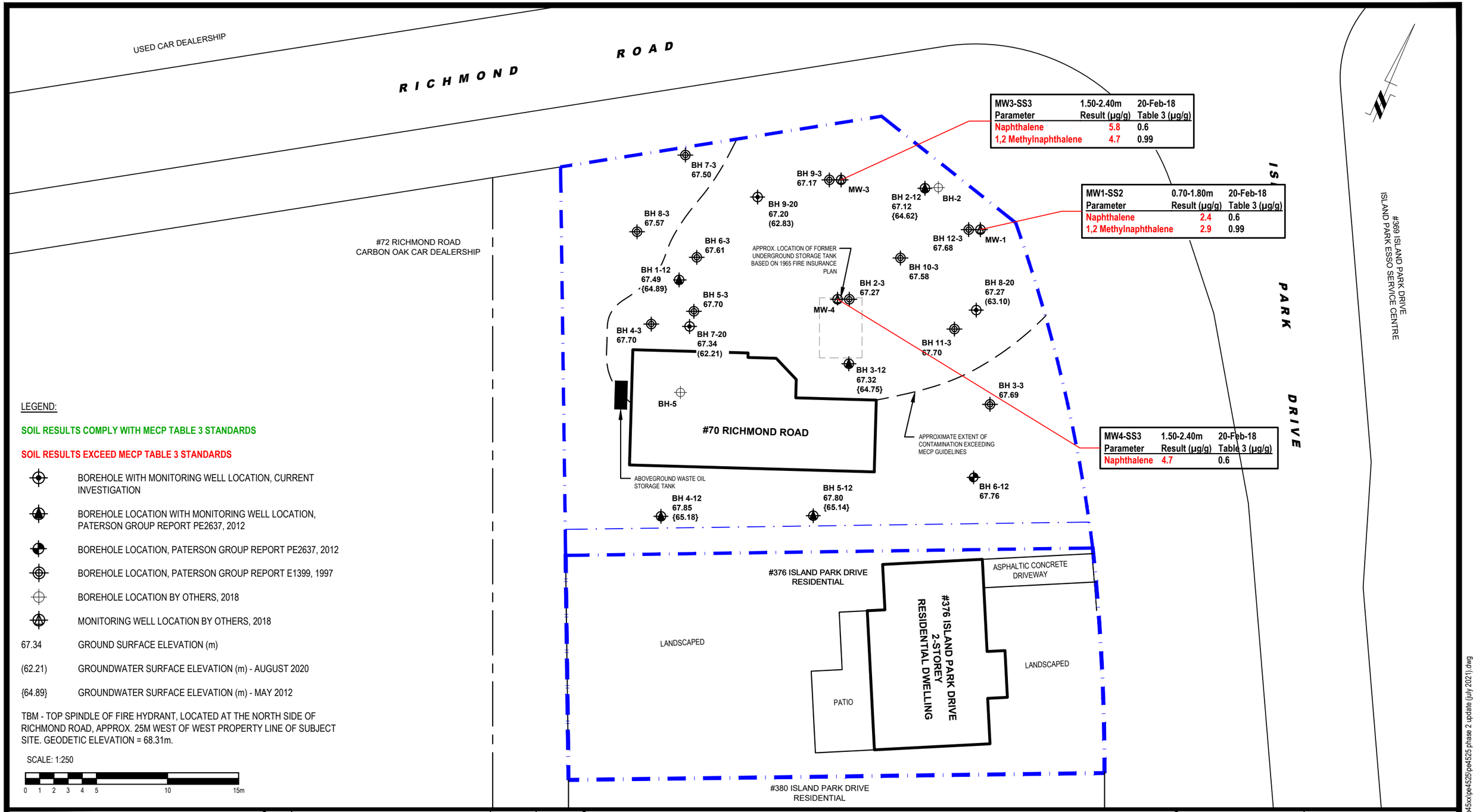

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SCALE: 1:250

0 1 2 3 4 5 10 15m

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DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE
OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - SOIL (PAH)

Scale: 1:250	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-7R
Approved by: MSD	Revision No.:

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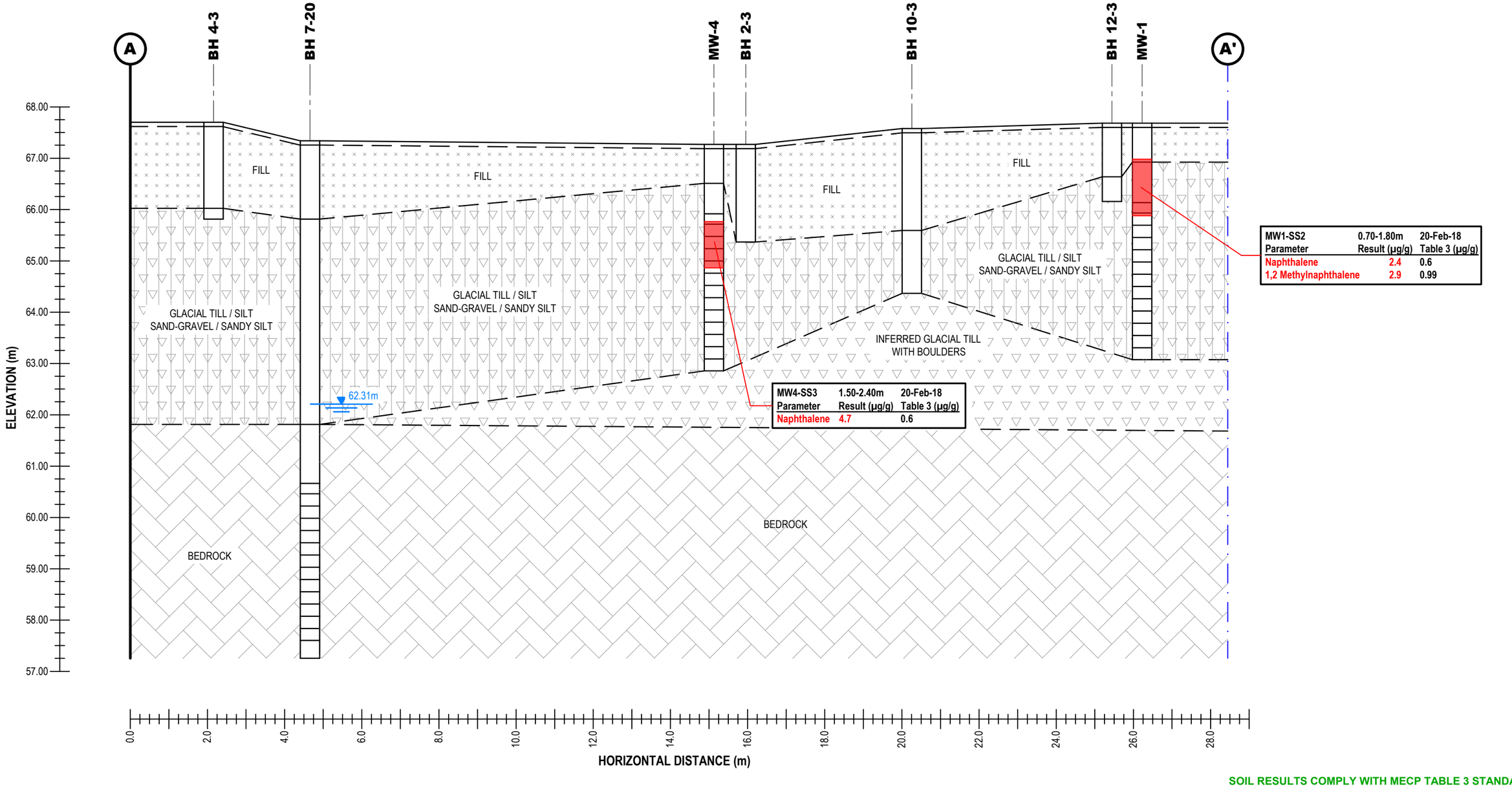

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TALBE 3 STANDARDS

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DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE

OTTAWA, ONTARIO

Title:

CROSS-SECTION A-A' - SOIL (PAHs)

Scale: AS SHOWN	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-7AR
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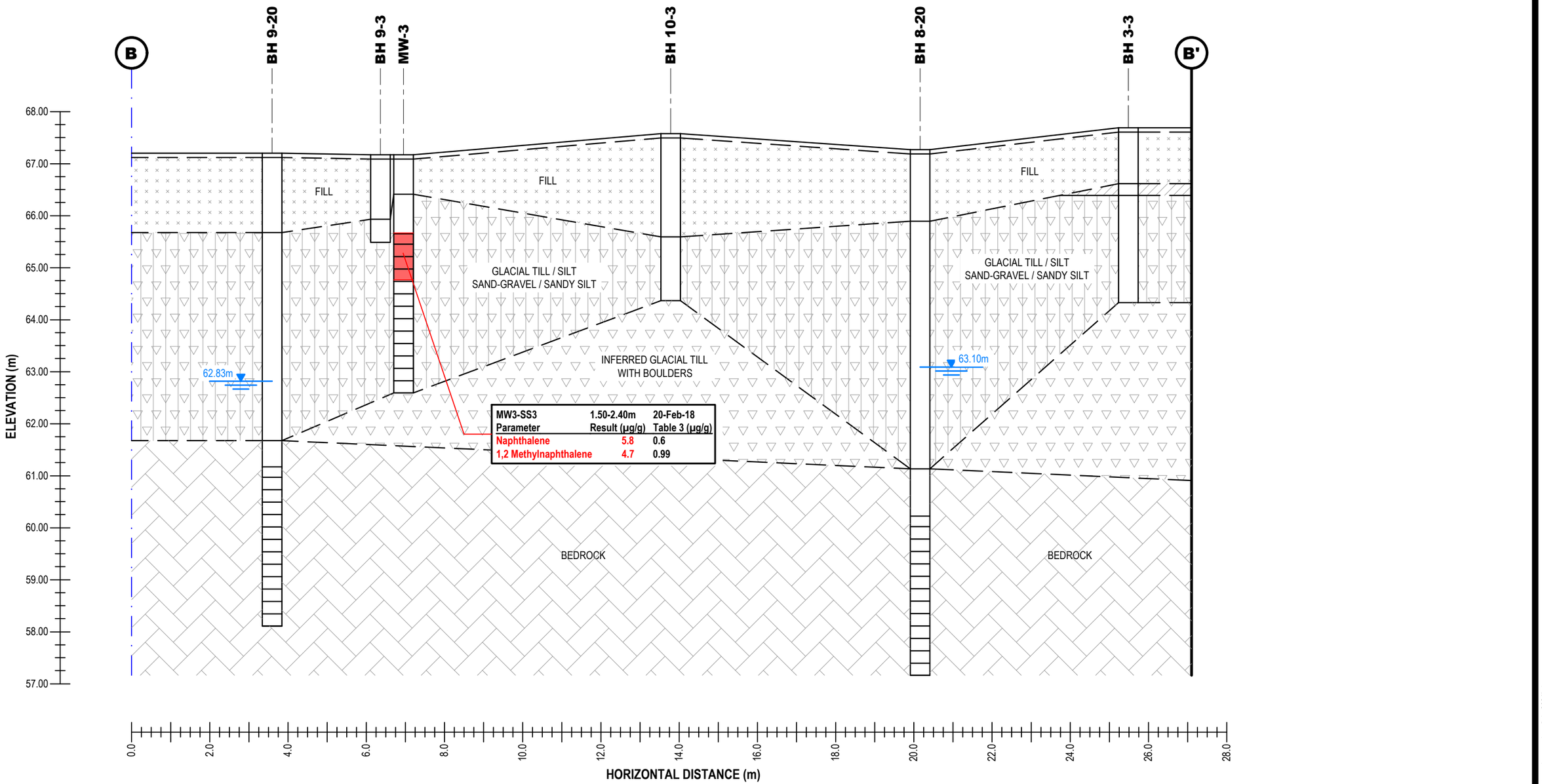

SOIL RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

SOIL RESULTS EXCEED MECP TALBE 3 STANDARDS

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DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE
OTTAWA, ONTARIO

Title:

CROSS-SECTION B-B' - SOIL (PAHs)

Scale:	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-7BR
Approved by: MSD	Revision No.:

11x17

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FIGURES

Drawing PE4525-8R – Analytical Testing Plan – Groundwater (VOCs)

Drawing PE4525-8AR – Cross-section A – A’ – Groundwater (VOCs)

Drawing PE4525-8BR – Cross-section B – B’ – Groundwater (VOCs)

Drawing PE4525-9R – Analytical Testing Plan – Groundwater (PHCs)

Drawing PE4525-9AR – Cross-section A – A’ – Groundwater (PHCs)

Drawing PE4525-9BR – Cross-section B – B’ – Groundwater (PHCs)

Drawing PE4525-10R – Analytical Testing Plan – Groundwater (BTEX)

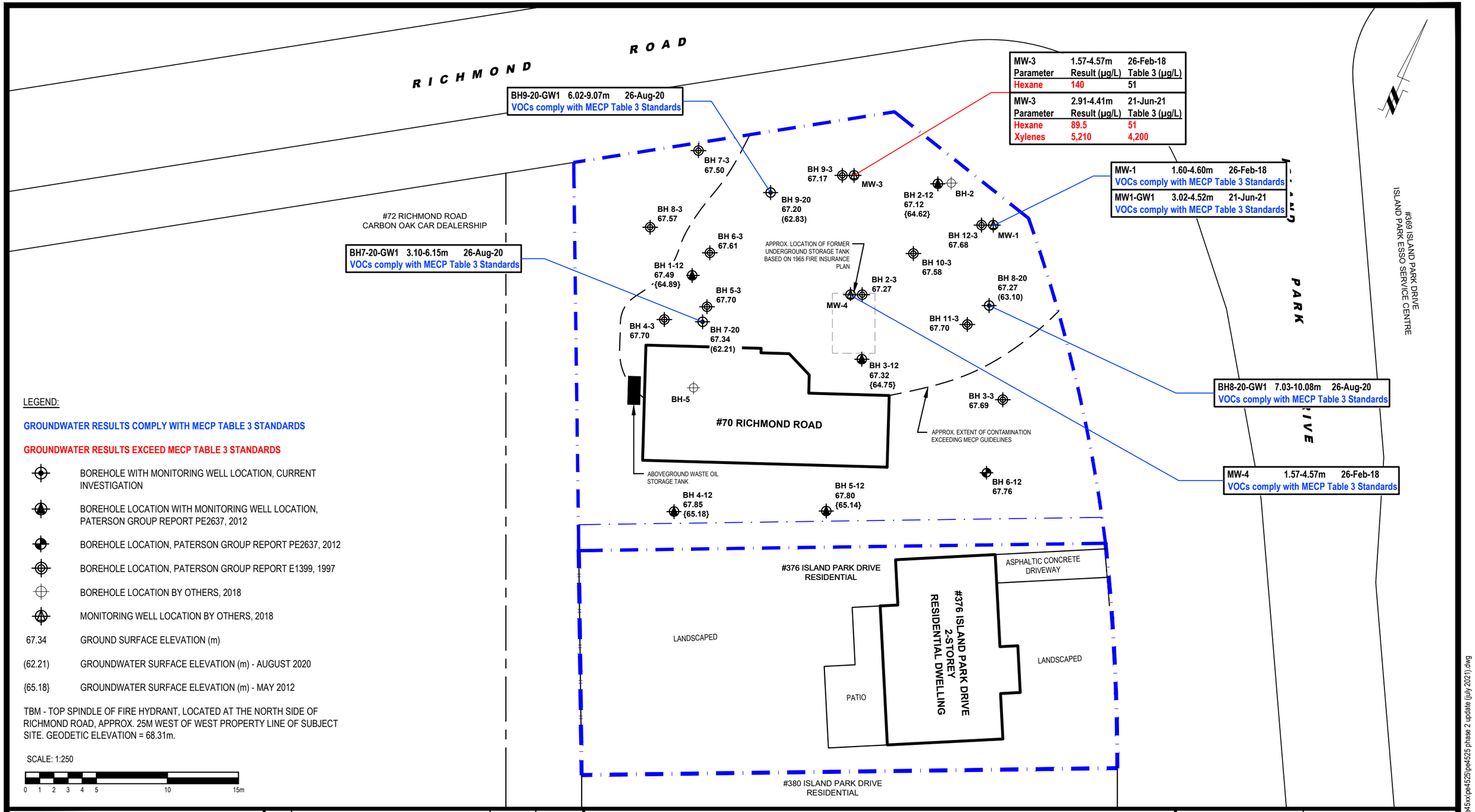
Drawing PE4525-10AR – Cross-section A – A’ – Groundwater (BTEX)

Drawing PE4525-10BR – Cross-section B – B’ – Groundwater (BTEX)

Drawing PE4525-11R – Analytical Testing Plan – Groundwater (PAHs)

Drawing PE4525-11AR – Cross-section A – A’ – Groundwater (PAHs)

Drawing PE4525-11BR – Cross-section B – B’ – Groundwater (PAHs)



LEGEND:

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TABLE 3 STANDARDS

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67.34 GROUND SURFACE ELEVATION (m)

(62.21) GROUNDWATER SURFACE ELEVATION (m) - AUGUST 2020

{65.18} GROUNDWATER SURFACE ELEVATION (m) - MAY 2012

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SCALE: 1:250

0 1 2 3 4 5 10 15m

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DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - GROUNDWATER (VOCs)

Scale: 1:250	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-8R
Approved by: MSD	Revision No.:

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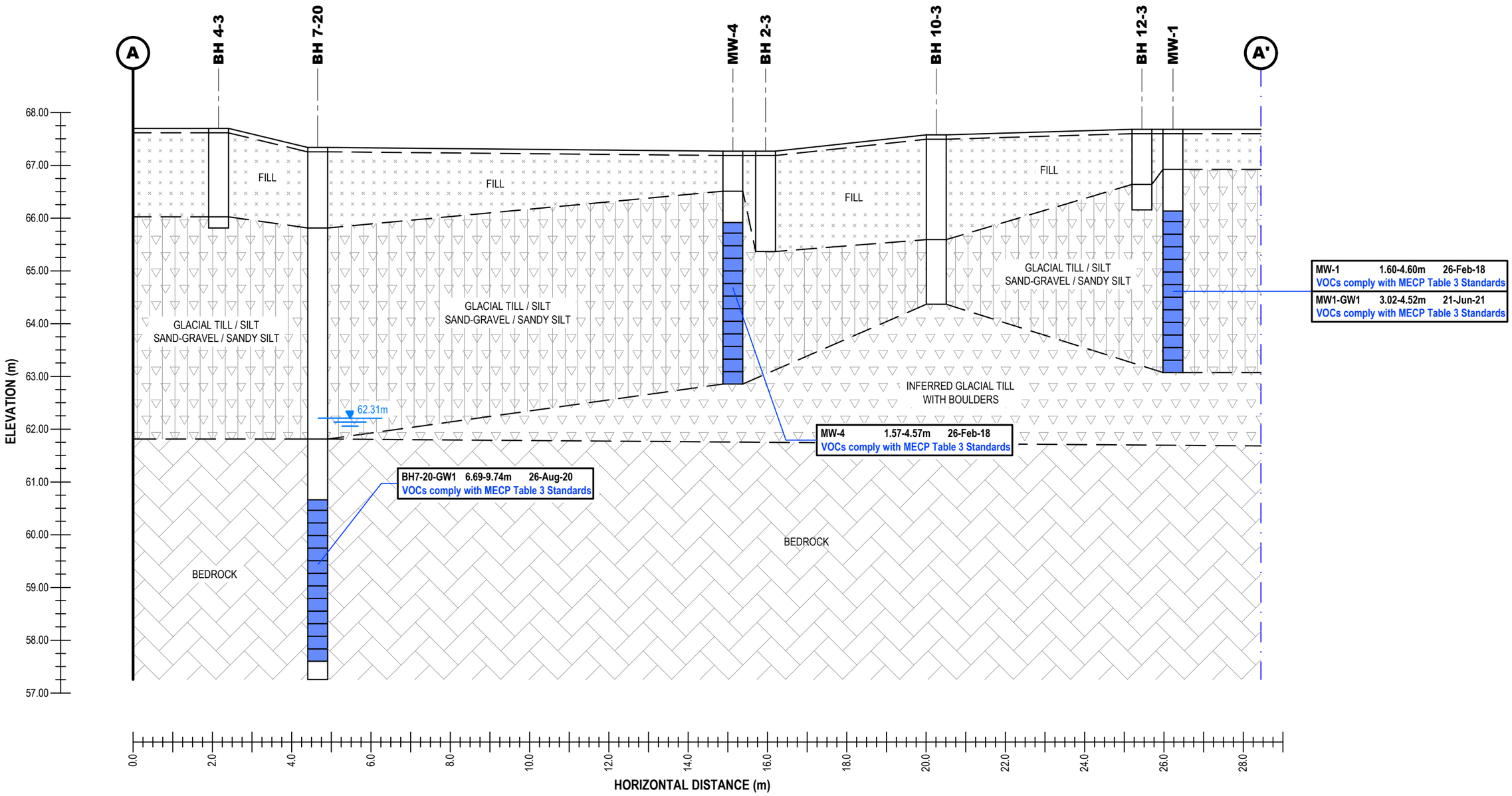

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULTS EXCEED MECP TALBE 3 STANDARDS

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PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE
OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
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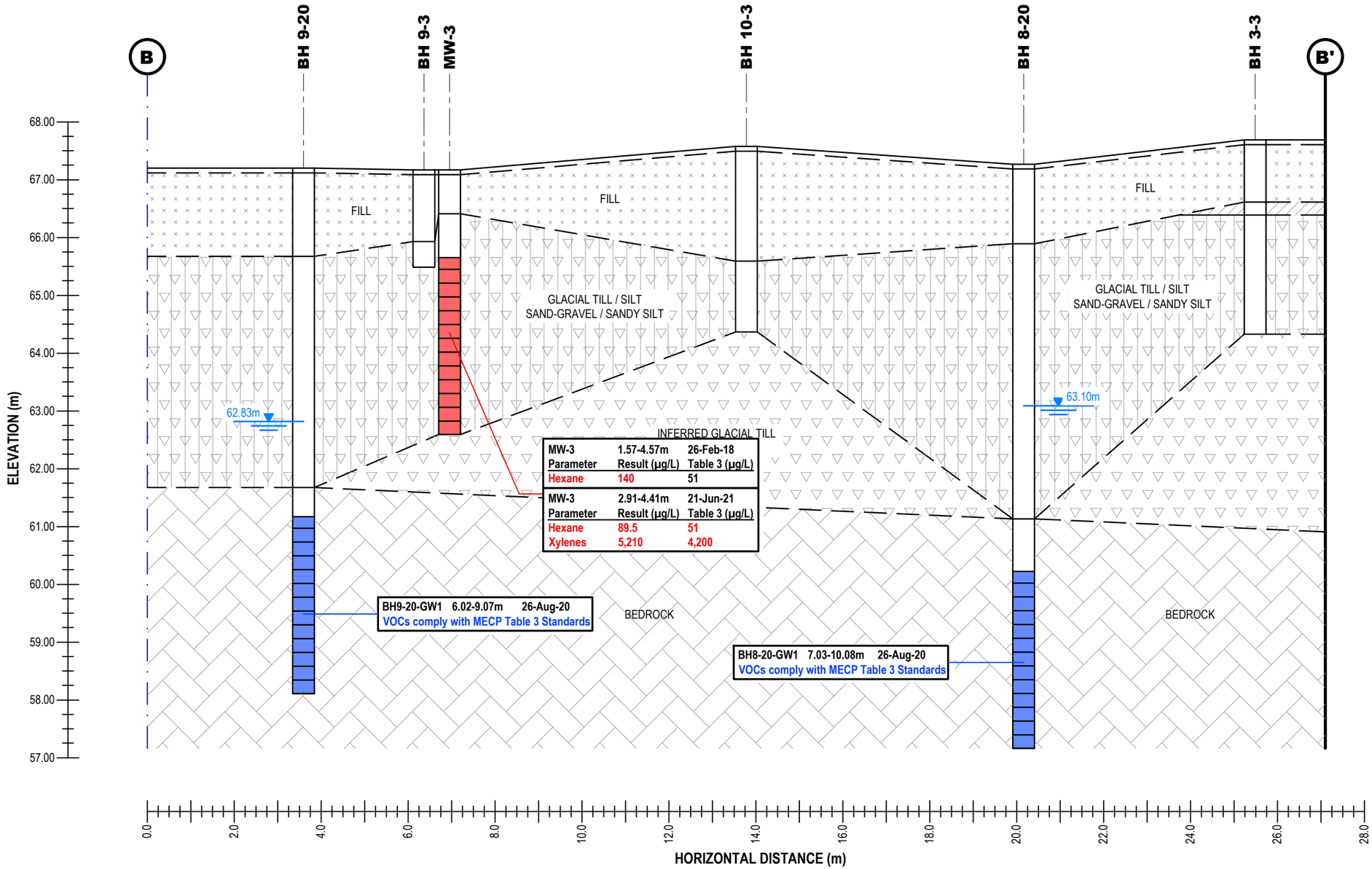

GROUNDWATER RESULTS COMPLY WITH MECP TABLE 3 STANDARDS

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DEVTRIN (ISLAND PARK) INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE
OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 07/2021
Drawn by: MPG	Report No.: PE4525-2R
Checked by: MW	Dwg. No.: PE4525-8BR
Approved by: MSD	Revision No.:

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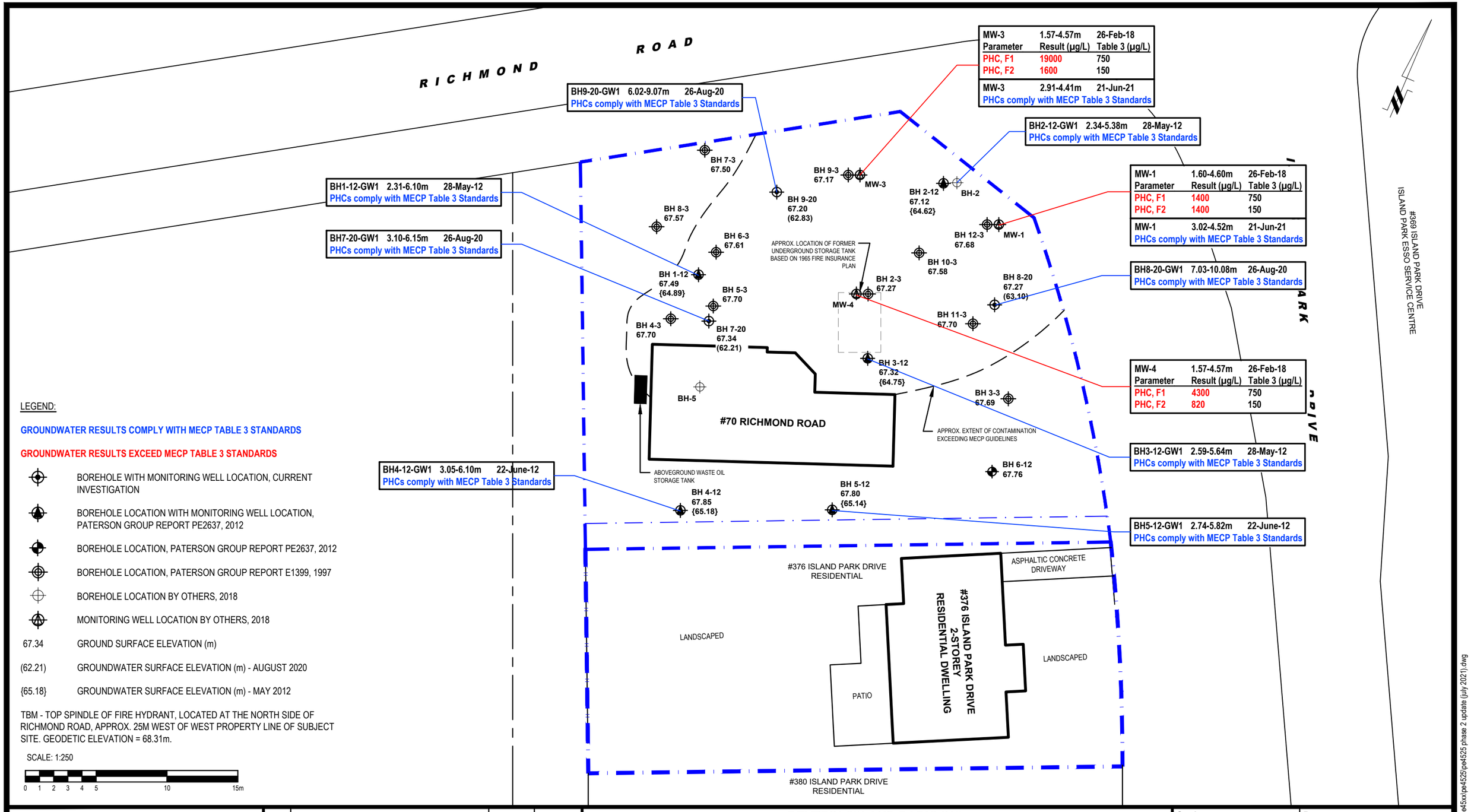

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Title:

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Scale: 1:250	Date: 07/2021
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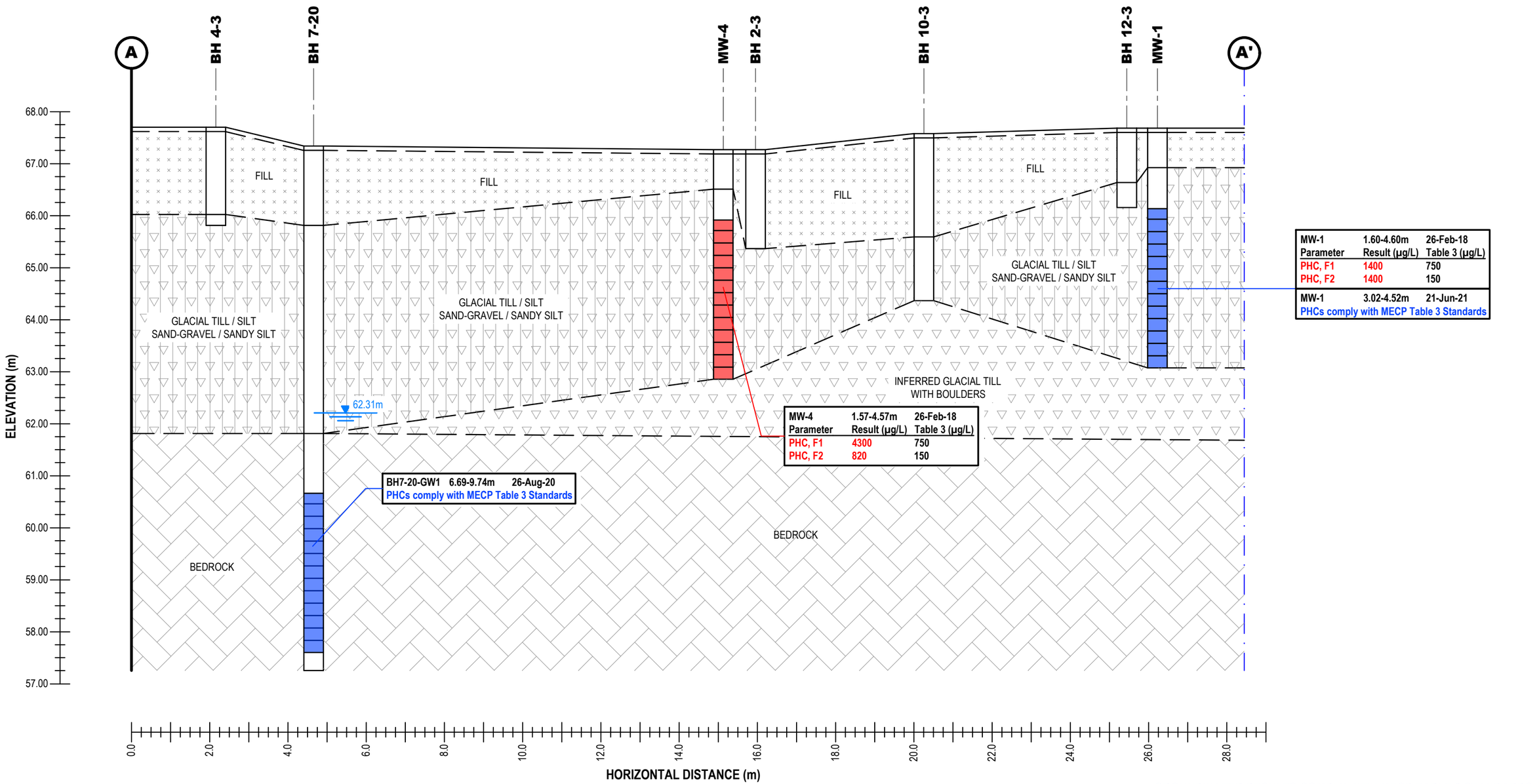

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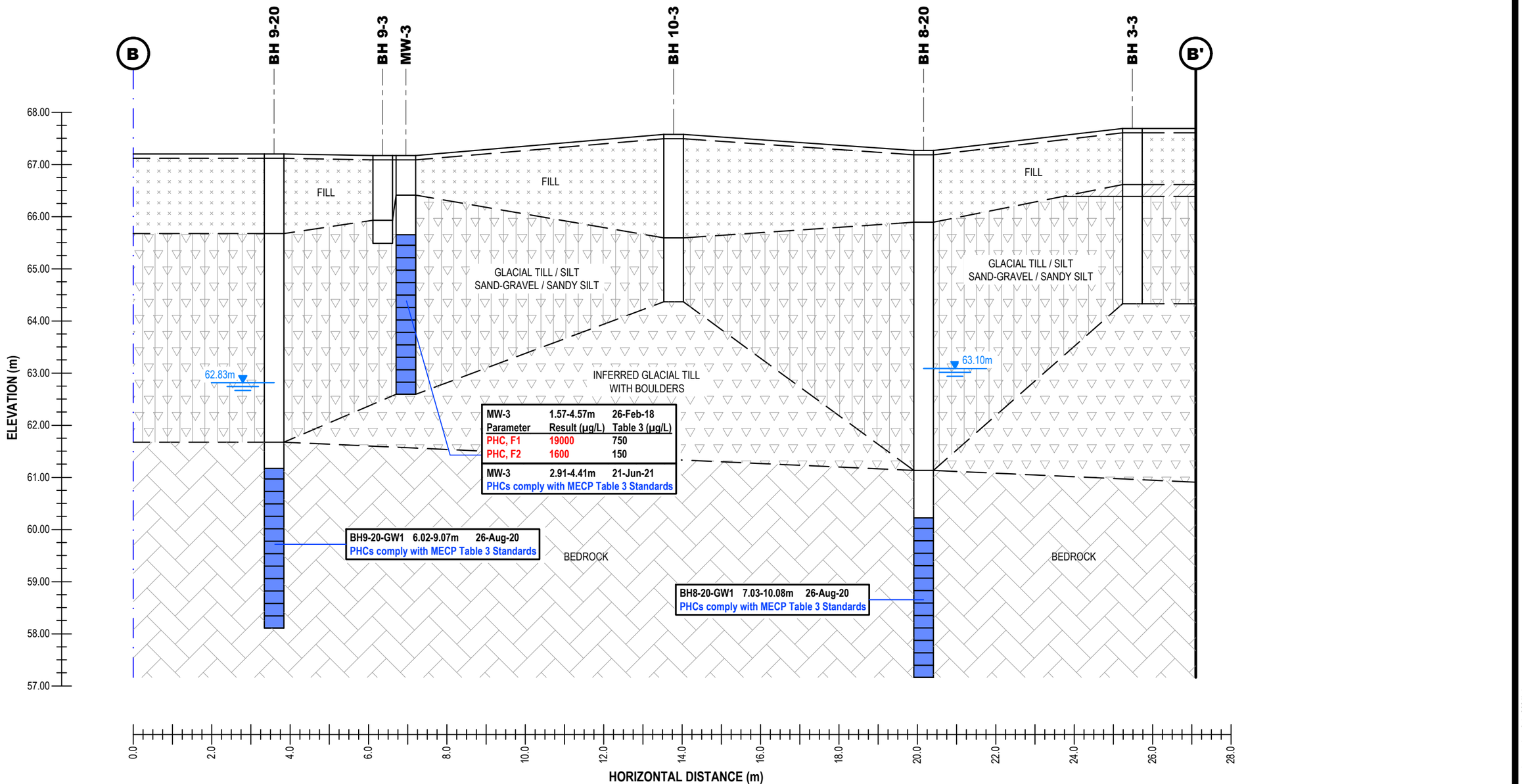

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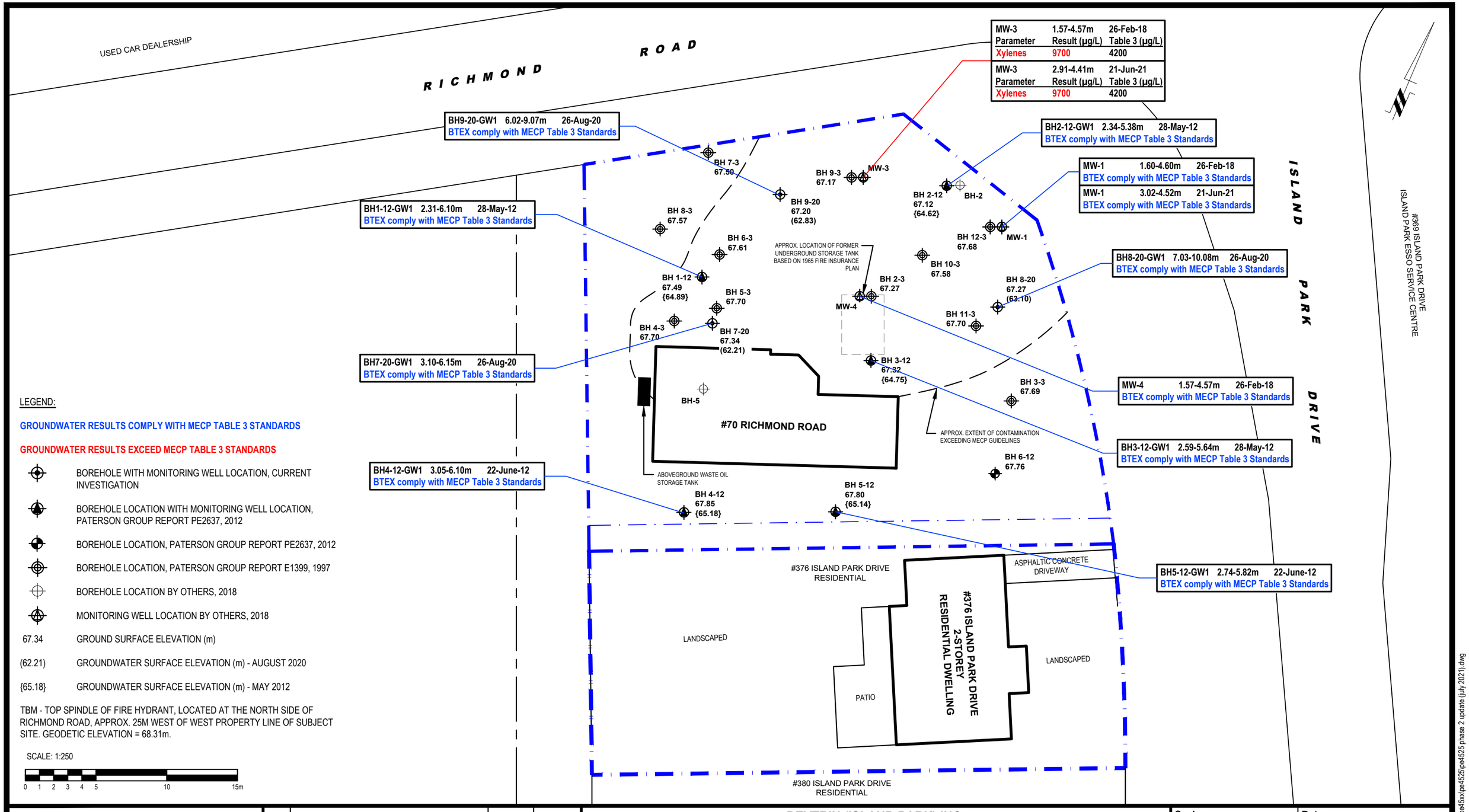

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70 RICHMOND ROAD AND 376 ISLAND PARK DRIVE

OTTAWA, ONTARIO

Title:

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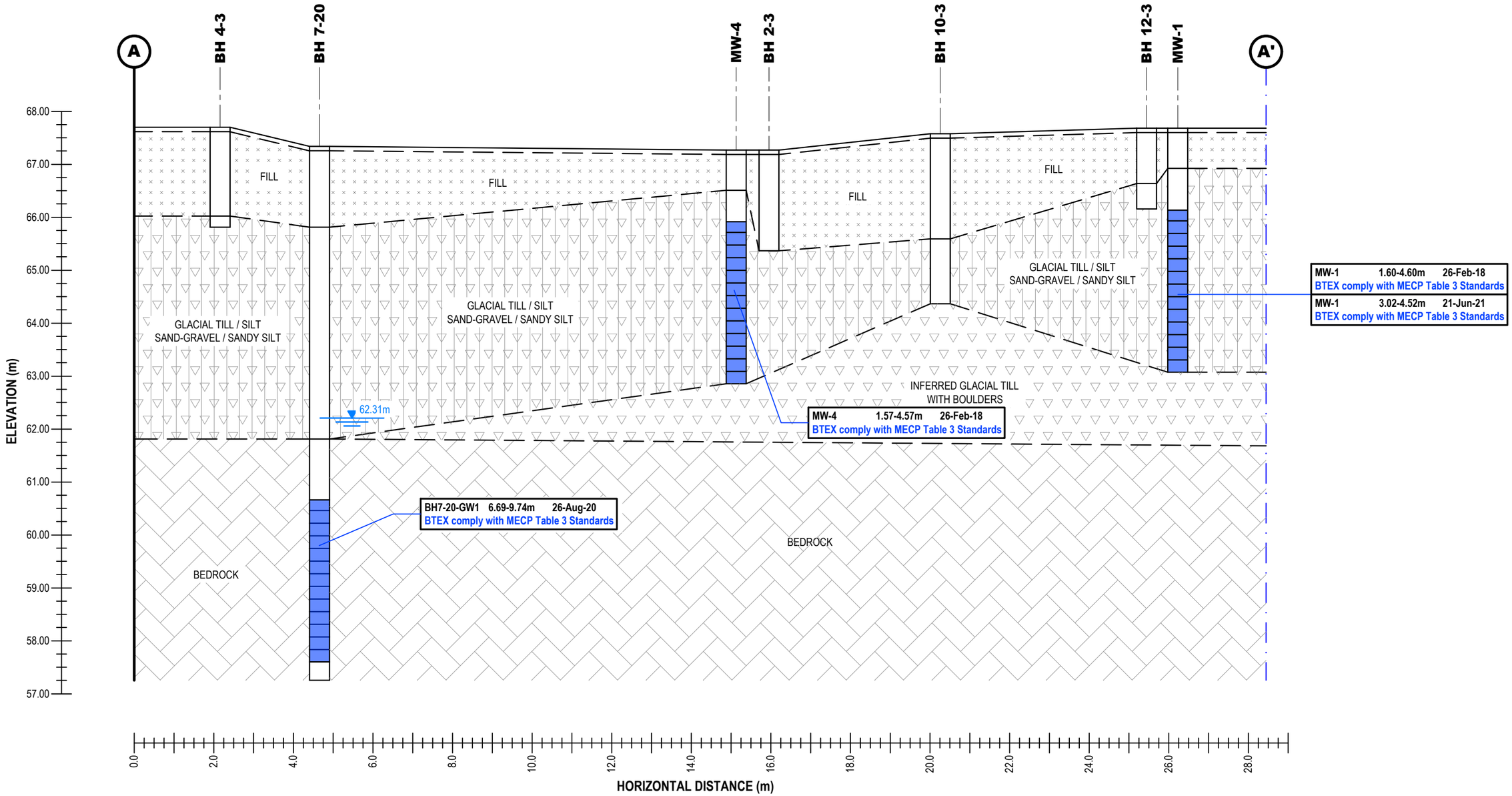

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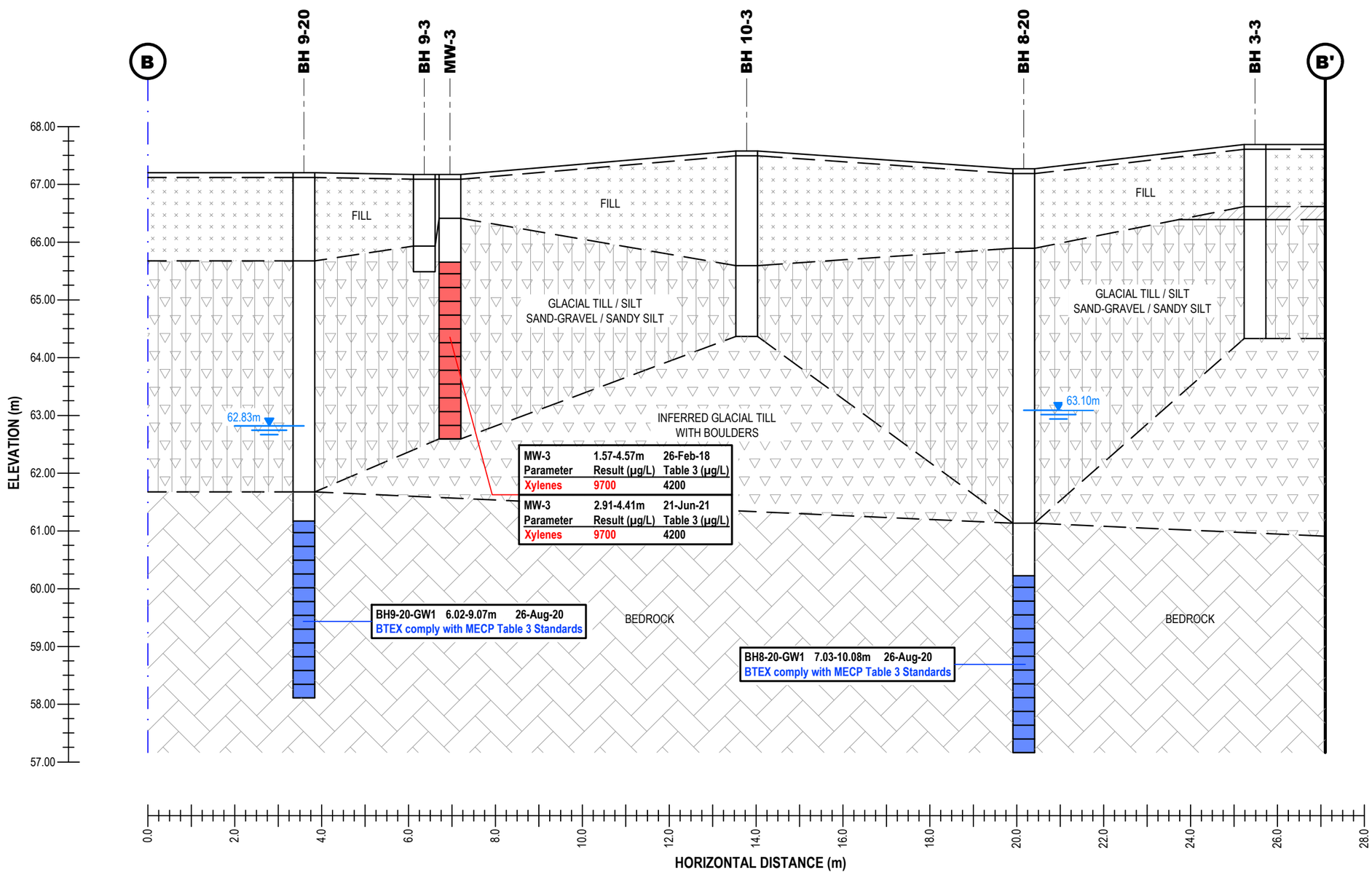

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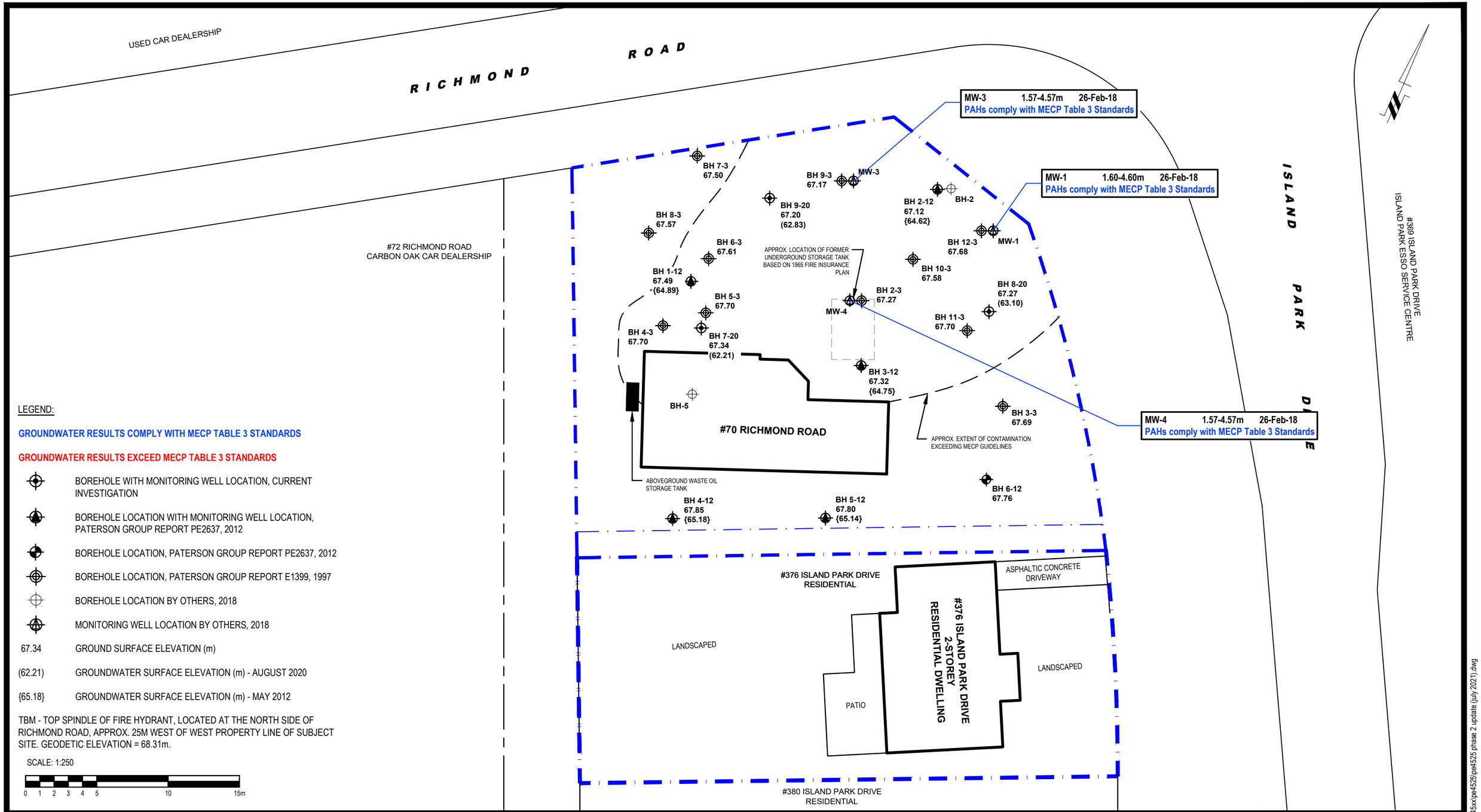

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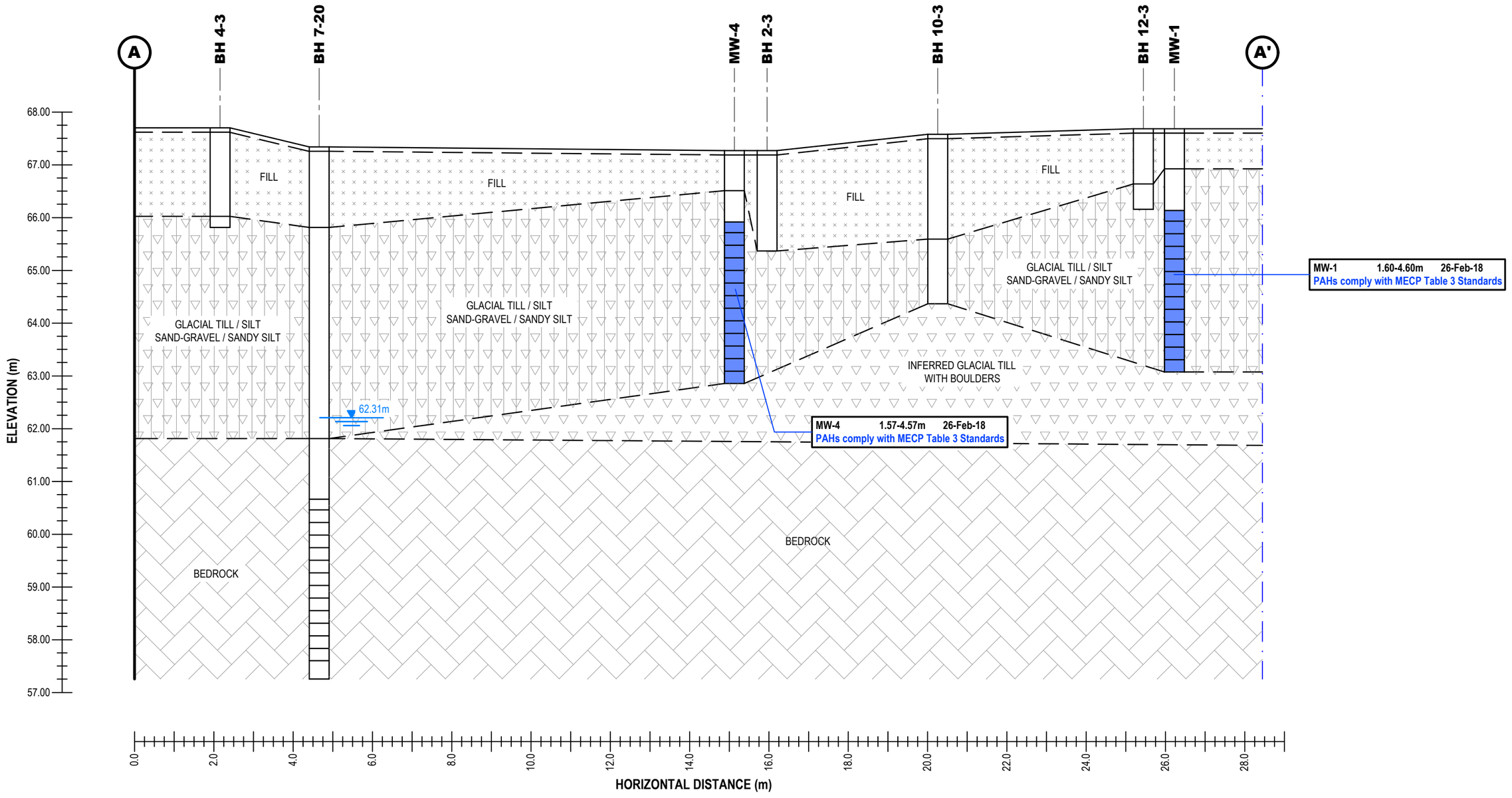

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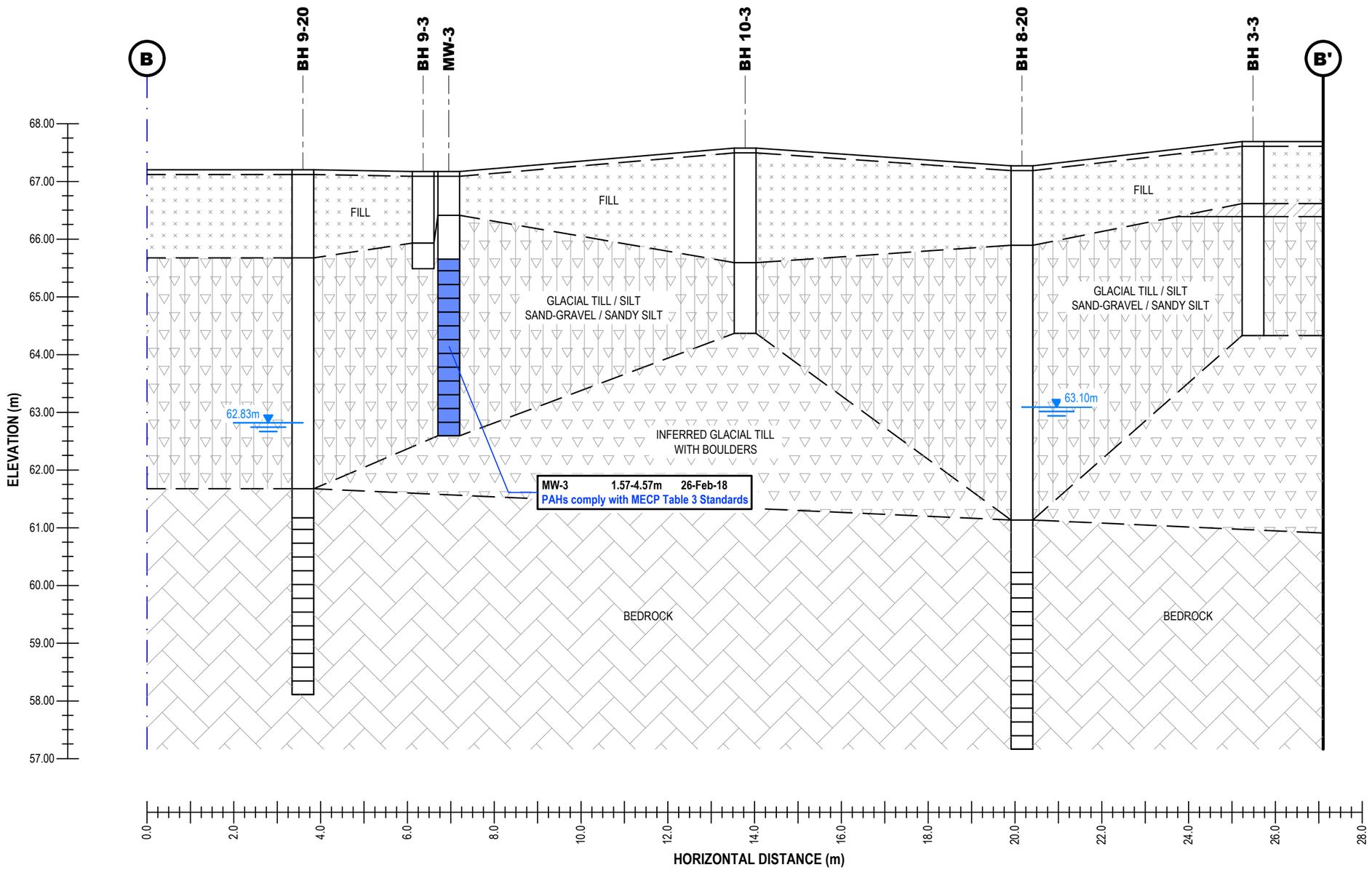

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

Paterson Group Inc.

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Sampling & Analysis Plan

Phase II Environmental Site Assessment
70 Richmond Road
Ottawa, Ontario

Prepared For

Devtrin (Island Park) Inc.

July 2020

Report: PE4525-SAP

Table of Contents

1.0 SAMPLING PROGRAM

Paterson was retained by Devtrin (Island Park) Inc. to conduct a Phase II Environmental Site Assessment (ESA) for the property addressed 70 Richmond Road, in the City of Ottawa, Ontario.

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

Borehole	Location & Rationale	Proposed Depth & Rationale
BH7-20	Place on the western side of the Phase II Property to assess the potential impact due to APECs 1 and 4.	Borehole to be advanced to approximately 6 mbgs to intercept the groundwater table to install monitoring well.
BH8-20	Place on the eastern side of the Phase II Property to assess the potential impact due to APEC 3.	Borehole to be advanced to approximately 6 mbgs to intercept the groundwater table to install monitoring well.
BH9-20	Place on the north eastern side of the Phase II Property to assess the potential impact due to APEC 2	Borehole to be advanced to approximately 6 mbgs to intercept the groundwater table to install monitoring well.

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

Following borehole drilling, monitoring wells will be installed in selected boreholes (as above) for the measurement of water levels and the collection of groundwater samples. Borehole locations are shown on the Test Hole Location Plan appended to the main report.

2.0 ANALYTICAL TESTING PROGRAM

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

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

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

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

3.0 STANDARD OPERATING PROCEDURES

3.1 Environmental Drilling Procedure

Purpose

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

Equipment

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

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

Determining Borehole Locations

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

After drilling is completed a plan with the borehole locations must be provided. Distances should be measured using a measuring tape or wheel rather than paced off. Boreholes were located and surveyed in the field by Paterson. All borehole locations were measured at geodetic elevations.

Drilling Procedure

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

- ❒ Continuous split spoon samples (every 0.6 m or 2') or semi-continuous (every 0.76 m or 2'6") are required.
- ❒ Make sure samples are well sealed in plastic bags with no holes prior to screening and are kept cool but unfrozen.
- ❒ If sampling for VOCs, BTEX, or PHCs F1, a soil core from each soil sample which may be analyzed must be taken and placed in the laboratory-provided methanol vial.
- ❒ Note all and any odours or discolouration of samples.
- ❒ Split spoon samplers must be washed between samples.
- ❒ If obvious contamination is encountered, continue sampling until vertical extent of contamination is delineated.
- ❒ As a general rule, environmental boreholes should be deep enough to intercept the groundwater table (unless this is impossible/impractical - call project manager to discuss).
- ❒ If at all possible, soil samples should be submitted to a preliminary screening procedure on site, either using a RKI Eagle, PID, etc. depending on type of suspected contamination.

Spoon Washing Procedure

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

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

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

Screening Procedure

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

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

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

3.2 Monitoring Well Installation Procedure

Equipment

- ❒ 5’ x 2” [1.52 m x 50 mm] threaded sections of Schedule 40 PVC slotted well screen (5’ x 1 ¼” [1.52 m x 32 mm] if installing in cored hole in bedrock)
- ❒ 5’ x 2” [1.52 m x 50 mm] threaded sections of Schedule 40 PVC riser pipe (5’ x 1 ¼” [1.52 m x 32 mm] if installing in cored hole in bedrock)
- ❒ Threaded end-cap
- ❒ Slip-cap or J-plug
- ❒ Asphalt cold patch or concrete
- ❒ Silica Sand
- ❒ Bentonite chips (Holeplug)
- ❒ Steel flushmount casing

Procedure

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

3.3 Monitoring Well Sampling Procedure

Equipment

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

Sampling Procedure

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

4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

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

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

5.0 DATA QUALITY OBJECTIVES

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

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

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

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

For the purpose of calculating the RPD, it is desirable to select field duplicates from samples for which parameters are present in concentrations above laboratory detection limits, i.e. samples which are expected to be contaminated. If parameters are below laboratory detection limits for selected samples or duplicates, the RPD may be calculated using a concentration equal to one half (0.5 x) the laboratory detection limit.

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

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS TO SAMPLING & ANALYSIS PLAN

Physical impediments to the Sampling and Analysis plan may include:

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

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

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
70 Richmond Road
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on the north side of Richmond Road, approx. 25m west of west property line of subject site. Geodetic elevation = 68.31m.

REMARKS

FILE NO. PE4525

HOLE NO. BH 7-20

BORINGS BY CME-55 Low Clearance Drill **DATE** July 27, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	67.34
Asphaltic concrete 0.08							
FILL: Brown silty sand with crushed stone 0.66		AU	1				
		SS	2	47	50+	1	66.34
FILL: Brown to grey silt and sand with gravel		SS	3	50	53	2	65.34
		SS	4	58	54		
3.05		SS	5	63	50+	3	64.34
Dense, grey **SANDY SILT**		SS	6	33	31	4	63.34
4.42		SS	7	50	44		
Dense to very dense, grey **SILTY SAND-GRAVEL**		SS	8	67	50+	5	62.34
6.00						6	61.34
		RC	1	94	74	7	60.34
BEDROCK: Fair to excellent quality, grey limestone						8	59.34
		RC	2	93	70	9	58.34
		RC	3	100	100		
10.06						10	57.34
End of Borehole							
(GWL @ 5.13m - August 26, 2020)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

Monitoring Well Construction

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
70 Richmond Road
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on the north side of Richmond Road, approx. 25m west of west property line of subject site. Geodetic elevation = 68.31m.

REMARKS

FILE NO. PE4525

HOLE NO. BH 8-20

BORINGS BY CME-55 Low Clearance Drill **DATE** July 27, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.08		AU	1			0	67.27
FILL: Brown silty sand with crushed stone		SS	2	42	14	1	66.27
1.37		SS	3	88	50+	2	65.27
		G	4				
Very dense, brown **SILTY SAND** with gravel		SS	5	50	50+	3	64.27
- grey by 3.0md epth		SS	6	90	86	4	63.27
		SS	7	42	84	5	62.27
		SS	8	84	34		
6.12						6	61.27
		RC	1	100	36	7	60.27
BEDROCK: Poor to excellent quality, grey limestone		RC	2	100	67	8	59.27
		RC	3	100	100	9	58.27
10.08						10	57.27
End of Borehole							
(GWL @ 4.17m - August 26, 2020)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
70 Richmond Road
Ottawa, Ontario

DATUM TBM - Top spindle of fire hydrant located on the north side of Richmond Road, approx. 25m west of west property line of subject site. Geodetic elevation = 68.31m.

REMARKS

FILE NO. PE4525

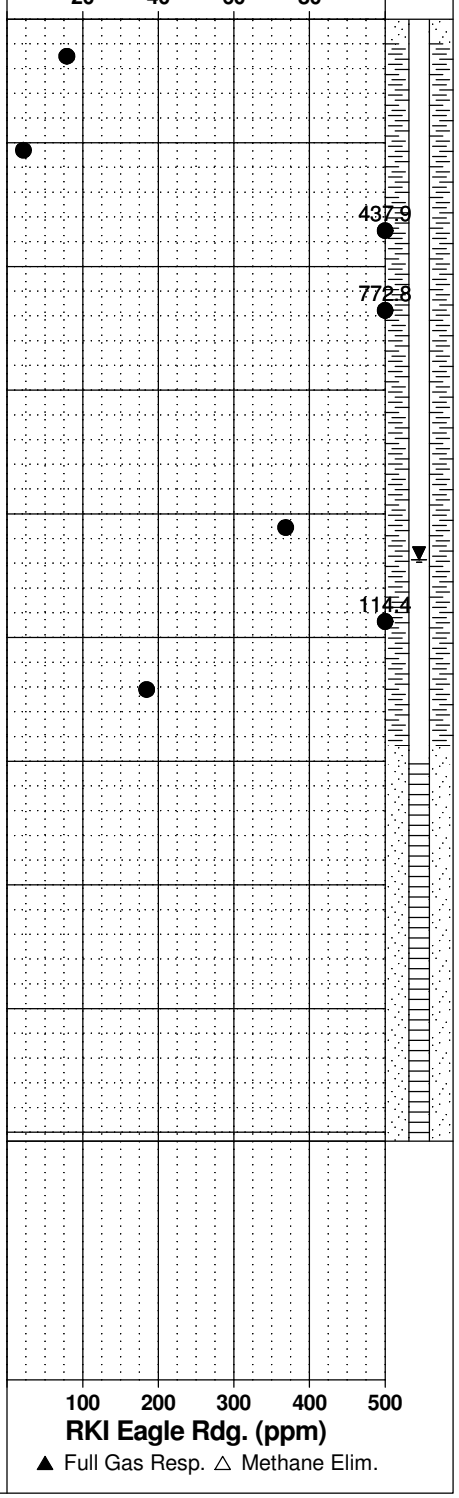
HOLE NO. BH 9-20

BORINGS BY CME-55 Low Clearance Drill **DATE** July 27, 2020

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	NUMBER	% RECOVERY	N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE						0	67.20
Asphaltic concrete 0.10		AU	1				
FILL: Brown silty sand with crushed stone		SS	2	4	10	1	66.20
1.52		SS	3	33	50+	2	65.20
		SS	4	20	50+		
		SS	5	0	50+	3	64.20
Very dense to compact, brown **SILTY SAND** with gravel		SS	6	38	24	4	63.20
		SS	7	50	24	5	62.20
5.51		SS	8	100	50+		
		RC	1	100	0	6	61.20
		RC	2	100	25		
BEDROCK: Very poor to good quality, grey limestone		RC	3	100	62	7	60.20
		RC	4	100	79	8	59.20
9.07						9	58.20
End of Borehole							
(GWL @ 4.37m - August 26, 2020)							

Photo Ionization Detector
● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**



Monitoring Well Construction

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

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

CONSOLIDATION TEST

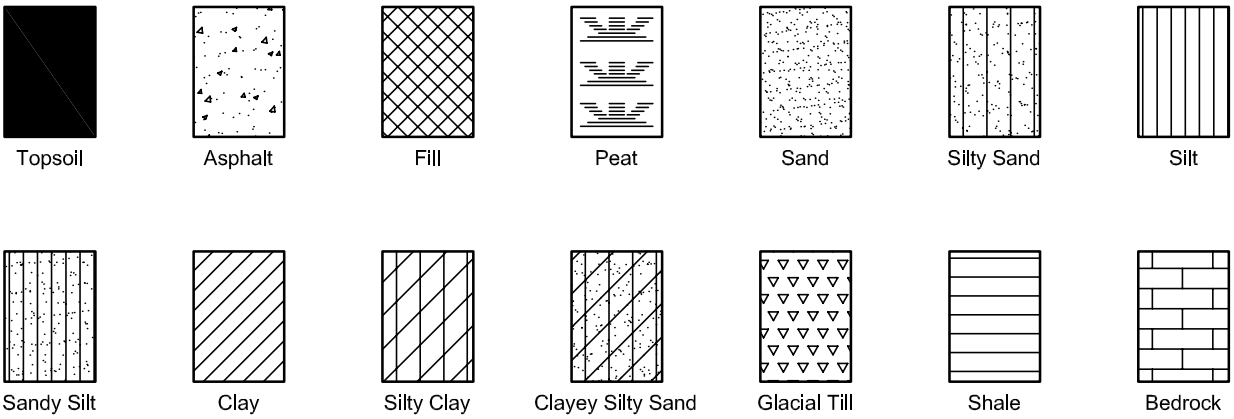
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

PERMEABILITY TEST

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

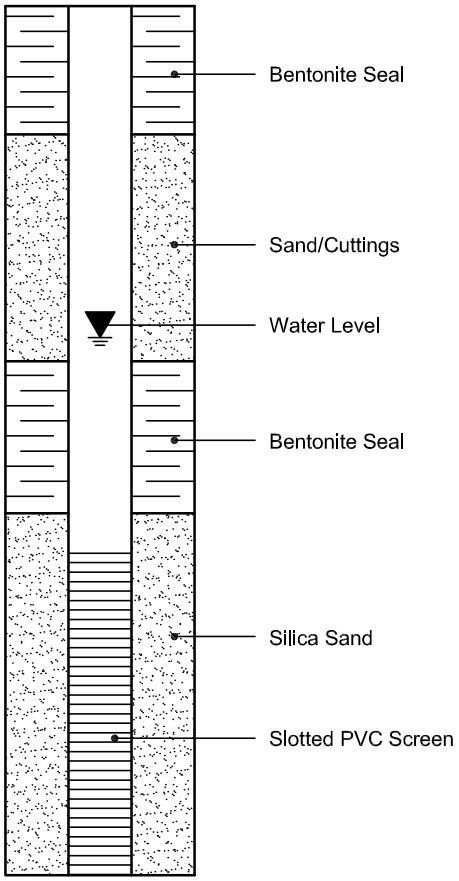
SYMBOLS AND TERMS (continued)

STRATA PLOT

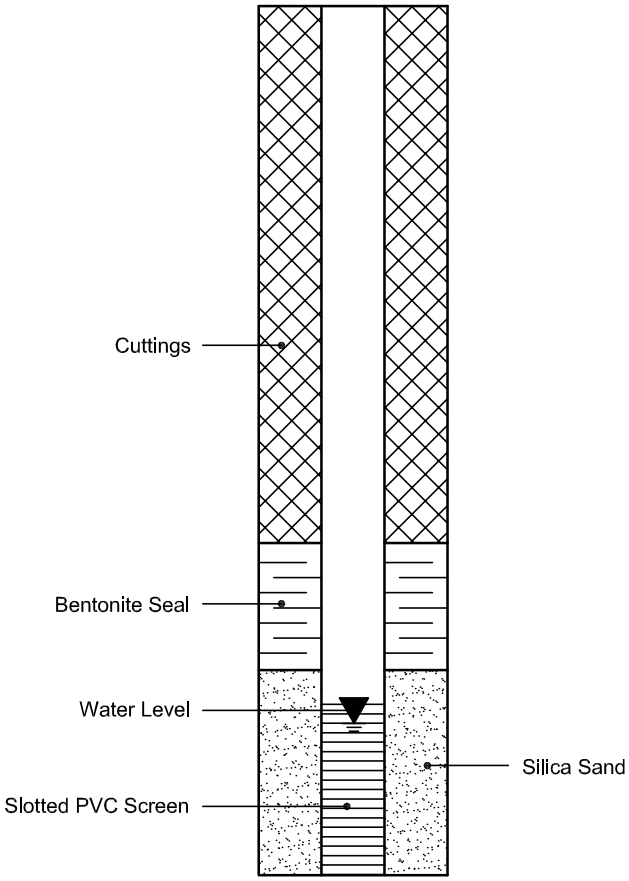


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 30502
Project: PE4525
Custody: 128592

Report Date: 5-Aug-2020
Order Date: 29-Jul-2020

Order #: 2031334

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

Paracel ID	Client ID
2031334-01	BH8-20-AU1
2031334-02	BH8-20-SS7
2031334-03	BH9-20-SS3
2031334-04	BH9-20-SS7
2031334-05	DUP

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 05-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 29-Jul-2020

Client PO: 30502

Project Description: PE4525

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	30-Jul-20	31-Jul-20
PHC F1	CWS Tier 1 - P&T GC-FID	30-Jul-20	31-Jul-20
PHC F4G (gravimetric)	CWS Tier 1 - Extraction Gravimetric	4-Aug-20	5-Aug-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	30-Jul-20	1-Aug-20
Solids, %	Gravimetric, calculation	4-Aug-20	4-Aug-20

Certificate of Analysis

Report Date: 05-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 29-Jul-2020

Client PO: 30502

Project Description: PE4525

	Client ID:	BH8-20-AU1	BH8-20-SS7	BH9-20-SS3	BH9-20-SS7
	Sample Date:	28-Jul-20 09:00	28-Jul-20 09:00	28-Jul-20 09:00	28-Jul-20 09:00
	Sample ID:	2031334-01	2031334-02	2031334-03	2031334-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	96.6	89.9	97.4	91.7
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	<0.02
Ethylbenzene	0.05 ug/g dry	0.14	<0.05	0.05	<0.05
Toluene	0.05 ug/g dry	<0.05	<0.05	0.05	<0.05
m,p-Xylenes	0.05 ug/g dry	0.47	<0.05	0.18	<0.05
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	<0.05
Xylenes, total	0.05 ug/g dry	0.52	<0.05	0.20	<0.05
Toluene-d8	Surrogate	100%	116%	98.0%	111%
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	17	<7	84	7
F2 PHCs (C10-C16)	4 ug/g dry	<40	<4	153	8
F3 PHCs (C16-C34)	8 ug/g dry	377	21	466	37
F4 PHCs (C34-C50)	6 ug/g dry	1180 [1]	<6	498 [1]	19
F4G PHCs (gravimetric)	50 ug/g dry	4660	-	1260	-

	Client ID:	DUP	-	-	-
	Sample Date:	28-Jul-20 09:00	-	-	-
	Sample ID:	2031334-05	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	96.6	-	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	-	-	-
Ethylbenzene	0.05 ug/g dry	0.09	-	-	-
Toluene	0.05 ug/g dry	<0.05	-	-	-
m,p-Xylenes	0.05 ug/g dry	0.46	-	-	-
o-Xylene	0.05 ug/g dry	<0.05	-	-	-
Xylenes, total	0.05 ug/g dry	0.50	-	-	-
Toluene-d8	Surrogate	105%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	15	-	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<40	-	-	-
F3 PHCs (C16-C34)	8 ug/g dry	936	-	-	-
F4 PHCs (C34-C50)	6 ug/g dry	2370 [1]	-	-	-
F4G PHCs (gravimetric)	50 ug/g dry	3540	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
F4G PHCs (gravimetric)	ND	50	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*3.64*		*ug/g*		*114*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	ND	40	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	404	80	ug/g dry	377			6.9	30	
F4 PHCs (C34-C50)	1250	60	ug/g dry	1180			5.7	30	
F4G PHCs (gravimetric)	5250	50	ug/g dry	4660			11.9	30	
Physical Characteristics									
% Solids	90.2	0.1	% by Wt.	91.2			1.1	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*4.39*		*ug/g dry*		*126*	*50-140*			

Certificate of Analysis

Report Date: 05-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 29-Jul-2020

Client PO: 30502

Project Description: PE4525

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	209	7	ug/g	ND	104	80-120			
F2 PHCs (C10-C16)	68	4	ug/g	ND	85.2	80-120			
F3 PHCs (C16-C34)	195	8	ug/g	ND	99.4	80-120			
F4 PHCs (C34-C50)	120	6	ug/g	ND	96.4	80-120			
F4G PHCs (gravimetric)	970	50	ug/g	ND	97.0	80-120			
Volatiles									
Benzene	2.77	0.02	ug/g	ND	69.1	60-130			
Ethylbenzene	4.01	0.05	ug/g	ND	100	60-130			
Toluene	3.99	0.05	ug/g	ND	99.8	60-130			
m,p-Xylenes	7.95	0.05	ug/g	ND	99.4	60-130			
o-Xylene	4.19	0.05	ug/g	ND	105	60-130			
Surrogate: Toluene-d8	*2.86*		*ug/g*		*89.3*	*50-140*			

Qualifier Notes:

Sample Qualifiers :

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

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

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Client Name: Paterson	Project Ref: PE 4525	Page 1 of 1
Contact Name: Mark D'Arcy	Quote #:	Turnaround Time
Address: 154 Colonade road	PO #: 30502	☐ 1 day ☐ 3 day ☐ 2 day ☑ Regular
Telephone: 613 226 7381	E-mail: Mdarcy@patersongroup.ca	Date Required:

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

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	Required Analysis: PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
1	BH8-20-AV1	S		2	July 28 2020		✓						
2	BH8-20-SS7	↓		↓	↓		↓						
3	BH9-20-SS3												
4	BH9-20 SS7												
5	DUP												
6													
7													
8													
9													
10													

Comments:

Method of Delivery: Paracel

Relinquished By (Sign):	Received By Driver/Depot: A. Soave	Received at Lab: Simeepan Dahmani	Verified By:
Relinquished By (Print):	Date/Time: 29/07/20 4:20	Date/Time: July 29, 2020 04:25	Date/Time: 7-29-20, 11:18
Date/Time:	Temperature: °C FH	Temperature: 18.6 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 30502
Project: PE4525
Custody: 128594

Report Date: 6-Aug-2020
Order Date: 31-Jul-2020

Order #: 2031574

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

Paracel ID	Client ID
2031574-01	BH7-20-SS3
2031574-02	BH7-20-SS7

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 06-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 31-Jul-2020

Client PO: 30502

Project Description: PE4525

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	4-Aug-20	4-Aug-20
PHC F1	CWS Tier 1 - P&T GC-FID	4-Aug-20	4-Aug-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	1-Aug-20	6-Aug-20
Solids, %	Gravimetric, calculation	6-Aug-20	6-Aug-20

Certificate of Analysis

Report Date: 06-Aug-2020

Client: **Paterson Group Consulting Engineers**

Order Date: 31-Jul-2020

Client PO: **30502**

Project Description: PE4525

	Client ID:	BH7-20-SS3	BH7-20-SS7	-	-
	Sample Date:	27-Jul-20 09:00	27-Jul-20 09:00	-	-
	Sample ID:	2031574-01	2031574-02	-	-
	MDL/Units	Soil	Soil	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	92.7	92.2	-	-
Volatiles					
Benzene	0.02 ug/g dry	<0.02	<0.02	-	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene	0.05 ug/g dry	<0.05	<0.05	-	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	-	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	-	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	-	-
Toluene-d8	Surrogate	111%	117%	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	8	<7	-	-
F2 PHCs (C10-C16)	4 ug/g dry	73	<4	-	-
F3 PHCs (C16-C34)	8 ug/g dry	51	<8	-	-
F4 PHCs (C34-C50)	6 ug/g dry	35	<6	-	-

Certificate of Analysis

Report Date: 06-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 31-Jul-2020

Client PO: 30502

Project Description: PE4525

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Volatiles									
Benzene	ND	0.02	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Toluene	ND	0.05	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: Toluene-d8	*3.62*		*ug/g*		*113*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g dry	ND			NC	40	
F2 PHCs (C10-C16)	5	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	41	8	ug/g dry	16			NC	30	
F4 PHCs (C34-C50)	8	6	ug/g dry	ND			NC	30	
Physical Characteristics									
% Solids	93.7	0.1	% by Wt.	91.2			2.7	25	
Volatiles									
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
m,p-Xylenes	ND	0.05	ug/g dry	ND			NC	50	
o-Xylene	ND	0.05	ug/g dry	ND			NC	50	
Surrogate: Toluene-d8	*3.93*		*ug/g dry*		*119*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	197	7	ug/g	ND	98.3	80-120			
F2 PHCs (C10-C16)	84	4	ug/g	ND	92.7	60-140			
F3 PHCs (C16-C34)	238	8	ug/g	16	100	60-140			
F4 PHCs (C34-C50)	172	6	ug/g	ND	123	60-140			
Volatiles									
Benzene	2.84	0.02	ug/g	ND	71.0	60-130			
Ethylbenzene	4.53	0.05	ug/g	ND	113	60-130			
Toluene	4.43	0.05	ug/g	ND	111	60-130			
m,p-Xylenes	8.81	0.05	ug/g	ND	110	60-130			
o-Xylene	4.52	0.05	ug/g	ND	113	60-130			
Surrogate: Toluene-d8	*2.81*		*ug/g*		*87.7*	*50-140*			

Qualifier Notes:

QC Qualifiers :

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

Paracel ID: 2031574

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Ottawa, Ontario K1G 4J8
p: 1-800-749-1947
e: paracel@paracellabs.com
www.paracellabs.com

Paracel Order Number (Lab Use Only): 2031574

Chain Of Custody (Lab Use Only): Nº 128594

Client Name: Paterson
Contact Name: Mark D'arcy
Address: 154 colonade road
Telephone: 613 226 7381

Project Ref: PE 4525
Quote #:
PO #: 30502
E-mail: Mdarcy@PatersonGroup.ca

Page 1 of 1

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

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

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
1	BH7-20-553	S		2	July 27 2020		✓						
2	BH7-20-554	↓		↓	↓		✓ HOLD						
3	BH7-20-557	↓		↓	↓		✓						
4													
5													
6													
7													
8													
9													
10													

Comments:

Method of Delivery: Swift

Relinquished By (Sign): G Pak	Received By Driver/Depot:	Received at Lab: DLan	Verified By:
Relinquished By (Print): Grant paterson	Date/Time:	Date/Time: 31/Jul/2020/15:5	Date/Time: 7-31-20 16:11
Date/Time: July 30 2020	Temperature: °C	Temperature: 21.3 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Mandy Witteman

Client PO: 30700
Project: PE4525
Custody: 128107

Report Date: 31-Aug-2020
Order Date: 27-Aug-2020

Order #: 2035552

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

Paracel ID	Client ID
2035552-01	BH7-20-GW
2035552-02	BH8-20-GW
2035552-03	BH9-20-GW

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 31-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 27-Aug-2020

Client PO: 30700

Project Description: PE4525

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	28-Aug-20	29-Aug-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	31-Aug-20	31-Aug-20
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	28-Aug-20	29-Aug-20

Certificate of Analysis

Report Date: 31-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 27-Aug-2020

Client PO: 30700

Project Description: PE4525

	Client ID:	BH7-20-GW	BH8-20-GW	BH9-20-GW	-
	Sample Date:	26-Aug-20 09:00	26-Aug-20 09:00	27-Aug-20 09:00	-
	Sample ID:	2035552-01	2035552-02	2035552-03	-
	MDL/Units	Water	Water	Water	-
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	-
Benzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	-
Hexane	1.0 ug/L	<1.0	<1.0	17.8	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-

Certificate of Analysis

Report Date: 31-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 27-Aug-2020

Client PO: 30700

Project Description: PE4525

	Client ID:	BH7-20-GW	BH8-20-GW	BH9-20-GW	-
	Sample Date:	26-Aug-20 09:00	26-Aug-20 09:00	27-Aug-20 09:00	-
	Sample ID:	2035552-01	2035552-02	2035552-03	-
	MDL/Units	Water	Water	Water	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	<0.5	<0.5	8.6	-
o-Xylene	0.5 ug/L	<0.5	<0.5	1.7	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	10.3	-
4-Bromofluorobenzene	Surrogate	110%	113%	110%	-
Dibromofluoromethane	Surrogate	100%	98.8%	98.9%	-
Toluene-d8	Surrogate	104%	104%	104%	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<25	<25	-
F2 PHCs (C10-C16)	100 ug/L	<100 [2]	<100	<100	-
F3 PHCs (C16-C34)	100 ug/L	<100 [2]	<100	<100	-
F4 PHCs (C34-C50)	100 ug/L	<100 [2]	<100	<100	-

Certificate of Analysis

Report Date: 31-Aug-2020

Client: Paterson Group Consulting Engineers

Order Date: 27-Aug-2020

Client PO: 30700

Project Description: PE4525

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*89.0*		*ug/L*		*111*	*50-140*			
Surrogate: Dibromofluoromethane	*71.0*		*ug/L*		*88.8*	*50-140*			
Surrogate: Toluene-d8	*85.5*		*ug/L*		*107*	*50-140*			

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L	ND			NC	30	
Volatiles									
Acetone	ND	5.0	ug/L	ND			NC	30	
Benzene	ND	0.5	ug/L	ND			NC	30	
Bromodichloromethane	ND	0.5	ug/L	ND			NC	30	
Bromoform	ND	0.5	ug/L	ND			NC	30	
Bromomethane	ND	0.5	ug/L	ND			NC	30	
Carbon Tetrachloride	ND	0.2	ug/L	ND			NC	30	
Chlorobenzene	ND	0.5	ug/L	ND			NC	30	
Chloroform	ND	0.5	ug/L	ND			NC	30	
Dibromochloromethane	ND	0.5	ug/L	ND			NC	30	
Dichlorodifluoromethane	ND	1.0	ug/L	ND			NC	30	
1,2-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,3-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,4-Dichlorobenzene	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
cis-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
trans-1,2-Dichloroethylene	ND	0.5	ug/L	ND			NC	30	
1,2-Dichloropropane	ND	0.5	ug/L	ND			NC	30	
cis-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
trans-1,3-Dichloropropylene	ND	0.5	ug/L	ND			NC	30	
Ethylbenzene	ND	0.5	ug/L	ND			NC	30	
Ethylene dibromide (dibromoethane, 1,2-	ND	0.2	ug/L	ND			NC	30	
Hexane	ND	1.0	ug/L	ND			NC	30	
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L	ND			NC	30	
Methyl Isobutyl Ketone	ND	5.0	ug/L	ND			NC	30	
Methyl tert-butyl ether	ND	2.0	ug/L	ND			NC	30	
Methylene Chloride	ND	5.0	ug/L	ND			NC	30	
Styrene	ND	0.5	ug/L	ND			NC	30	
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L	ND			NC	30	
Tetrachloroethylene	ND	0.5	ug/L	ND			NC	30	
Toluene	ND	0.5	ug/L	ND			NC	30	
1,1,1-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
1,1,2-Trichloroethane	ND	0.5	ug/L	ND			NC	30	
Trichloroethylene	ND	0.5	ug/L	ND			NC	30	
Trichlorofluoromethane	ND	1.0	ug/L	ND			NC	30	
Vinyl chloride	ND	0.5	ug/L	ND			NC	30	
m,p-Xylenes	ND	0.5	ug/L	ND			NC	30	
o-Xylene	ND	0.5	ug/L	ND			NC	30	
Surrogate: 4-Bromofluorobenzene	*90.0*		*ug/L*		*112*	*50-140*			
Surrogate: Dibromofluoromethane	*78.4*		*ug/L*		*98.0*	*50-140*			
Surrogate: Toluene-d8	*83.1*		*ug/L*		*104*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1620	25	ug/L	ND	80.9	68-117			
F2 PHCs (C10-C16)	1500	100	ug/L	ND	94.1	60-140			
F3 PHCs (C16-C34)	3950	100	ug/L	ND	101	60-140			
F4 PHCs (C34-C50)	2470	100	ug/L	ND	99.6	60-140			
Volatiles									
Acetone	106	5.0	ug/L	ND	106	50-140			
Benzene	40.9	0.5	ug/L	ND	102	60-130			
Bromodichloromethane	31.7	0.5	ug/L	ND	79.2	60-130			
Bromoform	48.8	0.5	ug/L	ND	122	60-130			
Bromomethane	44.6	0.5	ug/L	ND	112	50-140			
Carbon Tetrachloride	33.9	0.2	ug/L	ND	84.8	60-130			
Chlorobenzene	39.1	0.5	ug/L	ND	97.6	60-130			
Chloroform	37.3	0.5	ug/L	ND	93.2	60-130			
Dibromochloromethane	35.3	0.5	ug/L	ND	88.3	60-130			
Dichlorodifluoromethane	50.0	1.0	ug/L	ND	125	50-140			
1,2-Dichlorobenzene	38.2	0.5	ug/L	ND	95.4	60-130			
1,3-Dichlorobenzene	38.0	0.5	ug/L	ND	95.1	60-130			
1,4-Dichlorobenzene	39.4	0.5	ug/L	ND	98.6	60-130			
1,1-Dichloroethane	32.0	0.5	ug/L	ND	80.1	60-130			
1,2-Dichloroethane	47.8	0.5	ug/L	ND	119	60-130			
1,1-Dichloroethylene	25.0	0.5	ug/L	ND	62.5	60-130			
cis-1,2-Dichloroethylene	35.2	0.5	ug/L	ND	87.9	60-130			
trans-1,2-Dichloroethylene	29.5	0.5	ug/L	ND	73.8	60-130			
1,2-Dichloropropane	39.3	0.5	ug/L	ND	98.2	60-130			
cis-1,3-Dichloropropylene	45.5	0.5	ug/L	ND	114	60-130			
trans-1,3-Dichloropropylene	47.0	0.5	ug/L	ND	118	60-130			
Ethylbenzene	41.4	0.5	ug/L	ND	104	60-130			
Ethylene dibromide (dibromoethane, 1,2-	28.6	0.2	ug/L	ND	71.4	60-130			
Hexane	39.0	1.0	ug/L	ND	97.5	60-130			
Methyl Ethyl Ketone (2-Butanone)	90.8	5.0	ug/L	ND	90.8	50-140			
Methyl Isobutyl Ketone	94.0	5.0	ug/L	ND	94.0	50-140			
Methyl tert-butyl ether	86.1	2.0	ug/L	ND	86.1	50-140			
Methylene Chloride	37.4	5.0	ug/L	ND	93.4	60-130			
Styrene	32.4	0.5	ug/L	ND	81.0	60-130			
1,1,1,2-Tetrachloroethane	37.5	0.5	ug/L	ND	93.7	60-130			
1,1,2,2-Tetrachloroethane	42.0	0.5	ug/L	ND	105	60-130			
Tetrachloroethylene	35.3	0.5	ug/L	ND	88.3	60-130			
Toluene	40.7	0.5	ug/L	ND	102	60-130			
1,1,1-Trichloroethane	30.3	0.5	ug/L	ND	75.8	60-130			
1,1,2-Trichloroethane	36.8	0.5	ug/L	ND	92.0	60-130			
Trichloroethylene	33.7	0.5	ug/L	ND	84.4	60-130			
Trichlorofluoromethane	36.4	1.0	ug/L	ND	91.1	60-130			
Vinyl chloride	36.8	0.5	ug/L	ND	92.0	50-140			
m,p-Xylenes	82.5	0.5	ug/L	ND	103	60-130			
o-Xylene	41.1	0.5	ug/L	ND	103	60-130			
Surrogate: 4-Bromofluorobenzene	*90.8*		*ug/L*		*114*	*50-140*			
Surrogate: Dibromofluoromethane	*81.3*		*ug/L*		*102*	*50-140*			
Surrogate: Toluene-d8	*82.6*		*ug/L*		*103*	*50-140*			

Qualifier Notes:

Login Qualifiers :

Sample - Received with >5% sediment, instructed to decant and analyze without sediment

Applies to samples: BH7-20-GW

Sample Qualifiers :

2 : Sample decanted prior to analysis due to sediments.

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: 2035552

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2035552	Nº 128107

Client Name: Paterson	Project Ref: PE 4525	Page __ of __
Contact Name: mandy witteman	Quote #:	Turnaround Time
Address: 154 Colonnade	PO #: 30700	☐ 1 day ☐ 3 day
	E-mail:	☑ 2 day ☐ Regular
Telephone: 613 226 7381	mwitteman@patersongroup.ca	Date Required:

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

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

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken: Date	Sample Taken: Time	PHCs F1-F4+BTEX	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)
1	BH7-20-GW	GW		3	Aug 26 2020		✓	✓					
2	BH8-20-GW	GW		3	Aug 26 2020		✓	✓					
3	BH9-20-GW	GW		3	Aug 27 2020		✓	✓					
4													
5													
6													
7													
8													
9													
10													

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Grant G-Pat	T Deane		
Relinquished By (Print): Grant Paterson	Date/Time: 27/08/20 3:20	Date/Time: Aug 27, 2020 17:15	Date/Time: Aug 27, 2020 18:20
Date/Time: Aug 27 2020	Temperature: °C	Temperature: 16.8 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 32330
Project: PE4525
Custody: 132470

Report Date: 28-Jun-2021
Order Date: 22-Jun-2021

Order #: 2126297

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

Paracel ID	Client ID
2126297-01	MW1-GW1
2126297-02	MW3-GW1
2126297-03	DUP-1

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 28-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 22-Jun-2021

Client PO: 32330

Project Description: PE4525

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	24-Jun-21	25-Jun-21
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	25-Jun-21	25-Jun-21
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	24-Jun-21	25-Jun-21

Certificate of Analysis

Report Date: 28-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 22-Jun-2021

Client PO: 32330

Project Description: PE4525

	Client ID:	MW1-GW1	MW3-GW1	DUP-1	-
	Sample Date:	21-Jun-21 13:00	21-Jun-21 13:30	21-Jun-21 00:00	-
	Sample ID:	2126297-01	2126297-02	2126297-03	-
	MDL/Units	Ground Water	Ground Water	Ground Water	-
Volatiles					
Acetone	5.0 ug/L	<5.0	<5.0	<5.0	-
Benzene	0.5 ug/L	0.7	3.8	0.7	-
Bromodichloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromoform	0.5 ug/L	<0.5	<0.5	<0.5	-
Bromomethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Carbon Tetrachloride	0.2 ug/L	<0.2	<0.2	<0.2	-
Chlorobenzene	0.5 ug/L	0.8	2.7	0.7	-
Chloroform	0.5 ug/L	<0.5	<0.5	<0.5	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	0.7	1030	0.9	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	-
Hexane	1.0 ug/L	<1.0	89.5	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L	<0.5	52.3	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-

Certificate of Analysis

Report Date: 28-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 22-Jun-2021

Client PO: 32330

Project Description: PE4525

	Client ID:	MW1-GW1	MW3-GW1	DUP-1	-
	Sample Date:	21-Jun-21 13:00	21-Jun-21 13:30	21-Jun-21 00:00	-
	Sample ID:	2126297-01	2126297-02	2126297-03	-
	MDL/Units	Ground Water	Ground Water	Ground Water	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Trichlorofluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
Vinyl chloride	0.5 ug/L	<0.5	<0.5	<0.5	-
m,p-Xylenes	0.5 ug/L	0.8	5100	1.2	-
o-Xylene	0.5 ug/L	<0.5	110	<0.5	-
Xylenes, total	0.5 ug/L	0.8	5210	1.2	-
4-Bromofluorobenzene	Surrogate	106%	100%	102%	-
Dibromofluoromethane	Surrogate	112%	110%	108%	-
Toluene-d8	Surrogate	102%	102%	101%	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	250	<25	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	<100	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	<100	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	<100	-	-

Certificate of Analysis

Report Date: 28-Jun-2021

Client: Paterson Group Consulting Engineers

Order Date: 22-Jun-2021

Client PO: 32330

Project Description: PE4525

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*83.9*		*ug/L*		*105*	*50-140*			
Surrogate: Dibromofluoromethane	*99.1*		*ug/L*		*124*	*50-140*			
Surrogate: Toluene-d8	*79.9*		*ug/L*		*99.9*	*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	5.85	0.5	ug/L	6.08			3.9	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	14.1	0.5	ug/L	9.20			41.9	30	QR-07
Dibromochloromethane	5.02	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	*81.2*		*ug/L*		*102*	*50-140*			
Surrogate: Dibromofluoromethane	*93.7*		*ug/L*		*117*	*50-140*			
Surrogate: Toluene-d8	*80.8*		*ug/L*		*101*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1800	25	ug/L	ND	90.1	68-117			
F2 PHCs (C10-C16)	1380	100	ug/L	ND	86.4	60-140			
F3 PHCs (C16-C34)	3660	100	ug/L	ND	93.2	60-140			
F4 PHCs (C34-C50)	2610	100	ug/L	ND	105	60-140			
Volatiles									
Acetone	110	5.0	ug/L	ND	110	50-140			
Benzene	34.4	0.5	ug/L	ND	86.0	60-130			
Bromodichloromethane	46.4	0.5	ug/L	ND	116	60-130			
Bromoform	47.7	0.5	ug/L	ND	119	60-130			
Bromomethane	25.3	0.5	ug/L	ND	63.2	50-140			
Carbon Tetrachloride	45.7	0.2	ug/L	ND	114	60-130			
Chlorobenzene	38.8	0.5	ug/L	ND	96.9	60-130			
Chloroform	38.5	0.5	ug/L	ND	96.2	60-130			
Dibromochloromethane	47.8	0.5	ug/L	ND	119	60-130			
Dichlorodifluoromethane	43.7	1.0	ug/L	ND	109	50-140			
1,2-Dichlorobenzene	38.3	0.5	ug/L	ND	95.8	60-130			
1,3-Dichlorobenzene	38.1	0.5	ug/L	ND	95.3	60-130			
1,4-Dichlorobenzene	37.4	0.5	ug/L	ND	93.5	60-130			
1,1-Dichloroethane	37.2	0.5	ug/L	ND	93.0	60-130			
1,2-Dichloroethane	36.9	0.5	ug/L	ND	92.2	60-130			
1,1-Dichloroethylene	37.9	0.5	ug/L	ND	94.8	60-130			
cis-1,2-Dichloroethylene	36.9	0.5	ug/L	ND	92.3	60-130			
trans-1,2-Dichloroethylene	38.4	0.5	ug/L	ND	96.0	60-130			
1,2-Dichloropropane	35.2	0.5	ug/L	ND	88.0	60-130			
cis-1,3-Dichloropropylene	49.6	0.5	ug/L	ND	124	60-130			
trans-1,3-Dichloropropylene	45.8	0.5	ug/L	ND	114	60-130			
Ethylbenzene	34.1	0.5	ug/L	ND	85.4	60-130			
Ethylene dibromide (dibromoethane, 1,2-	46.2	0.2	ug/L	ND	115	60-130			
Hexane	34.7	1.0	ug/L	ND	86.8	60-130			
Methyl Ethyl Ketone (2-Butanone)	92.2	5.0	ug/L	ND	92.2	50-140			
Methyl Isobutyl Ketone	88.0	5.0	ug/L	ND	88.0	50-140			
Methyl tert-butyl ether	96.9	2.0	ug/L	ND	96.9	50-140			
Methylene Chloride	35.5	5.0	ug/L	ND	88.8	60-130			
Styrene	41.4	0.5	ug/L	ND	104	60-130			
1,1,1,2-Tetrachloroethane	40.3	0.5	ug/L	ND	101	60-130			
1,1,2,2-Tetrachloroethane	39.9	0.5	ug/L	ND	99.8	60-130			
Tetrachloroethylene	39.2	0.5	ug/L	ND	98.1	60-130			
Toluene	42.6	0.5	ug/L	ND	106	60-130			
1,1,1-Trichloroethane	43.1	0.5	ug/L	ND	108	60-130			
1,1,2-Trichloroethane	37.5	0.5	ug/L	ND	93.7	60-130			
Trichloroethylene	38.7	0.5	ug/L	ND	96.8	60-130			
Trichlorofluoromethane	36.4	1.0	ug/L	ND	91.0	60-130			
Vinyl chloride	40.7	0.5	ug/L	ND	102	50-140			
m,p-Xylenes	71.2	0.5	ug/L	ND	89.0	60-130			
o-Xylene	37.0	0.5	ug/L	ND	92.5	60-130			
Surrogate: 4-Bromofluorobenzene	*88.3*		*ug/L*		*110*	*50-140*			
Surrogate: Dibromofluoromethane	*99.0*		*ug/L*		*124*	*50-140*			
Surrogate: Toluene-d8	*78.7*		*ug/L*		*98.3*	*50-140*			

Qualifier Notes:

QC Qualifiers :

QR-07 : Duplicate result exceeds RPD limits due to non-homogeneity between multiple sample vials. Remainder of QA/QC is acceptable.

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 LT

Paracel ID: 2126297

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2126297	№ 132470

Client Name: Paterson Group	Project Ref: PE4525		Page 1 of 1
Contact Name: Nick Sullivan / Mark D'Arcy	Quote #:		Turnaround Time
Address: 154 Colonnade Rd. S.	PO #: 32330		☐ 1 day ☐ 3 day
	E-mail: nsullivan@patersongroup.ca mdarcy@patersongroup.ca		☐ 2 day ☒ Regular
Telephone: 613-226-7381			Date Required:

Regulation 153/04	Other Regulation	Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other)
☐ Table 1 ☒ Res/Park ☐ Med/Fine	☐ REG 558 ☐ PWQO	
☐ Table 2 ☐ Ind/Comm ☒ Coarse	☐ CCME ☐ MISA	
☒ Table 3 ☐ Agri/Other	☐ SU - Sani ☐ SU - Storm	
☐ Table	Mun:	
For RSC: ☐ Yes ☐ No	☐ Other:	

Required Analysis

	Sample ID/Location Name	Matrix	Air Volume	# of Containers	Sample Taken Date	Sample Taken Time	PHCs F1-F4	VOCs	PAHs	Metals by ICP	Hg	CrVI	B (HWS)						
1	MW1-GW1	GW		3	June 21/21	1:00 PM	X	X											
2	MW3-GW1	↓		3	↓	1:30 PM	X	X											
3	DUP-1	↓		2	↓			X											
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: PARACEL COURIER

Relinquished By (Sign): N. Sullivan	Received By Driver/Depot: M. TROUSE	Received at Lab: Simeepann Dhami	Verified By: SCL
Relinquished By (Print): Nick Sullivan	Date/Time: 22/06/21 3:40	Date/Time: Jun 22, 2021 04.32	Date/Time: June 23/21 10:58a
Date/Time: June 22/2021	Temperature: °C PM.	Temperature: 5.6 °C	pH Verified: ☐ By: N/A

Chain of Custody (Env.) xlsx

Revision 3.0