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Phase II Environmental Site Assessment

394 - 404 Bank Street
Ottawa, Ontario

Prepared For

Urban Capital Property Group

March 24, 2020

Report: PE4650-3

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EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the subject site addressed 394 - 404 Bank Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address areas of potential environmental concerns (APECs) on the Phase II Property, resulting from historical on- and off-site potentially contaminating activities (PCAs).

An initial Phase II ESA was carried out by Levac Robichaud Leclerc Associates Ltd. (LRL Associates) in 2010 to address a historical retail fuel outlet at 390 Bank Street and a former automotive service garage at 406$^{1/2}$ Bank Street. A borehole and a monitoring well were placed on the northern and southern portion of the Phase II Property, respectively.

The current subsurface investigation consisted of the placement of four (4) boreholes, three (3) of which were installed with groundwater monitoring wells; two (2) in the interior of the subject building and one on the south western portion of the Phase II Property. The findings of the current and previous subsurface investigations conducted by Paterson and LRL Associates are presented in this report.

Soil samples obtained from all of the boreholes were screened using visual observations and vapour measurements. Seven (7) soil samples were submitted for laboratory analysis of a combination of benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, F1-F4), volatile organic compounds (VOCs) and/or metals (including Hg and CrVI).

Based on the analytical test results, BTEX, PHC and VOC concentrations were in compliance with the MECP Table 3 Residential Standards. Metal parameters, specifically cobalt, barium, vanadium and lead concentrations were identified in excess of the selected MECP Standards. The levels of cobalt and vanadium are considered to be natural occurring in silty clay soils and as such, they are not considered contaminants of concern. Barium and lead were identified in the fill sample BH3-SS2 (fill material). All other samples analyzed were in compliance with the MECP Table 3 Residential Standards.

Groundwater samples from monitoring wells installed in BH1 through BH3 were recovered and analyzed for PHC and VOC parameters (includes BTEX). With the exception of chloroform in BH3, all groundwater samples were in compliance with the MECP Table 3 Standards.

It is our opinion that the elevated chloroform concentration in BH2 is a result of the use of chlorinated municipal water during the slab coring and drilling program and as such, is not considered a contaminant. Further testing is required to validate our opinion.

Although there were no elevated concentrations of mercury identified in soil, it is our opinion that the marginal mercury concentration identified in groundwater in 2010 is considered to be a result of sediment in the sample due to an improperly purged well and/or unscreened groundwater sampling procedure. Further testing is required to validate our opinion.

Recommendations

To confirm our opinion on the quality of the groundwater, it is recommended that BH2 be retested for chloroform and that MW-2 (if it can be found once the snow and ice have disappeared) be retested for metals to confirm that there is no mercury contamination. If MW-2 cannot be found, BH3 should be tested to confirm our opinion.

Soils

It is our understanding that the site will be redeveloped with a mixed-use building containing two (2) levels of underground parking. It is our recommendation that the contaminated fill material be excavated and disposed of at a licensed landfill during site redevelopment under the supervision of Paterson Group Inc.

Monitoring Wells

If the monitoring wells installed at the Phase II Property are not going to be used in the future, they should be abandoned according to Ontario Regulation 903. The monitoring wells will be registered with the MECP under this regulation. Further information can be provided up request in this regard.

1.0 INTRODUCTION

At the request of Urban Capital Property Group, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the property 394 - 404 Bank Street, in the City of Ottawa, Ontario, herein referred to as the Phase II Property.

The purpose of this Phase II ESA is to address the areas of potential environmental concern (APECs) identified on the Phase II Property, during the Phase I ESA conducted by Paterson in February 2020. The findings of the LRL Associate's 2011 Phase II ESA is presented in this report.

1.1 Site Description

Address:	394 - 404 Bank Street, Ottawa, Ontario
Legal Description:	Lot 20, Plan 15558, Bank Street West, in the City of Ottawa.
Property Identification Numbers:	04119-0140
Location:	The Phase I Property is occupied by 2-storey commercial office building. The western portion of the site is used for vehicular parking associated with the subject building.
Latitude and Longitude:	45° 24' 47.07" N, 75° 41' 40.91" W
Configuration:	Rectangular
Site Area:	531 m^2 (approximate)

1.2 Property Ownership

The Phase II Property is currently owned Urban Capital (James Street) Inc. Paterson was retained by Mr. Eric Malka from Urban Capital Property Group to complete the Phase II ESA at 394 – 404 Bank Street. The head office is located at 17 Nelson Street, Toronto, Ontario. Mr. Malka can be reached by telephone at (416) 304-1755.

1.3 Current and Proposed Future Uses

The Phase II Property is currently used for commercial purposes as an office building (Doyle Group) at 394-404 Bank Street.

It is our understanding that the Phase II Property will be redeveloped with a 9-storey mixed-use building with ground-floor commercial space and residential units and 2 levels of underground parking.

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 Ontario Ministry of the Environment (MECP), April 2011. The MECP Table 3 Residential Standards are based on the following considerations:

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

2.0 BACKGROUND INFORMATION

2.1 Physical Setting

The Phase II Property is situated in a downtown urban area surrounded by various sized commercial and residential structures in a mixed-use zone. The Phase II Property is located on the west side of Bank Street between James Street and Florence Street. The site is at a similar grade as the adjacent properties and streets.

Site topography is generally flat, while the regional topography slopes gently down in a southerly direction. Site drainage consists primarily of sheet drainage in the paved areas to catch basins along Bank Street and James Street. The Phase II Property is situated within a municipally serviced area.

2.2 Past Investigations

A Phase I-ESA was completed by Paterson for the Phase II Property, addressed 394-404 Bank Street in February 2020 (Report: PE4650-2). Based on the findings of the Phase I ESA, three (3) Potentially Contaminating Activity (PCAs) were identified and considered to represent Areas of Potential Environmental concern (APECs): former paint shops on-site and a former automotive repair garage at 406$^{1/2}$ Bank Street (now 19 Florence Street).

A summary of the aforementioned PCAs resulting in APECs on the Phase I and II Property as well as the Contaminants of Potential Concern (CPCs) are presented in Table 1.

Table 1: Potentially Contaminating Activities and Areas of Potential Environmental Concern

Area of Potential Environmental Concern	Location of Area of Potential Environmental Concern	Potentially Contaminating Activity	Location of PCA (on-site or off-site)	Contaminants of Potential Concern	Media Potentially Impacted (Groundwater, Soil, and/or Sediment)
APEC 1: Resulting from former on-site paint and oil store	Eastern half of the Phase I Property	PCA 39 – Paints Manufacturing, Processing and Bulk Storage	On-site	VOCs Metals (Mercury CrVI)	Soil, Groundwater Soil
APEC 3: Resulting from fill material of unknown quality	Western portion of the Phase I Property	PCA 30 – Importation of Fill Material of Unknown Quality	On-site	Metals (Mercury CrVI)	Soil
APEC 2: Resulting from former off-site automotive repair garage	Southern portion of the Phase I Property	PCA 52 – Storage, maintenance, fuelling and repairing of equipment, vehicles, and materials used to maintain transportation systems	Off-site	BTEX PHCs	Soil, Groundwater

A Phase II ESA was recommended to address the aforementioned APECs. The APECs are outlined on Drawing PE4650-2 – Site Plan, appended to the Phase I ESA report.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

A investigation was carried out to address the former automotive repair garage located at 19 Florence Street (formerly 406$^{1/2}$ Bank Street) on December 22, 2011. The field program consisted of drilling two (2) boreholes, of which, one was completed as monitoring well (MW-2). The boreholes were completed to depths ranging from approximately 12.0 to 13.5m below the ground surface.

The current subsurface investigation was carried out on February 13, 2020. The field program consisted of drilling two (2) boreholes inside the building at 394 – 404 Bank Street. The boreholes were completed to depths ranging from approximately 5.18 to 5.49 m below the basement floor slab. Both boreholes were completed with monitoring well installations in order to access the groundwater table. Two (2) additional boreholes were drill outside on the western portion of site on March 6, 2020, one of which was completed as a groundwater monitoring well to access the groundwater table.

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 these media is based on the Contaminants of Potential Concern (CPCs) identified in the Phase I ESA.

As noted in Table 1 in Section 2.2, CPCs for soil and groundwater include benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, fractions F_1-F_4), volatile organic compounds (VOCs) and/or metals (including mercury, lead and hexavalent chromium)

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 shale of the Billings Formation.

The overburden is reported to consist of alluvial sediments (sand and silt) of depths ranging from 10 to 25 m over the entire site.

According to the Geological Survey of Canada website, the bedrock in the area of the Phase I Property is reported to consist of shale of the Billings Formation.

Fill Placement

Based on the findings of the LRL Associates (January 2011), some impacted may be present on-site. It is expected that that fill material associated with the demolition of the former buildings and/or redevelopment of the Phase I Property in the 1950s may be present on-site.

Water Bodies and Areas of Natural Significance

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

Drinking Water Wells

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

Existing Buildings and Structures

The present-day commercial building addressed 394- 404 Bank Street was constructed circa 1956. The subject building is a two-storey building with basement level (poured concrete). The exterior is finished in concrete with a flat style roof. The building has been used primarily for retail until the late 1990s followed by commercial office space. The building is heated with natural gas-fired equipment. No other buildings or structures are present on the Phase I Property.

Subsurface Structures and Utilities

The Phase I Property is situated in a municipally serviced area. Underground utility services on the subject land include natural gas, electricity, municipal water and sewer services. Theses services enter the Phase I Property from the west side of the site from James Street.

Neighbouring Land Use

Neighbouring land use in the Phase I Study Area consists of residential and commercial (offices, cafes, and retailers) properties.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per Section 2.2 of this report, three (3) 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) on the Phase I Property.

Contaminants of Potential Concern

As noted in Table 1, the contaminants of potential concern (CPCs) associated with the APECs include:

- Benzene, ethylbenzene, toluene and xylenes (BTEX);
- Petroleum hydrocarbons (PHCs, Fractions F_1-F_4);
- Volatile organic compounds (VOCs); and
- Metals including Mercury and Hexavalent Chromium

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 historical on-site and off-site PCAs that have resulted in 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

The Sampling and Analysis Plan for this project is included in Appendix 1 of this report. The field measurement of water quality parameters was not conducted at the time of the groundwater sampling events due to instrument failure in the field. There were no other deviations from the Sampling and Analysis Plan.

3.5 Impediments

It was not possible to drill near the southwest corner or the southern property boundaries due to the presence of underground locates, as shown in Drawing PE4650-5 – Test Hole Location Plan.

Groundwater sampling of a previously drilled monitoring well (MW-2) could not be sampled at the time of this investigation as it was not possible to locate the groundwater monitoring well due to the presence of ice and snow on-site. No other physical impediments were encountered during the field portion of the Phase II ESA.

4.0 INVESTIGATION METHOD

4.1 Subsurface Investigation

The subsurface investigation was carried out for the Phase II Property during the interim of February 13, 202 to and March 6, 2020. The field program consisted of drilling two (2) boreholes inside the building at 394-404 Bank Street and two (2) on the eastern portion of the Phase II Property. The interior boreholes were completed to depths ranging from approximately 5.18 to 5.49 m below the basement floor slab, while the exterior boreholes were completed at depths ranging from 2.90 to 6.86 m below the ground surface (mbgs). Three (3) boreholes were completed with monitoring well installations in order to access the groundwater table. The boreholes were placed to address the aforementioned areas of potential environmental concern (APECs).

The interior boreholes were drilled with a portable drill rig, while the exterior boreholes were drilled with a truck mounted rig, both provided by CCC Geotechnical and Environmental Drilling Limited, Ottawa, Ontario. Borehole locations are shown on Drawing PE4650-5 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

A total of thirty (30) soil samples were obtained from the boreholes by means of split spoon sampling and grab sampling from auger flights. Split spoon samples were taken at approximate 0.76 m intervals. The depths at which grab samples and split spoon samples were obtained from the boreholes are shown as "**G**" and "**SS**" on the Soil Profile and Test Data Sheets, appended to this report.

The borehole profiles generally consist of asphaltic concrete over fill material that consisted of silty clay with gravel, underlain by silty clay with some sand. Fill material present beneath the pavement structure extended to depths ranging from 1.5 to 2.29m. The boreholes were terminated in native silty clay in BH2 to BH4 at depths ranging from approximately 2.90 to 5.18 mbgs and in glacial till in BH1 at a depth of 5.49 mbgs.

No deleterious materials or signs of potential contamination were identified in the fill material.

4.3 Field Screening Measurements

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 room temperature prior to conducting the vapour survey. Allowing the samples to stabilize to room temperature ensures consistency of readings between samples.

To measure the soil vapours, the analyser probe is inserted into the nominal headspace above the soil sample. A photo ionization detector (PID) was used to measure the volatile organic vapour concentrations. The sample is agitated/manipulated gently as the measurement is taken. The peak reading registered within the first 15 seconds is recorded as the vapour measurement.

The PID readings were found to be zero in the soil samples obtained. These results do not indicate the potential for significant contamination from volatile contaminants. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

No olfactory indications of potential contamination were identified in the soil samples.

4.4 Groundwater Monitoring Well Installation

Three (3) groundwater monitoring wells were installed on the subject site as part of the subsurface investigation. The monitoring wells consisted of 32 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.

Boreholes were surveyed using a benchmark elevation at the top grate of a catchbasin located on James Street with a geodetic elevation of 71.77m above sea level (m ASL).

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
BH1	68.87	5.49	2.49-5.49	1.83-5.49	0.1-1.83	Flushmount
BH2	69.14	5.18	2.18-5.18	1.67-5.18	0.15-1.64	Flushmount
BH3	71.89	6.86	3.86-6.86	3.35-6.86	0.13-3.86	Flushmount

4.5 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.

4.6 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan appended to this report, the following soil and groundwater samples as well as analyzed parameters are presented in Tables 3 and 4. For reference purposes, previous sample ID(s) and analyzed parameters from the 2011 Phase II ESA conducted by LRL Associates have been included in the tables.

TABLE 3. Soil Samples Submitted and Analyzed Parameters

Sample ID	Sample Depth or Stratigraphic Unit	Parameters Analyzed			Rationale
		Metals[1]	BTEX and/or VOCs	PHCs (F1-F4)	
December 22, 2010 (LRL Associates, 2011)					
BH1-SB9	9.35-10.4m Clay		X	X	Sample selected to assess potential impact due to the former retail fuel outlet (LRL Associates, 2011)

TABLE 3. Soil Samples Submitted and Analyzed Parameters					
Sample ID	Sample Depth or Stratigraphic Unit	Parameters Analyzed			Rationale
		Metals[1]	BTEX and/or VOCs	PHCs (F1-F4)	
BH1-SB11	12-13.3m Shale		X	X	Sample selected to assess potential impact due to the former retail fuel outlet (LRL Associates, 2011)
BH2-SB2 (MW-2)	1.2-1.9m Sand		X	X	Sample selected to assess potential impact due to the former automotive garage (LRL Associates, 2011)
BH2-SB3 (MW-2)	1.9-2.6m Clay		X	X	Sample selected to assess potential impact due to the former automotive garage (LRL Associates, 2011)
BH2-SB8 (MW-2)	8.35-9.4m Clay		X	X	Sample selected to assess potential impact due to the former automotive garage (LRL Associates, 2011)

TABLE 3 Continued. Soil Samples Submitted and Analyzed Parameters					
Sample ID	Sample Depth or Stratigraphic Unit	Parameters Analyzed			Rationale
		Metals[1]	BTEX and/or VOCs	PHCs (F1-F4)	
February 13, 2020 (Paterson, 2020)					
BH1-SS7	3.66-4.27m Silty clay		X	X	Sample selected based on vapour screening.
BH2-AS1	0-0.05m Fill	X	X		Sample selected to assess the potential impact in the fill material.
March 6, 2020 (Paterson, 2020)					
BH3-SS2	0.76-1.52m Fill	X			Sample selected to assess the potential impact in the fill material.
BH3-SS4	1.72-2.48m Silty clay	X			Sample selected to delineate any potential soil impacts.
BH3-SS6	3.64-4.40m Silty clay	X	X	X	Sample selected to delineate any potential soil impacts.
BH3-SS9	6.03-6.79m Silty clay	X			Sample selected to delineate any potential soil impacts.
BH4-SS2	0.76-1.52m Fill	X			Sample selected to assess the potential impact in the fill material.

Note:
VOC group of parameters includes BTEX parameters

TABLE 4: Groundwater Samples Submitted						
Sample ID	Screened Interval and Stratigraphic Unit	Parameters Analyzed				Rationale
		BTEX	PHCs (F_1-F_4)	Metals[1]	VOCs	
December 23, 2010 (LRL Associates, 2011)						
BH2-GW (MW-2)	7.5-12.0m Clay-shale	X	X	X		Assess the potential impacts from the former off-site automotive garage.
February 20, 2020 (Paterson, 2020)						
BH1-GW1	2.49-5.49m Silty clay		X		X	Assess the potential impacts from the former on-site paint shops.
BH2-GW1	2.18-5.18m Silty clay		X		X	Assess the potential impacts from the former on-site paint shops and former automotive repair garage.
March 10, 2020 (Paterson, 2020)						
BH3-GW1	3.86-6.86m Silty clay		X		X	Assess the potential impacts from the former on-site paint shops and automotive repair garage.

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.

4.7 Residue Management

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

4.8 Elevation Surveying

An elevation survey of all borehole locations was completed by Paterson at the time of the subsurface investigation. All borehole elevations are referenced to the top grate of a catchbasin, located on James Street, with a geodetic elevation of 71.77m.

4.9 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

Site soils generally consist of a pavement structure over fill material, underlain by native silty clay, followed by glacial till. Bedrock was not encountered during the subsurface program.

Groundwater was encountered within the native silty clay at depths ranging from approximately .4 to 1.86m.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling events on February 18, 2020 and March 10, 2020 using an electronic water level meter. Groundwater levels are summarized below in Table 5.

All measurements are relative to the top grate of a catchbasin located on James Street, with geodetic elevation of 71.77.

Table 5: Groundwater Level Measurements

Borehole Location	Ground Surface Elevation (m)	Water Level Depth (m below grade)	Water Level Elevation (m ASL)	Date of Measurement
BH1	68.87	0.47	68.40	March 10, 2020
BH2	69.14	1.89	67.28	March 10, 2020
BH3	71.89	0.40	71.49	March 10, 2020

Groundwater contour mapping was completed for groundwater levels measured during the sampling event. The groundwater contours are shown on Drawing PE4650-5–Groundwater Contour Plan. Based on the contour mapping, groundwater flow beneath the Phase II Property appears to flow towards the north. An average horizontal hydraulic gradient of approximately 0.055m/m was calculated.

5.3 Fine-Coarse Soil Texture

Based on field soil observations, the majority of the site soils are fine-grained, however, coarse grain soil standards were used as a conservative approach on the Phase II Property.

5.4 Soil: Field Screening

The vapour readings were generally less than 3ppm in the soil samples obtained and were not considered to be indicative of potential hydrocarbon impacts. No obvious staining or odours were noted in the soil samples.

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

5.5 Soil Quality

Based on the findings of the field screening, in combination with sample depth and location, a total of seven (7) soil samples were submitted for analysis of a combination of BTEX, PHC (F1-F4), VOCs and/or metals (including Hg and CrVI). The results of the analytical testing, and the selected soil standards, are presented in Tables 6 through 8. The laboratory certificates of analysis are provided in Appendix 1.

Table 6: Analytical Test Results – Soil (LRL Associates, 2011)
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (ug/g)	Soil Samples (µg/g) December 22, 2010		MECP Table 3 Residential Standards (µg/g)
		BH1-SB9 9.4-10.4m	BH1-SB11 12-13.3m	
Benzene	0.03	nd	nd	0.21
Ethylbenzene	0.05	nd	nd	2
Toluene	0.05	nd	nd	2.3
Xylenes	0.1	nd	nd	3.1
PHC F1	10	nd	nd	55
PHC F2	10	49	nd	98
PHC F3	10	38	nd	300
PHC F4	10	nd	nd	2,800

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

Table 6 Continued: Analytical Test Results – Soil (LRL Associates 2011)
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (ug/g)	Soil Samples (µg/g) December 22, 2010			MECP Table 3 Residential Standards (µg/g)
		BH2-SB2 1.2-1.9	BH2-SB3 1.9-2.6	BH2-SB8 8.35-9.4	
Benzene	0.03	nd	nd	nd	0.21
Ethylbenzene	0.05	nd	nd	nd	2
Toluene	0.05	nd	nd	nd	2.3
Xylenes	0.1	nd	nd	nd	3.1
PHC F1	10	nd	nd	nd	55
PHC F2	10	nd	nd	nd	98
PHC F3	10	nd	nd	nd	300
PHC F4	10	nd	nd	nd	2,800

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

All BTEX and PHC (F1-F4) analytical results for soil tested in 2010 comply with the selected MECP Table 3 Residential Standards.

Table 6 Continued: Analytical Test Results – Soil
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (ug/g)	Soil Samples (µg/g)			MECP Table 3 Residential Standards (µg/g)
		February 13, 2020		March 6, 2020	
		BH1-SS7* 3.66-4.27m	BH2-AS1* 1-0.05m	BH3-SS6 3.66-4.27m	
Benzene	0.02	nd	nd	nd	0.21
Ethylbenzene	0.05	nd	nd	nd	2
Toluene	0.05	nd	nd	nd	2.3
Xylenes	0.05	nd	nd	nd	3.1
PHC F1	7	nd	NA	nd	55
PHC F2	4	nd	NA	nd	98
PHC F3	8	nd	NA	nd	300
PHC F4	6	nd	NA	nd	2,800

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – Parameter not tested
- * - BTEX tested through the VOC group of parameters

No BTEX or PHC parameter concentrations were detected in the soil samples analyzed. All soil samples comply with the selected MECP Table 3 Residential Standards.

Table 7: Analytical Test Results – Soil (LRL Associates, 2011)
Metals

Parameter	MDL (ug/g)	Soil Samples (µg/g) December 22, 2010		MECP Table 3 Residential Standards (µg/g)
		BH2-SB2 1.2-1.9m	BH2-SB3 1.9-2.6m	
Antimony	1.0	nd	nd	7.5
Arsenic	1.0	nd	nd	18
Barium	1.0	14	379	390
Beryllium	0.5	nd	nd	4
Boron	5.0	nd	nd	120
Cadmium	0.5	nd	nd	1.2
Chromium	5.0	12	128	160
Chromium (VI)	0.2	nd	nd	8
Cobalt	1.0	2	**24**	22
Copper	5.0	12	61	140
Lead	1.0	2	9	120
Mercury	0.1	nd	nd	0.27
Molybdenum	1.0	7	71	6.9
Nickel	5.0	nd	nd	100
Selenium	1.0	nd	nd	2.4
Silver	0.3	nd	nd	20
Thallium	1.0	nd	nd	1
Uranium	1.0	nd	nd	23
Vanadium	10.0	16	**109**	86
Zinc	20.0	nd	119	340

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

Vanadium and cobalt in soil sample BH2-SB3 was in excess of the selected MECP Table 3 Residential Standards. It is expected that vanadium and cobalt are naturally occurring in the silty clay layer at these concentrations. All other metal parameters in the 2010 analytical results comply with the selected MECP Table 3 Residential Standards.

Table 7 Continued: Analytical Test Results – Soil
Metals

Parameter	MDL (ug/g)	Soil Samples (µg/g)			MECP Table 3 Residential Standards (µg/g)
		February 13, 2020	March 6, 2020		
		BH2-AS1 1-0.05m	BH3-SS2 0.76-1.52m	BH3-SS4 1.72-2.48m	
Antimony	1.0	nd	nd	nd	7.5
Arsenic	1.0	2.3	6.1	3.5	18
Barium	1.0	363	**411**	330	390
Beryllium	0.5	0.9	0.6	0.8	4
Boron	5.0	6.1	nd	5.8	120
Cadmium	0.5	nd	nd	nd	1.2
Chromium	5.0	141	67.7	113	160
Chromium (VI)	0.2	0.3	nd	NA	8
Cobalt	1.0	**26.5**	14.1	21.3	22
Copper	5.0	61.1	44.0	49.4	140
Lead	1.0	10.5	**698**	12.6	120
Mercury	0.1	nd	0.1	NA	0.27
Molybdenum	1.0	nd	nd	nd	6.9
Nickel	5.0	75.3	33.5	61.1	100
Selenium	1.0	nd	nd	nd	2.4
Silver	0.3	nd	nd	nd	20
Thallium	1.0	nd	nd	nd	1
Uranium	1.0	nd	nd	nd	23
Vanadium	10.0	**125**	64.9	**98.5**	86
Zinc	20.0	142	219	118	340

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

Table 7 Continued: Analytical Test Results – Soil
Metals

Parameter	MDL (ug/g)	Soil Samples (µg/g) March 6, 2020			MECP Table 3 Residential Standards (µg/g)
		BH3-SS6 3.64-4.40m	BH3-SS9 6.03-6.79m	BH4-SS2 0.76-1.52m	
Antimony	1.0	nd	nd	nd	7.5
Arsenic	1.0	3.4	3.5	2.9	18
Barium	1.0	279	230	58.6	390
Beryllium	0.5	0.7	0.8	nd	4
Boron	5.0	8.1	11.1	nd	120
Cadmium	0.5	nd	nd	nd	1.2
Chromium	5.0	118	89.9	29.9	160
Chromium (VI)	0.2	NA	NA	nd	8
Cobalt	1.0	21.4	17.4	6.0	22
Copper	5.0	43.0	36.4	14.7	140
Lead	1.0	9.7	7.1	15.7	120
Mercury	0.1	NA	NA	nd	0.27
Molybdenum	1.0	nd	nd	nd	6.9
Nickel	5.0	65.1	48.0	13.6	100
Selenium	1.0	nd	nd	nd	2.4
Silver	0.3	nd	nd	nd	20
Thallium	1.0	nd	nd	nd	1
Uranium	1.0	nd	1.6	nd	23
Vanadium	10.0	**92.8**	82.3	50.1	86
Zinc	20.0	107	99.4	63.5	340

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

Barium and lead concentrations in fill sample BH3-SS2 exceeded the selected MECP Standards.

Cobalt and/or vanadium concentrations in the native soil samples in BH2-AS1, BH3-SS4 and BH3-SS6 exceeded the selected standards, however, these parameter concentrations are considered to be naturally occurring levels. As a result, these concentrations are not considered to be classified as contamination. All other metal parameter concentrations comply with MECP Standards.

Metal exceedances are shown on Drawing PE4650-6 and are appended to this report.

Table 8: Analytical Test Results – Soil
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/g)	Soil Samples (µg/g)		MECP Table 3 Residential Standards (µg/g)
		February 13, 2020		
		BH1-SS7 3.66-4.27m	BH2-AS1 1-0.05m	
Acetone	0.5	nd	nd	16
Benzene	0.02	nd	nd	0.21
Bromodichloromethane	0.05	nd	nd	13
Bromoform	0.05	nd	nd	0.27
Bromomethane	0.05	nd	nd	0.05
Carbon Tetrachloride	0.05	nd	nd	0.05
Chlorobenzene	0.05	nd	nd	0.05
Chloroform	0.05	nd	nd	9.4
Dichlorodifluoromethane	0.05	nd	nd	16
1,2-Dichlorobenzene	0.05	nd	nd	3.4
1,3-Dichlorobenzene	0.05	nd	nd	4.8
1,4-Dichlorobenzene	0.05	nd	nd	0.083
1,1-Dichloroethane	0.05	nd	nd	3.5
1,2-Dichloroethane	0.05	nd	nd	0.05
1,1-Dichloroethylene	0.05	nd	nd	0.05
cis-1,2-Dichloroethylene	0.05	nd	nd	3.4
trans-1,2-Dichloroethylene	0.05	nd	nd	0.84
1,2-Dichloropropane	0.05	nd	nd	0.05
1,3-Dichloropropene, total	0.05	nd	nd	0.05
Ethylbenzene	0.05	nd	nd	2
Hexane	0.05	nd	nd	0.05
Methyl Ethyl Ketone (2-Butanone)	0.50	nd	nd	2.8
Methyl Isobutyl Ketone	0.50	nd	nd	16
Methyl tert-butyl ether	0.05	nd	nd	1.7
Methylene Chloride	0.05	nd	nd	0.75
Styrene	0.05	nd	nd	0.1
1,1,1,2-Tetrachloroethane	0.05	nd	nd	0.7
1,1,2,2-Tetrachloroethane	0.05	nd	nd	0.058
Tetrachloroethylene	0.05	nd	nd	0.05
Toluene	0.05	nd	nd	2.3
1,1,1-Trichloroethane	0.05	nd	nd	0.38
1,1,2-Trichloroethane	0.05	nd	nd	0.05
Trichloroethylene	0.05	nd	nd	0.061
Trichlorofluoromethane	0.05	nd	nd	4
Vinyl Chloride	0.02	nd	nd	0.02
Xylenes, total	0.05	nd	nd	3.1

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- BTEX is included in the VOC group parameters

No VOC parameter concentrations were detected in the soil samples analyzed. All soil samples tested for VOCs comply with the selected MECP Table 3 Residential Standards.

The maximum concentrations of analyzed parameters in the soil at the Phase II Property are summarized below in Table 9.

Table 9: Maximum Concentrations – Soil

Parameter	Maximum Concentration (µg/g)	Borehole	Depth Interval (m BGS)
PHC F2	49	BH1-SB9	9.4-10.4m
PHC F3	38	BH1-SB9	9.4-10.4m
Arsenic	6.1	BH3-SS2	0.76-1.52m
Barium	**411**	BH3-SS2	0.76-1.52m
Beryllium	0.9	BH2-AS1	1-0.05m
Boron	11.1	BH3-SS9	6.03-6.79m
Cobalt	**26.5**	BH2-AS1	1-0.05m
Copper	61.1	BH2-AS1	1-0.05m
Lead	**698**	BH3-SS2	0.76-1.52m
Mercury	0.1	BH3-SS2	0.76-1.52m
Molybdenum	71	BH2-SB3	1.9-2.6m
Nickel	75.3	BH2-AS1	1-0.05m
Uranium	1.6	BH3-SS9	6.03-6.79m
Vanadium	**125**	BH2-AS1	1-0.05m
Zinc	219	BH3-SS2	0.76-1.52m

All other parameter concentrations were below laboratory method detection limits.

5.6 Groundwater Quality

Groundwater samples were submitted for laboratory analysis of a combination of PHCs, BTEX and/or VOCs. The groundwater samples were obtained from the screened intervals noted on Table 2. Monitoring wells, BH1 through BH3 were installed and sampled during the interim of February 20 to March 10, 2020.

The results of the analytical testing are presented below in Tables 10 through 12. The laboratory certificates of analysis are provided in Appendix 1.

Table 10: Analytical Test Results – Groundwater (LRL Associates 2010)
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)	MECP Table 3 Standards (µg/L)
		December 23, 2010	
		BH2-GW (MW-2)	
Benzene	0.5	nd	44
Ethylbenzene	0.5	nd	2,300
Toluene	0.5	nd	18,000
Xylenes	0.5	nd	4,200
PHC F1	200	nd	750
PHC F2	100	nd	150
PHC F3	100	nd	500
PHC F4	100	nd	500

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

No BTEX or PHC concentrations were identified in the groundwater sample analyzed in 2010 (LRL Associates, 2011). The analytical test results comply with the selected MECP Table 3 Standards.

Table 10 Continued: Analytical Test Results – Groundwater
BTEX and PHCs (Fractions 1 to 4)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 3 Standards (µg/L)
		February 20, 2020		March 10, 2020	
		BH1-GW1*	BH2-GW1*	BH3-GW1*	
Benzene	0.5	nd	nd	nd	44
Ethylbenzene	0.5	nd	nd	nd	2,300
Toluene	0.5	nd	nd	nd	18,000
Xylenes	0.5	nd	nd	nd	4,200
PHC F1	25	nd	nd	nd	750
PHC F2	100	nd	nd	nd	150
PHC F3	100	nd	nd	nd	500
PHC F4	100	nd	nd	nd	500

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – Parameter not tested
- * - BTEX tested through the VOC group of parameters

No BTEX or PHC concentrations were identified in any of the groundwater samples analyzed. The analytical test results comply with the selected MECP Table 3 Standards.

Table 11: Analytical Test Results – Groundwater (LRL Associates, 2011)
Metals

Parameter	MDL (ug/L)	Groundwater Sample (µg/L) December 22, 2010 BH2 (MW2)	MECP Table 3 Standards (µg/L)
Antimony	1.0	nd	20,000
Arsenic	10	nd	1,900
Barium	10	407	29,000
Beryllium	1	nd	67
Boron	50	344	45,000
Cadmium	1	nd	2.7
Chromium	50	nd	810
Cobalt	1	nd	66
Copper	5	36	87
Lead	1	2	25
Mercury	0.1	**0.3**	0.29
Molybdenum	5	13	9,200
Nickel	5	nd	490
Selenium	5	nd	63
Silver	1	nd	1.5
Thallium	1	nd	510
Vanadium	1	4	250
Zinc	20	nd	1,000

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

The mercury concentration was marginally in excess of the selected standards (0.3ug/L). This is likely a result of sediment in the sample due to an improperly purged well, as there were no indications of elevated mercury concentrations in the soil samples analyzed. All other metal parameters in the groundwater sample comply with the MECP Table 3 Standards.

Table 12: Analytical Test Results – Groundwater
Volatile Organic Compounds (VOCs)

Parameter	MDL (µg/L)	Groundwater Samples (µg/L)			MECP Table 3 Standards (µg/L)
		February 20, 2020		March 10, 2020	
		BH1-GW1	BH2-GW1	BH3-GW1	
Acetone	5.0	nd	nd	nd	130,000
Benzene	0.5	nd	nd	nd	44
Bromodichloromethane	0.5	nd	nd	nd	85,000
Bromoform	0.5	nd	nd	nd	380
Bromomethane	0.5	nd	nd	nd	5.6
Carbon Tetrachloride	0.2	nd	nd	nd	0.79
Chlorobenzene	0.5	nd	nd	nd	630
Chloroform	0.5	nd	**6.4**	nd	2.4
Dibromochloromethane	0.5	nd	nd	nd	82,000
Dichlorodifluoromethane	1.0	nd	nd	nd	4,400
1,2-Dibromoethane	0.2	nd	nd	nd	0.25
1,2-Dichlorobenzene	0.5	nd	nd	nd	4,600
1,3-Dichlorobenzene	0.5	nd	nd	nd	9,600
1,4-Dichlorobenzene	0.5	nd	nd	nd	8
1,1-Dichloroethane	0.5	nd	nd	nd	320
1,2-Dichloroethane	0.5	nd	nd	nd	1.6
1,1-Dichloroethylene	0.5	nd	nd	nd	1.6
cis-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
trans-1,2-Dichloroethylene	0.5	nd	nd	nd	1.6
1,2-Dichloropropane	0.5	nd	nd	nd	16
1,3-Dichloropropene	0.5	nd	nd	nd	5.2
Ethylbenzene	0.5	nd	nd	nd	2,300
Hexane	1.0	nd	nd	nd	51
Methyl Ethyl Ketone	5.0	nd	nd	nd	470,000
Methyl Isobutyl Ketone	5.0	nd	nd	nd	140,000
Methyl tert-butyl Ether	2.0	nd	nd	nd	1900
Methylene Chloride	5.0	nd	nd	nd	610
Styrene	0.5	nd	nd	nd	1,300
1,1,1,2-Tetrachloroethane	0.5	nd	nd	nd	3.4
1,1,2,2-Tetrachloroethane	0.5	nd	nd	nd	3.2
Tetrachloroethylene	0.5	nd	nd	nd	1.6
Toluene	0.5	nd	nd	nd	18,000
1,1,1-Trichloroethane	0.5	nd	nd	nd	640
1,1,2-Trichloroethane	0.5	nd	nd	nd	4.7
Trichloroethylene	0.5	nd	nd	nd	1.6
Trichlorofluoromethane	1.0	nd	nd	nd	2,500
Vinyl Chloride	0.5	nd	nd	nd	0.5
Xylenes	0.5	nd	nd	nd	4,200

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

With the exception of chloroform, no VOC concentrations were identified in any of the groundwater samples analyzed. The elevated level of chloroform in BH2 is expected to be a result of the use of chlorinated municipal water during the slab coring and drilling program and as such, is not considered a contaminant.

All groundwater samples analyzed comply to the selected MECP Table 3 Standards.

The maximum concentrations of analyzed parameters in the groundwater at the Phase II Property are summarized below in Table 13.

Table 13: Maximum Concentrations – Groundwater

Parameter	Maximum Concentration (µg/L)	Monitoring Well	Screened Interval (m BGS)
Barium	407	MW2	7.5-12
Boron	344	MW2	7.5-12
Copper	36	MW2	7.5-12
Lead	2	MW2	7.5-12
Mercury	**0.3**	MW2	7.5-12
Molybdenum	13	MW2	7.5-12
Vanadium	4	MW2	7.5-12
Chloroform	**6.4**	BH2	2.18-5.18

All other parameter concentrations were below laboratory method detection limits.

5.7 Quality Assurance and Quality Control Results

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

As per the sampling and analysis plan, duplicate soil and groundwater samples (DUP) from BH1-SS7 and BH2-GW1, respectively, were obtained and analyzed for VOC parameters. No parameter concentrations were detected above the laboratory method detection limits in either the original or duplicate samples, with the exception of chloroform in groundwater sample BH2-GW1. The Relative percent difference (RPD) was calculated to be 6%. Overall, the quality of the field data collected during this Phase II-ESA is considered to be sufficient to meet the overall objectives of this assessment.

5.8 Phase II Conceptual Site Model

The following section has been prepared in accordance with the requirements of O.Reg. 153/04, as amended under 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 per Table 1 in Section 2.2, the following three (3) PCAs are considered to have resulted in three (3) APECs on the Phase II Property:

- APEC 1: Resulting from former on-site paint and oil/varnish store at 396 – 404 Bank Street; and
- APEC 2: Resulting from fill material of unknown quality, associated with the redevelopment of the site (394-404 Bank Street) in the 1950s; and
- APEC 3: Resulting from the former off-site automotive service garage (greasing/oiling) located immediately south of the Phase II Property.

Contaminants of Potential Concern

Contaminants of potential environmental concern associated with the aforementioned APECs on the Phase II Property include the following:

- Benzene, ethylbenzene, toluene and xylenes (BTEX);
- Petroleum hydrocarbons (PHCs, Fractions F_1-F_4);
- Volatile organic compounds (VOCs); and
- Metals plus Mercury (Hg) and Hexavalent Chromium (CrVI)

Subsurface Structures and Utilities

The Phase II Property is situated in a municipally serviced area. Underground utility services on the subject land include natural gas, electricity, municipal water and sewer services. Theses services enter the Phase II Property from the west side of the site from James Street. Other than service utilities, no subsurface structures were observed on the Phase II Property at the time of the site visit.

Physical Setting

Site Stratigraphy

The site stratigraphy consists of the following:

- A pavement structure consisting of approximately asphaltic concrete, followed by a crushed stone base extending to depths ranging from approximately 0.1 to 0.15 m below grade.
- Fill material generally consisting of brown silty sand or silty clay with gravel was identified at all borehole locations and extended to depths of approximately 0.1 to 2.29 m below grade.
- Native silty clay and was identified beneath the fill material, extending to depths of approximately 2.29 to 6.86 m at BH1, BH3 and BH4. Groundwater was identified in this stratigraphic unit.
- Glacial till was encountered in BH1, extending to a depth of approximately 5.49 m below grade.
- Boreholes were terminated in the native silty clay or glacial till layer at depths ranging from 2.29 to 9.86 m below grade.
- Bedrock was not encountered during the Phase II ESA.

Hydrogeological Characteristics

Groundwater at the Phase II Property was encountered within the native silty clay layer. This unit is interpreted to function as a local aquifer at the subject site.

Water levels were measured at the Phase II Property on March 10, 2020. Groundwater levels ranged in depths from approximately 0.4 to 1.86m below grade. Groundwater contour mapping was conducted for groundwater elevations during the March sampling event. Groundwater flow at the subject site was in a northerly direction, with an average hydraulic gradient of approximately 0.055 m/m.

Approximate Depth to Bedrock

Bedrock was not encountered during the Phase II ESA field program.

Approximate Depth to Water Table

Depth to water table at the subject site varies between approximately 0.4 and 1.86m below existing grade.

Sections 41 and 43.1 of the Regulation

Section 41 of the Regulation (Site Condition Standards, Environmentally Sensitive Areas) does not apply to the subject site as the Phase II Property is not within 30m of an environmentally sensitive area.

Section 43.1 of the Regulation does not apply to the subject site in that the subject site is not a Shallow Soil Property and is not within 30 m of a water body.

Fill Placement

Fill material was identified across the Phase II Property beneath the pavement structure and extending to depths of approximately 0.3 to 2.29 m below grade. The fill material generally consists of silty clay and/or silty sand with gravel and in sometimes with gravel and is considered to be associated with the pavement structure.

No visual or olfactory evidence of deleterious materials were identified in the fill material.

Proposed Buildings and Other Structures

It is our understanding that the Phase II Property will be redeveloped with a multi-storey mixed-use building consisting of commercial on the ground floor and residential units above, with two (2) levels of underground parking.

Existing Buildings and Structures

The subject building is a two-storey commercial building that has been used as offices since early 2000 and is heated with natural gas-fired equipment. No other buildings or structures are present on the Phase I Property.

Water Bodies and Areas of Natural Significance

There are no natural water bodies or areas of natural significance on or within 30m of the Phase II Property.

Environmental Condition

Areas Where Contaminants are Present

Based on the findings of the Phase II ESA, the fill material in BH3 is marginally impacted with some metals (i.e. barium and lead).

Elevated vanadium concentrations identified in the native silty clay also exceed the MECP Table 3 Residential Standards, however, these levels are considered to be naturally occurring on-site. As such, the native soils on the Phase II Property is considered to be in compliance with MECP Table 3 Residential Standards. There are minimal contaminants present in the fill material (0.3 to 2.29m below grade) on the Phase II Property.

The mercury concentration found in the groundwater at location MW-2 (LRL Associates, 2011) was marginally in excess of the selected. This is likely a result of sediment in the sample due to an improperly purged well and/or unscreened groundwater samples, as there were no indications of elevated mercury concentrations in the soil samples analyzed. All other metal parameters in the groundwater sample comply with the MECP Table 3 Standards.

Chloroform in excess of the selected MECP Standards was identified in the groundwater at BH2. The elevated level of chloroform in BH2 is expected to be a result of the use of chlorinated municipal water during the slab coring and drilling program and as such, is not considered a contaminant. All groundwater beneath the Phase II Property is in compliance with the MECP Table 3 Standards.

Types of Contaminants

Based on the findings of the Phase II ESA, the contaminants present in the fill material are barium and lead. Native soil and groundwater are in compliance with MECP Table 3 Residential Standards. Lead and barium in the fill material are the only contaminants of concern on the Phase II Property.

Contaminated Media

The fill material extending from 0.1 to 1.52 m in BH3 and is impacted with barium and lead concentrations in excess of the selected MECP Table 3 Residential Standards.

What Is Known About Areas Where Contaminants Are Present

Barium and lead are present in the fill material, specifically at BH3. There are no contaminants present in the underlying native silty clay beneath the Phase II Property. Cobalt and vanadium are not considered contaminants since they are naturally occurring in the silty clay at the levels.

No elevated concentrations of mercury were identified in soil samples analyzed. It is expected that the mercury concentration identified in groundwater is considered to be a result of sediment in the sample due to an improperly purged well and/or unscreened groundwater sampling. However further testing is required to confirm this.

The elevated level of chloroform in BH2 is expected to be a result of the use of chlorinated municipal water during the slab coring and drilling program and as such, is not considered a contaminant.

Discharge of Contaminants

Based on the findings of the Phase II ESA, a limited amount of impacted fill material may have been placed on-site. No other contaminants have been discharged on the Phase II Property.

Distribution and Migration of Contaminants

Based on the findings of the Phase II ESA, no distribution of contaminants is associated with the fill material on-site. Due to the low solubility of metals, it is not expected that the contaminants have migrated elsewhere.

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.

With the exception of the fill material, soil and groundwater on and beneath the Phase II Property are considered to be in compliance with MECP Table 3 Residential Standards. Therefore, climatic and meteorological conditions are not considered to have affected contaminant distribution at the Phase II Property.

Potential for Vapour Intrusion

The potential for vapour intrusion does not exist at the Phase II Property.

6.0 CONCLUSIONS

A Phase II ESA was conducted for the subject site addressed 394 - 404 Bank Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address areas of potential environmental concerns (APECs) on the Phase II Property, resulting from historical on- and off-site potentially contaminating activities (PCAs).

An initial Phase II ESA was carried out by Levac Robichaud Leclerc Associates Ltd. (LRL Associates) in 2010 to address a historical retail fuel outlet at 390 Bank Street and a former automotive service garage at 406$^{1/2}$ Bank Street. A borehole and a monitoring well were placed on the northern and southern portion of the Phase II Property, respectively.

The current subsurface investigation consisted of the placement of four (4) boreholes, three (3) of which were installed with groundwater monitoring wells; two (2) in the interior of the subject building and one on the south western portion of the Phase II Property. The findings of the current and previous subsurface investigations conducted by Paterson and LRL Associates are presented in this report.

Soil samples obtained from all of the boreholes were screened using visual observations and vapour measurements. Seven (7) soil samples were submitted for laboratory analysis of a combination of benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, F1-F4), volatile organic compounds (VOCs) and/or metals (including Hg and CrVI).

Based on the analytical test results, BTEX, PHC and VOC concentrations were in compliance with the MECP Table 3 Residential Standards. Metal parameters, specifically cobalt, barium, vanadium and lead concentrations were identified in excess of the selected MECP Standards. The levels of cobalt and vanadium are considered to be natural occurring in silty clay soils and as such, they are not considered contaminants of concern. Barium and lead were identified in the fill sample BH3-SS2 (fill material). All other samples analyzed were in compliance with the MECP Table 3 Residential Standards.

Groundwater samples from monitoring wells installed in BH1 through BH3 were recovered and analyzed for PHC and VOC parameters (includes BTEX). With the exception of chloroform in BH3, all groundwater samples were in compliance with the MECP Table 3 Standards.

It is our opinion that the elevated chloroform concentration in BH2 is a result of the use of chlorinated municipal water during the slab coring and drilling program and as such, is not considered a contaminant. Further testing is required to validate our opinion.

Although there were no elevated concentrations of mercury identified in soil, it is our opinion that the marginal mercury concentration identified in groundwater in 2010 is considered to be a result of sediment in the sample due to an improperly purged well and/or unscreened groundwater sampling procedure. Further testing is required to validate our opinion.

Recommendations

To confirm our opinion on the quality of the groundwater, it is recommended that BH2 be retested for chloroform and that MW-2 (if it can be found once the snow and ice have disappeared) be retested for metals to confirm that there is no mercury contamination. If MW-2 cannot be found, BH3 should be tested to confirm our opinion.

Soils

It is our understanding that the site will be redeveloped with a mixed-use building containing two (2) levels of underground parking. It is our recommendation that the contaminated fill material be excavated and disposed of at a licensed landfill during site redevelopment under the supervision of Paterson Group Inc.

Monitoring Wells

If the monitoring wells installed at the Phase II Property are not going to be used in the future, they should be abandoned according to Ontario Regulation 903. The monitoring wells will be registered with the MECP under this regulation. Further information can be provided up request in this regard.

7.0 STATEMENT OF LIMITATIONS

This Phase II - Environmental Site Assessment report has been prepared in general accordance with O.Reg. 153/04 as amended by the Environmental Protection Act 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.

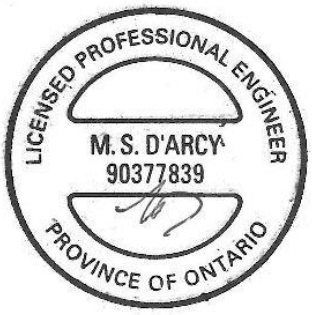
Should any conditions be encountered at the subject site and/or historical information that differ from our findings, we request that we be notified immediately in order to allow for a reassessment.

This report was prepared for the sole use of Urban Capital Property Group. Notification from Urban Capital Property Group and Paterson Group will be required to release this report to any other party.

Paterson Group Inc.

Mandy Witteman, B.Eng., M.A.Sc.

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



Report Distribution:

- Urban Capital Property Group.
- Paterson Group

FIGURES

FIGURE 1 – KEY PLAN

Drawing PE4650-5 - Test Hole Location Plan and Groundwater Contour Plan

Drawing PE4650-6 – Analytical Testing Plan – Soil (Metals)

Drawing PE4650-6A – Cross section A-A' – Soil (Metals)

Drawing PE4650-6B –Cross section B-B' – Soil (Metals)

Drawing PE4650-7 – Analytical Testing Plan – Soil (BTEX, PHC, VOC)

Drawing PE4650-7A – Cross section A-A' – Soil (BTEX, PHC, VOC)

Drawing PE4650-7B –Cross section B-B' – Soil (BTEX, PHC, VOC)

Drawing PE4650-8 – Analytical Testing Plan - Groundwater (VOCs)

Drawing PE4650-8A – Cross section A-A' –Groundwater (VOCs)

Drawing PE4650-8B– Cross section B-B' –Groundwater (VOCs)

FIGURES

Drawing PE4650-9 – Analytical Testing Plan - Groundwater (BTEX, PHC)

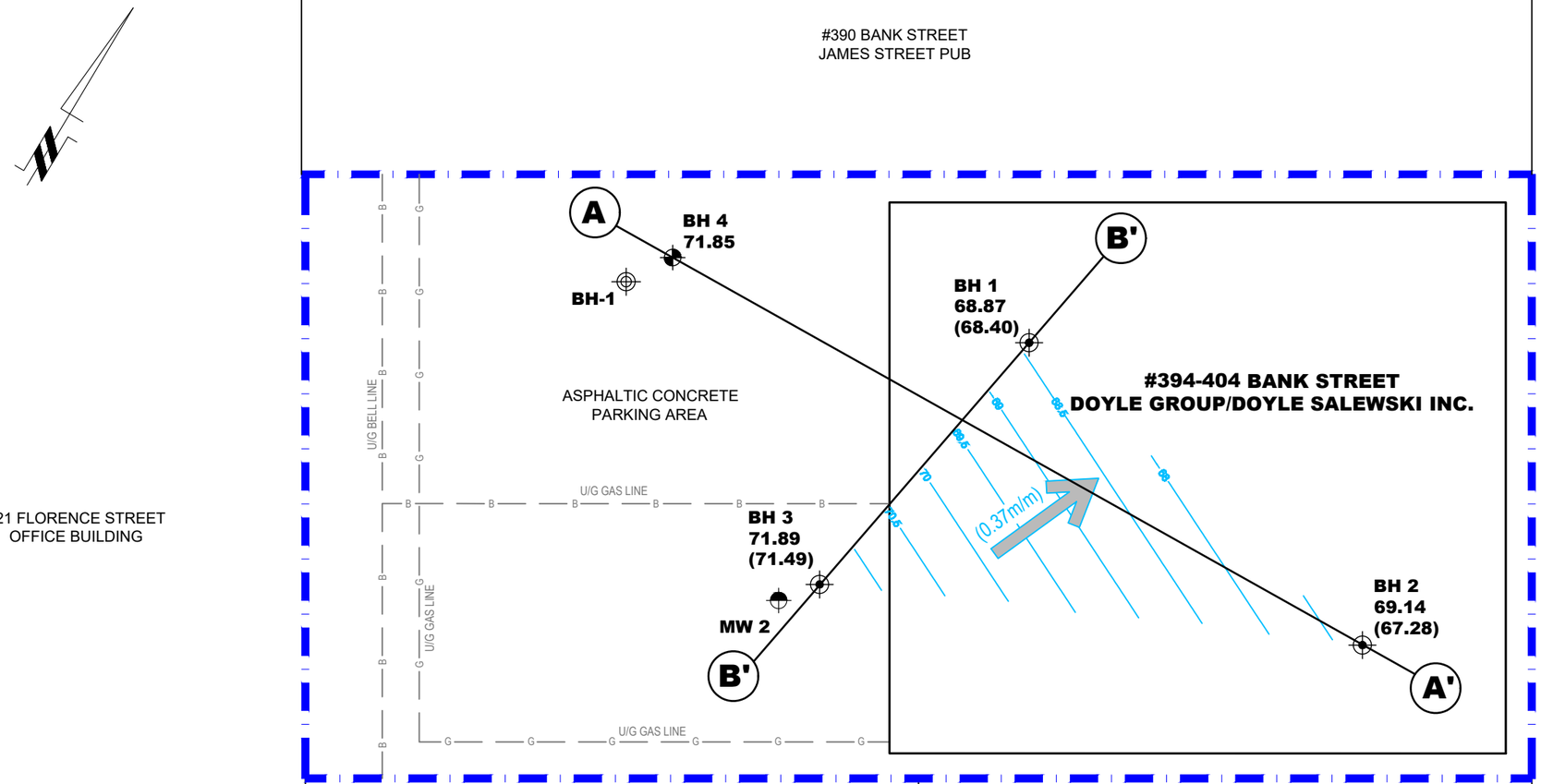
Drawing PE4650-9A –Cross section A-A’ –Groundwater (BTEX, PHC)

Drawing PE4650-9B –Cross section B-B’ –Groundwater (BTEX, PHC)

Drawing PE4650-10 – Analytical Testing Plan - Groundwater (Metals)

Drawing PE4650-10A –Cross section A-A’ –Groundwater (Metals)

Drawing PE4650-10B–Cross section B-B’ –Groundwater (Metals)



LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION BY OTHERS, 2011
- BOREHOLE WITH MONITORING WELL LOCATION BY OTHERS, 2011
- 97.7 — GROUNDWATER CONTOUR(m)
- (0.06m/m) — APPROXIMATE GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)
- 68.87 — GROUND SURFACE ELEVATION (m)
- (68.40) — GROUNDWATER SURFACE ELEVATION (m)

TBM - TOP OF MANHOLE COVER LOCATED ON JAMES STREET, NORTHWEST ENTRANCE TO SITE. GEODETIC ELEV. = 71.77m.

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NO.	REVISIONS	DATE	INITIAL
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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

Title: TEST HOLE LOCATION PLAN

Scale: 1:150	Date: 03/2020
Drawn by: RCG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-5
Approved by: MSD	Revision No.:

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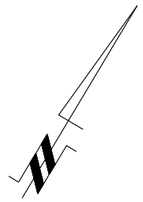

#390 BANK STREET
JAMES STREET PUB

BH4-SS2 0.76-1.52m 6-Mar-20
Metals comply with MECP Table 3 Standards

A

BH 4
71.85

BH-1

B'

BH 1
68.87
(68.40)

#394-404 BANK STREET
DOYLE GROUP/DOYLE SALEWSKI INC.

ASPHALTIC CONCRETE
PARKING AREA

U/G BELL LINE

U/G GAS LINE

BH 3
71.89
(71.49)

MW 2

B'

BH 2
69.14
(67.28)

A'

BANK STREET

WAVERLY STREET E.

#413 BANK STREET
STAPLES BUSINESS DEPOT

#21 FLORENCE STREET
OFFICE BUILDING

BH3-SS2	0.76-1.52m	6-Mar-20
Parameter	Results (ug/g)	Standards (ug/g)
Barium	411	390
Lead	698	120

All other metals comply with MECP Table 3 Standards

BH3-SS4	1.72-2.48m	6-Mar-20
Parameter	Results (ug/g)	Standards (ug/g)
Vanadium	98.5	86

Remaining metals comply with MECP Table 3 Standards

BH3-SS6	3.64-4.40m	6-Mar-20
Parameter	Results (ug/g)	Standards (ug/g)
Vanadium	92.8	86

Remaining metals comply with MECP Table 3 Standards

BH3-SS9 6.03-6.79m 6-Mar-20
Metals comply with MECP Table 3 Standards

BH2-SB2 1.2-1.9m 22-Dec-10
Metals comply with MECP Table 3 Standards

BH2-SB3	1.9-2.6m	22-Dec-10
Parameter	Results (µg/g)	Standards (µg/g)
Cobalt	24	22
Vanadium	109	86

Remaining metals comply with MECP Table 3 Standards

BH2-AS1	0-0.05m	13-Feb-20
Parameter	Results (ug/g)	Standards (ug/g)
Cobalt	26.5	22
Vanadium	125	86

Remaining metals comply with MECP Table 3 Standards

#19 FLORENCE STREET
ORGANIK GRAPHYX
DANCE STUDIO
RESIDENTIAL APARTMENTS

#406 BANK STREET
VACANT LOT

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION BY OTHERS, 2011
- BOREHOLE WITH MONITORING WELL LOCATION BY OTHERS, 2011
- 68.87 GROUND SURFACE ELEVATION (m)
- (68.40) GROUNDWATER SURFACE ELEVATION (m)

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

TBM - TOP OF MANHOLE COVER LOCATED ON JAMES STREET, NORTHWEST ENTRANCE TO SITE. GEODETIC ELEV. = 71.77m.

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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (METALS)

Scale: 1:150	Date: 03/2020
Drawn by: MPG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-6
Approved by: MSD	Revision No.:

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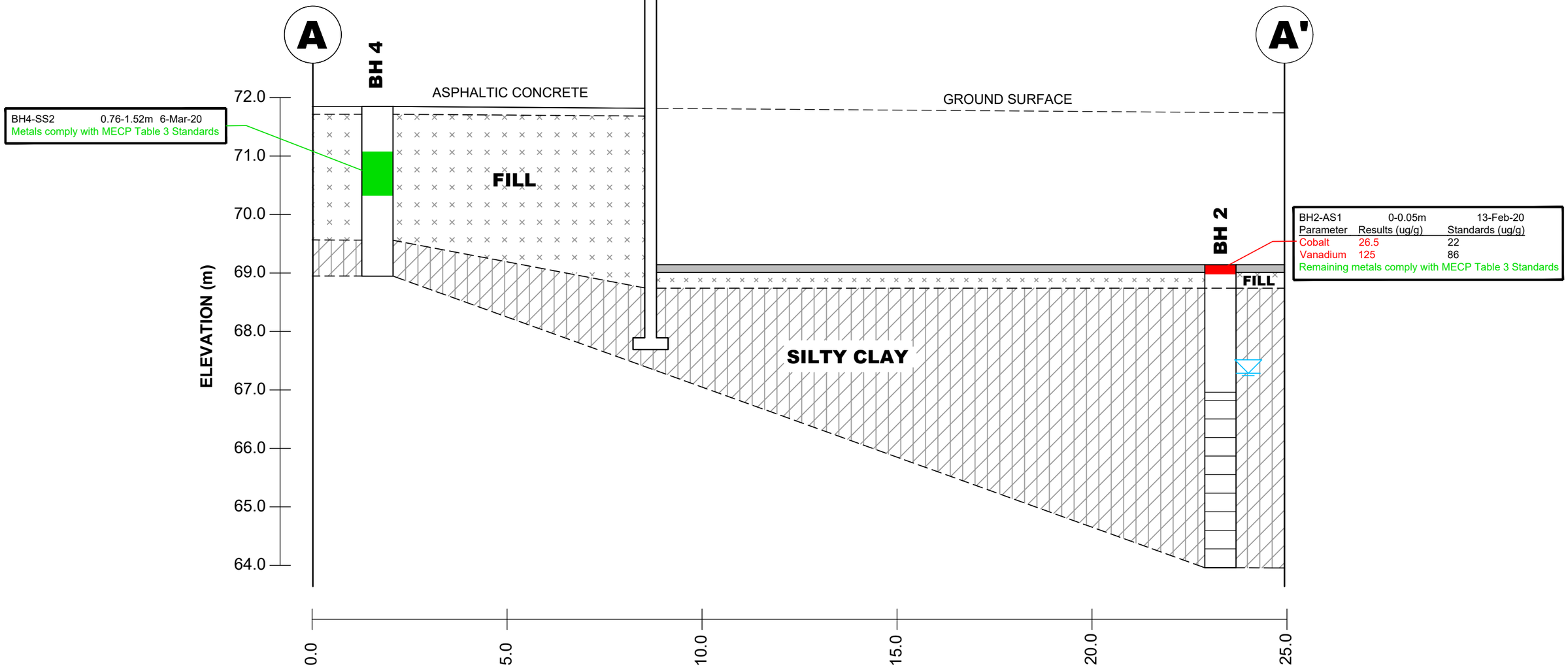

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A - SOIL (METALS)

Scale: AS SHOWN	Date: 03/2020
Drawn by: RCG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-6A
Approved by: MSD	Revision No.:

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BH3-SS2 0.76-1.52m 6-Mar-20

Parameter	Results (ug/g)	Standards (ug/g)
Barium	411	390
Lead	698	120

All other metals comply with MECP Table 3 Standards

BH2-SB2 1.2-1.9m 22-Dec-10

Metals comply with MECP Table 3 Standards

BH2-SB3 1.9-2.6m 22-Dec-10

Parameter	Results (µg/g)	Standards (µg/g)
Cobalt	24	22
Vanadium	109	86

Remaining metals comply with MECP Table 3 Standards

BH3-SS4 1.72-2.48m 6-Mar-20

Parameter	Results (ug/g)	Standards (ug/g)
Vanadium	98.5	86

Remaining metals comply with MECP Table 3 Standards

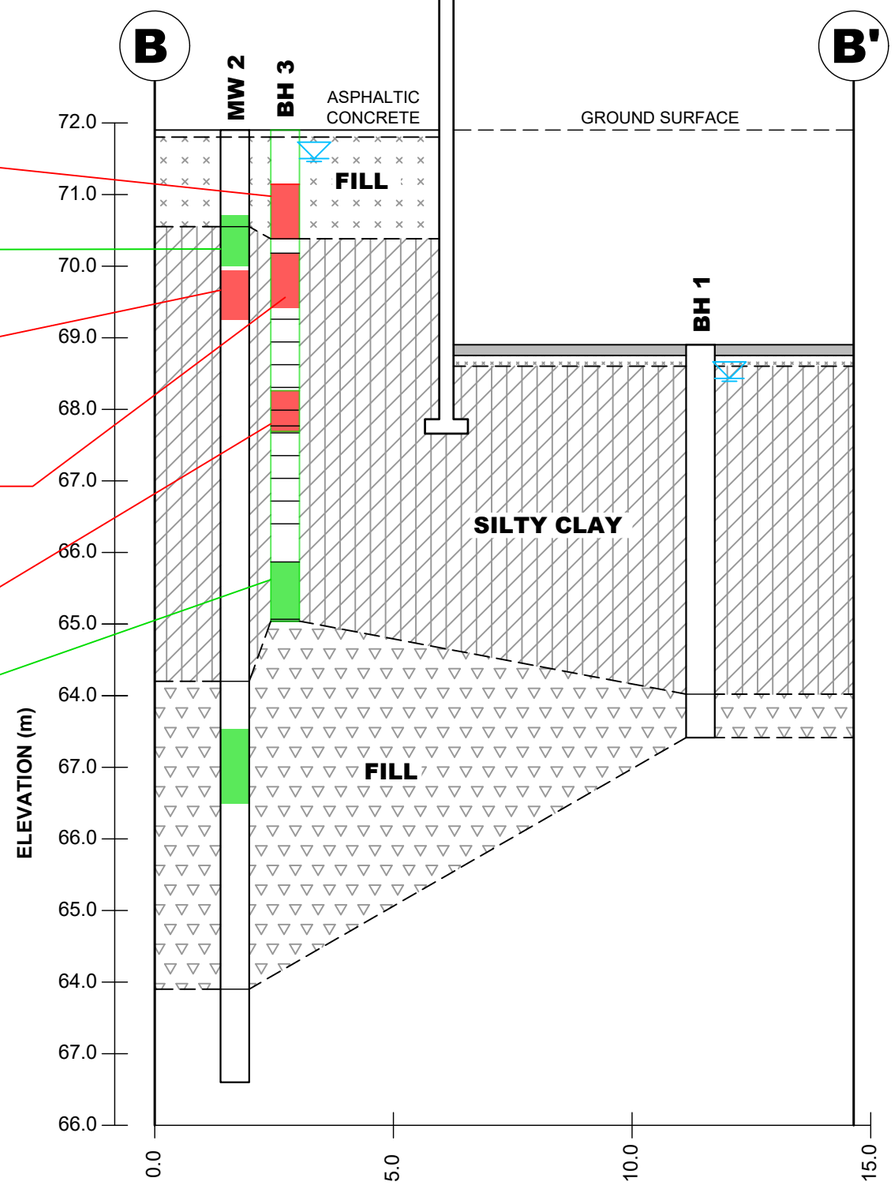
BH3-SS6 3.64-4.40m 6-Mar-20

Parameter	Results (ug/g)	Standards (ug/g)
Vanadium	92.8	86

Remaining metals comply with MECP Table 3 Standards

BH3-SS9 6.03-6.79m 6-Mar-20

Metals comply with MECP Table 3 Standards



SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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Ottawa, Ontario K2E 7J5
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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION B-B - SOIL (METALS)

Scale: AS SHOWN	Date: 03/2020
Drawn by: RCG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-6B
Approved by: MSD	Revision No.:

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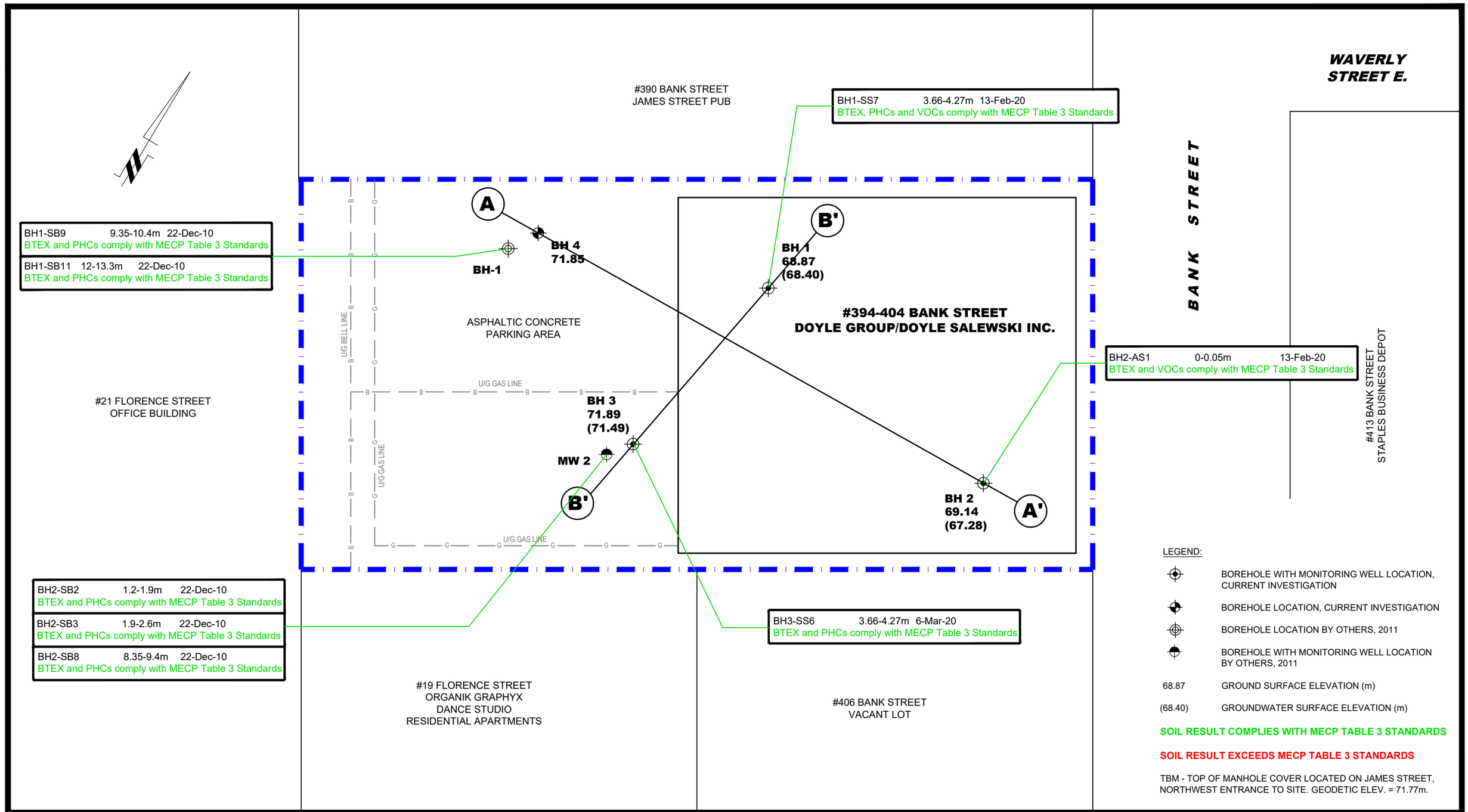

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION BY OTHERS, 2011
- BOREHOLE WITH MONITORING WELL LOCATION BY OTHERS, 2011
- 68.87 GROUND SURFACE ELEVATION (m)
- (68.40) GROUNDWATER SURFACE ELEVATION (m)

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

TBM - TOP OF MANHOLE COVER LOCATED ON JAMES STREET, NORTHWEST ENTRANCE TO SITE. GEODETIC ELEV. = 71.77m.

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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

Title:

ANALYTICAL TESTING PLAN - SOIL (BTEX,PHC,VOC)

Scale: 1:150	Date: 03/2020
Drawn by: MPG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-7
Approved by: MSD	Revision No.:

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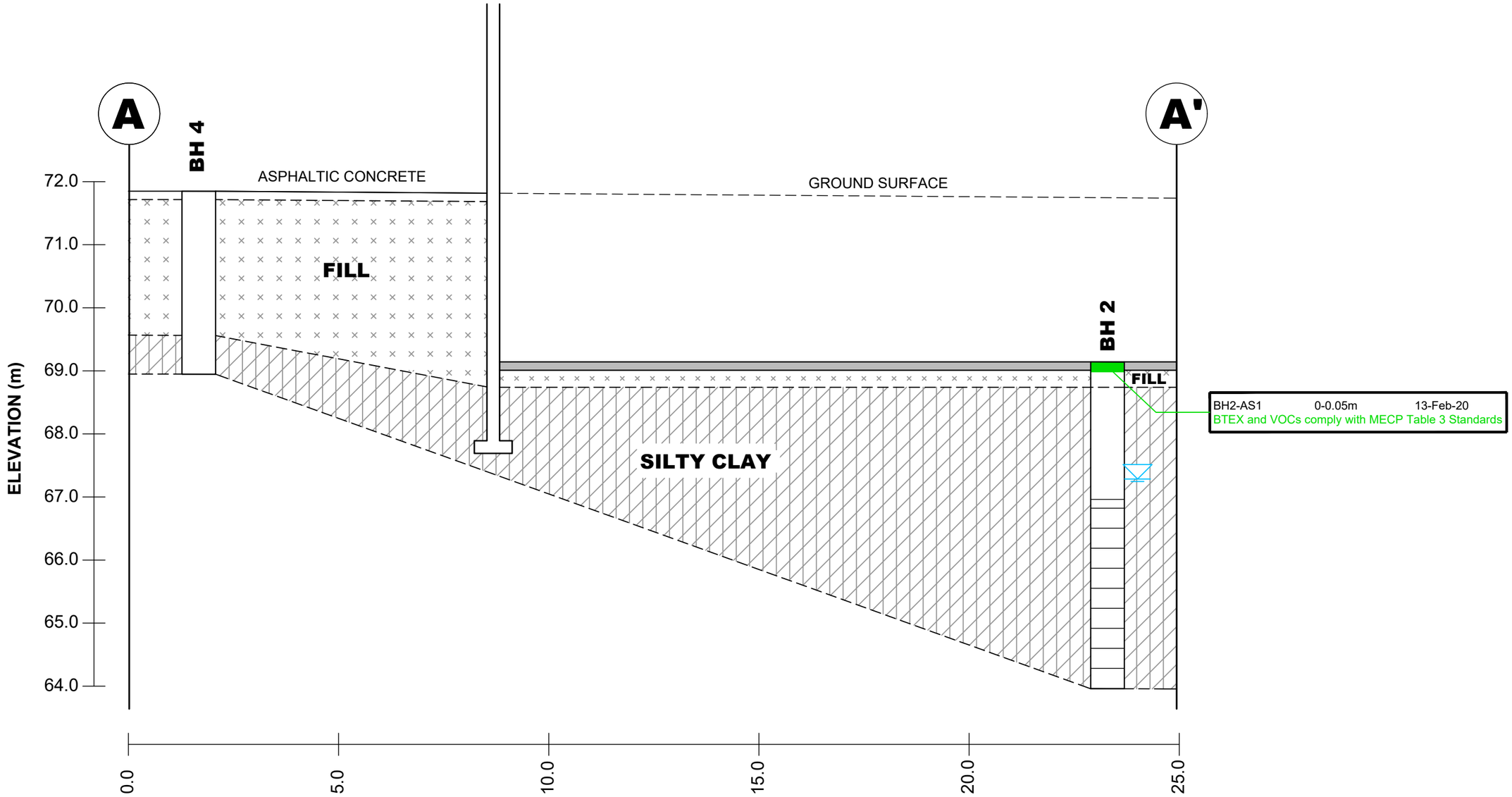

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A - SOIL (BTEX,PHC,VOC)

Scale: AS SHOWN	Date: 03/2020
Drawn by: RCG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-7A
Approved by: MSD	Revision No.:

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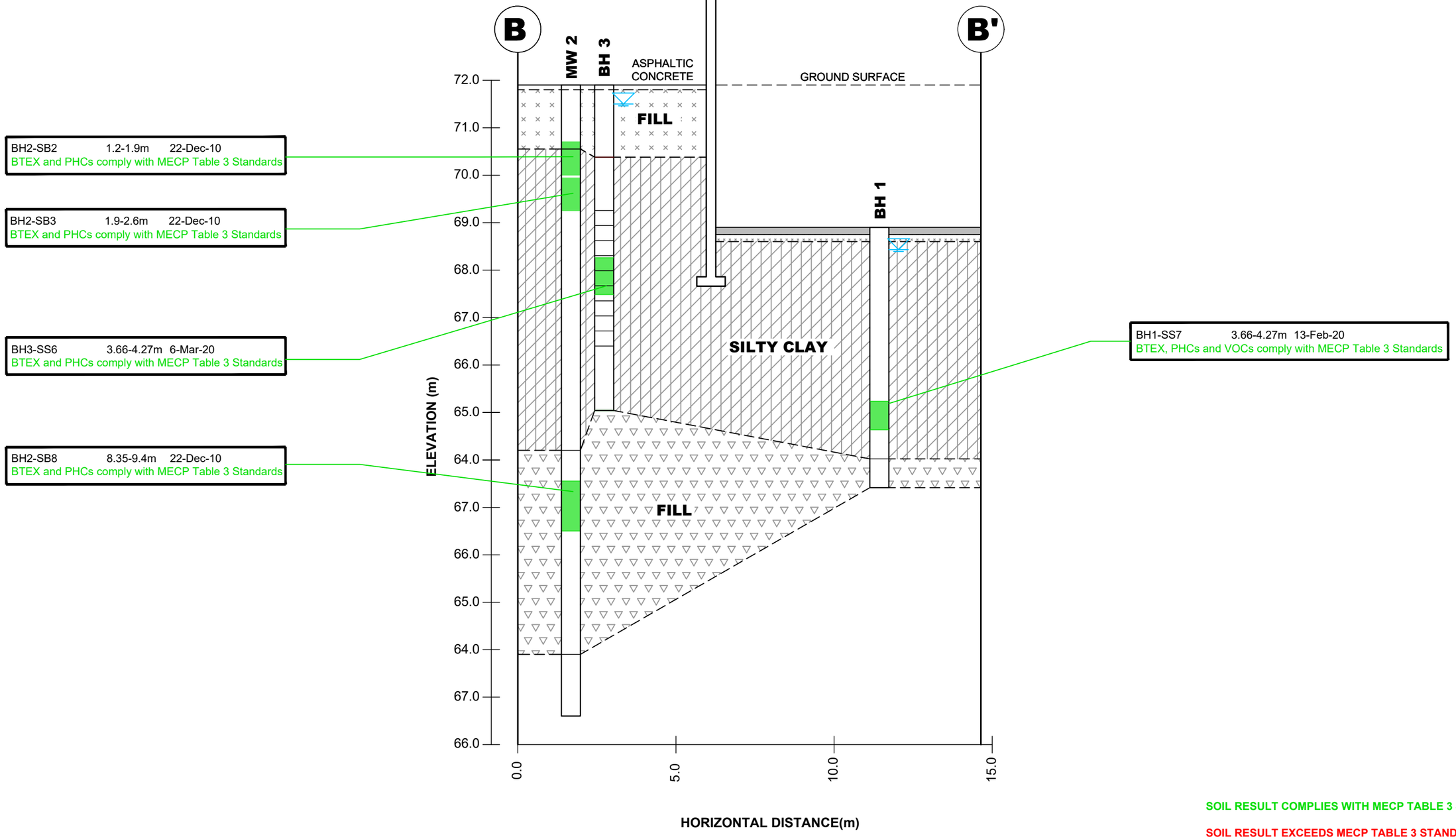

SOIL RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 3 STANDARDS

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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

Title: CROSS SECTION B-B - SOIL (BTEX, PHC, VOC)

Scale: AS SHOWN	Date: 03/2020
Drawn by: RCF	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-7B
Approved by: MSD	Revision No.:

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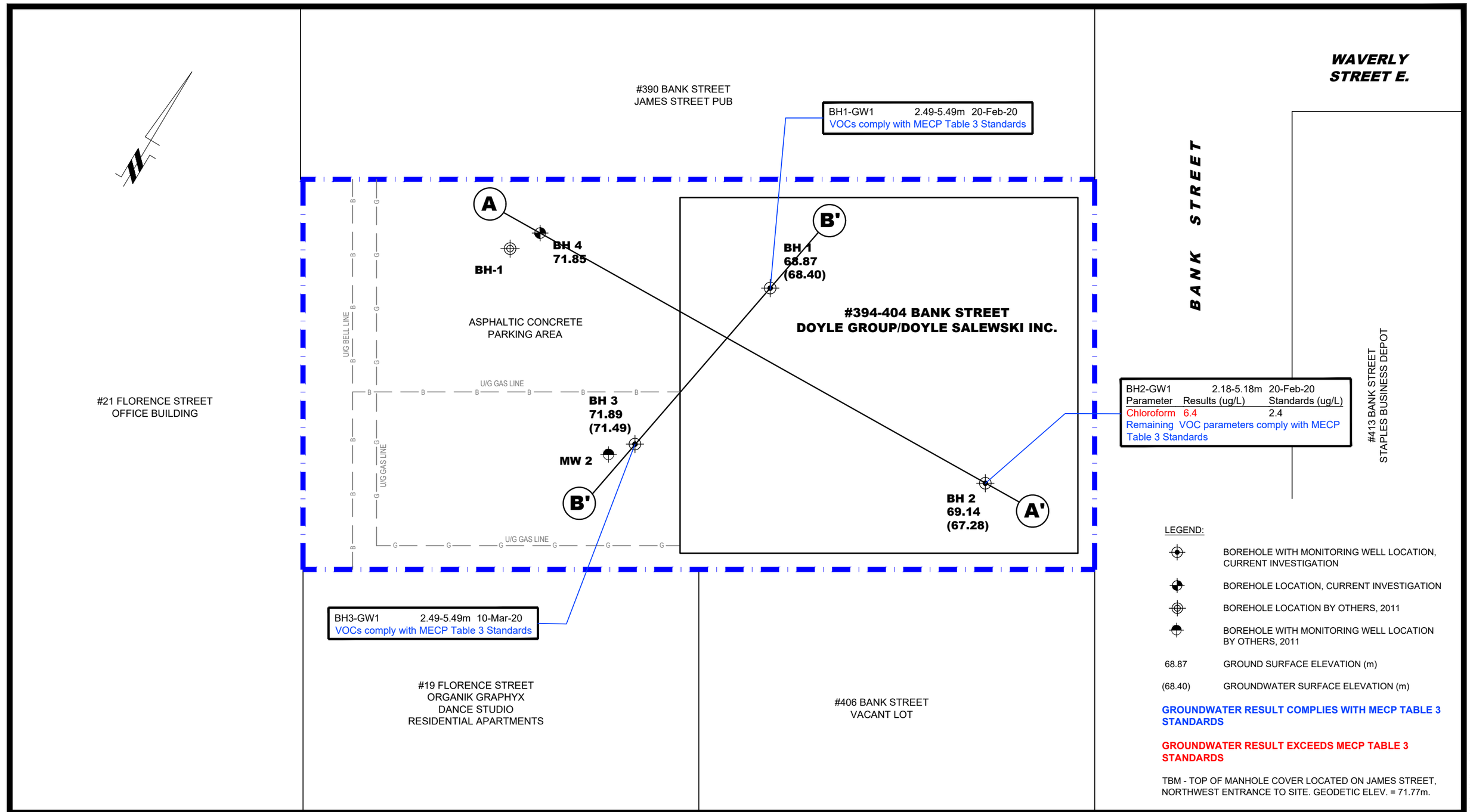

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION BY OTHERS, 2011
- BOREHOLE WITH MONITORING WELL LOCATION BY OTHERS, 2011
- 68.87 GROUND SURFACE ELEVATION (m)
- (68.40) GROUNDWATER SURFACE ELEVATION (m)

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

TBM - TOP OF MANHOLE COVER LOCATED ON JAMES STREET, NORTHWEST ENTRANCE TO SITE. GEODETIC ELEV. = 71.77m.

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consulting engineers

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Ottawa, Ontario K2E 7J5
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NO.	REVISIONS	DATE	INITIAL
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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

Title: ANALYTICAL TESTING PLAN - GROUNDWATER (VOC)

Scale: 1:150	Date: 03/2020
Drawn by: MPG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-8
Approved by: MSD	Revision No.:

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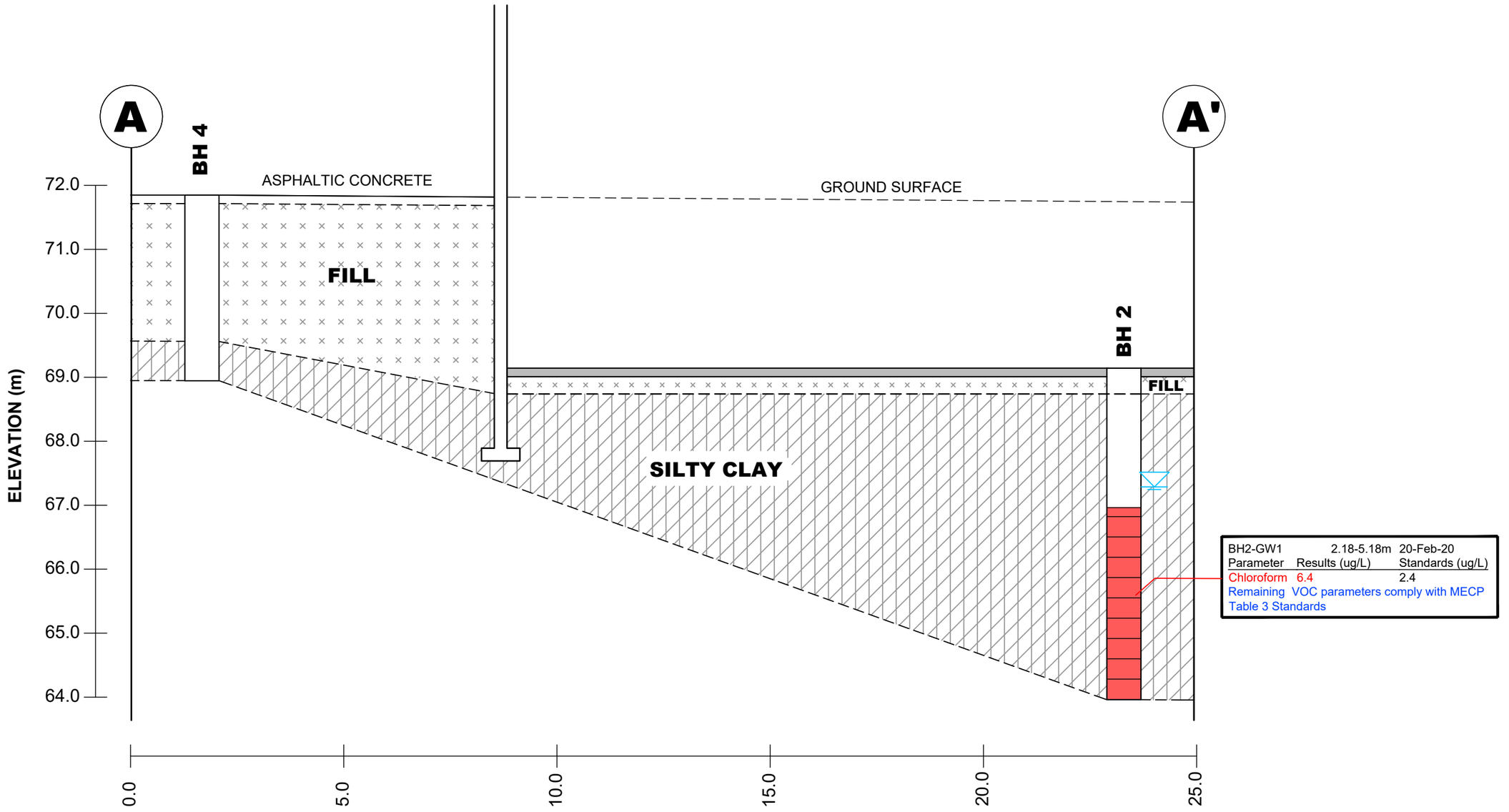

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL
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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2020
Drawn by: RCG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-8A
Approved by: MSD	Revision No.:

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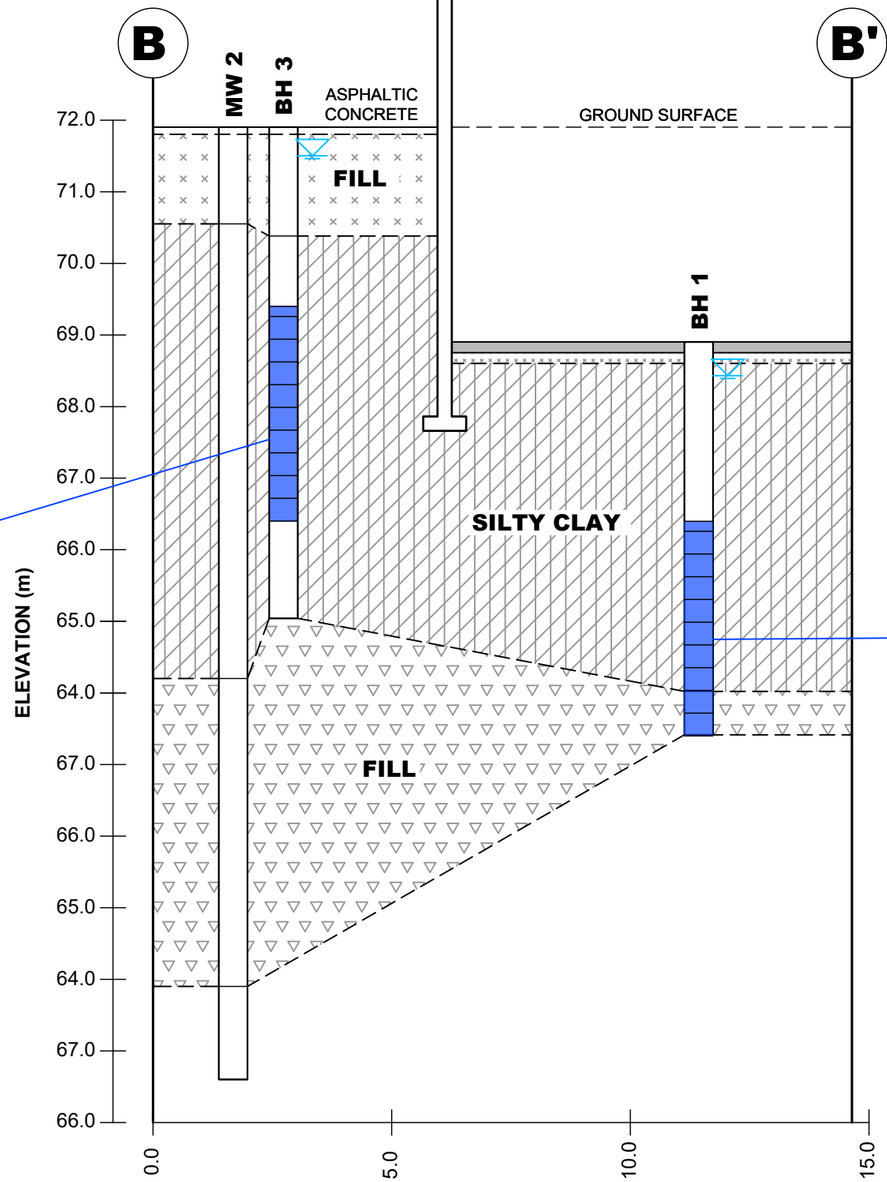

BH3-GW1 2.49-5.49m 10-Mar-20
VOCs comply with MECP Table 3 Standards

BH1-GW1 2.49-5.49m 20-Feb-20
VOCs comply with MECP Table 3 Standards

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2020
Drawn by: RCG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-8B
Approved by: MSD	Revision No.:

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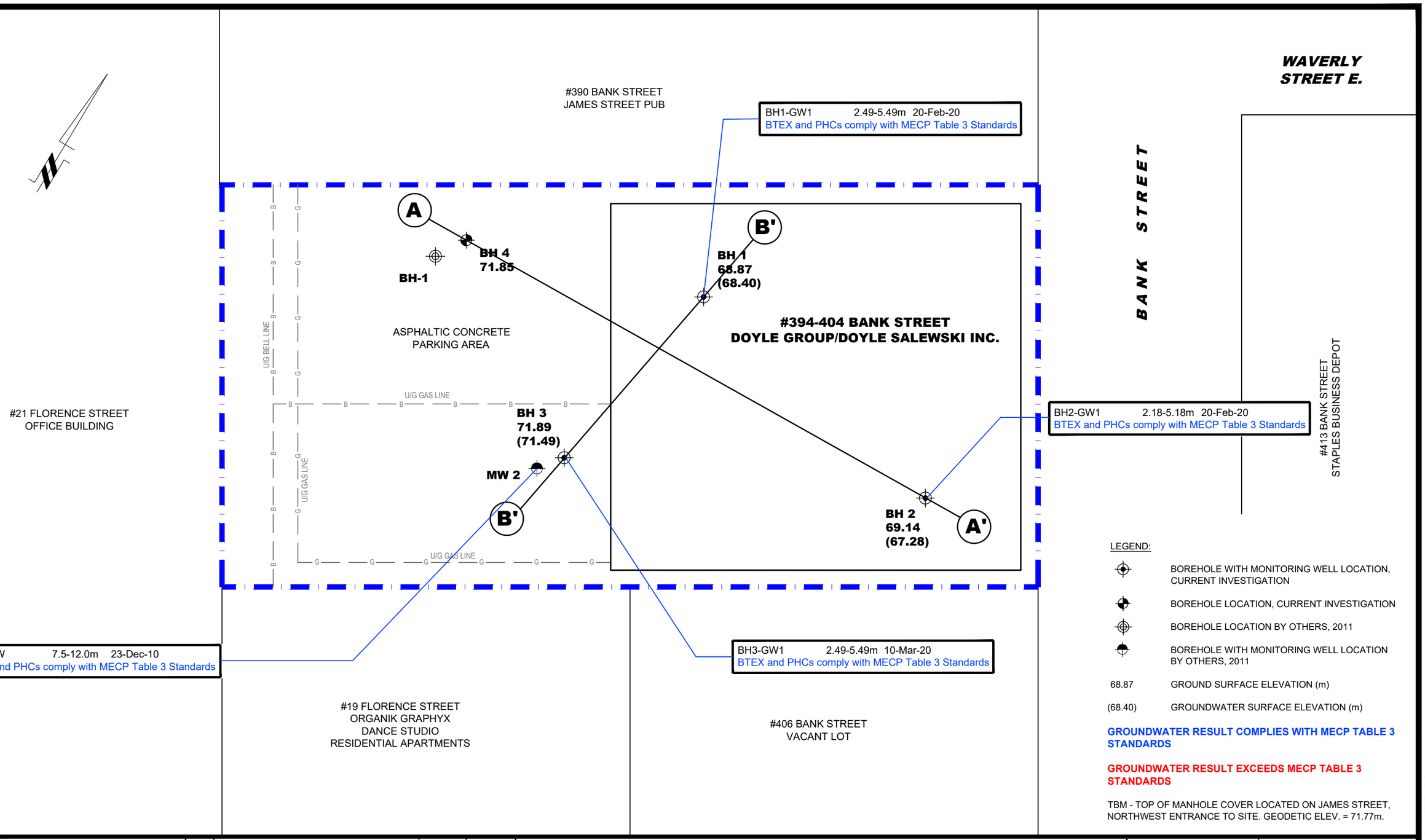

LEGEND:

- BOREHOLE WITH MONITORING WELL LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION, CURRENT INVESTIGATION
- BOREHOLE LOCATION BY OTHERS, 2011
- BOREHOLE WITH MONITORING WELL LOCATION BY OTHERS, 2011
- 68.87 GROUND SURFACE ELEVATION (m)
- (68.40) GROUNDWATER SURFACE ELEVATION (m)

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

TBM - TOP OF MANHOLE COVER LOCATED ON JAMES STREET, NORTHWEST ENTRANCE TO SITE. GEODETIC ELEV. = 71.77m.

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NO.	REVISIONS	DATE	INITIAL
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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

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

Scale: 1:150	Date: 03/2020
Drawn by: MPG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-9
Approved by: MSD	Revision No.:

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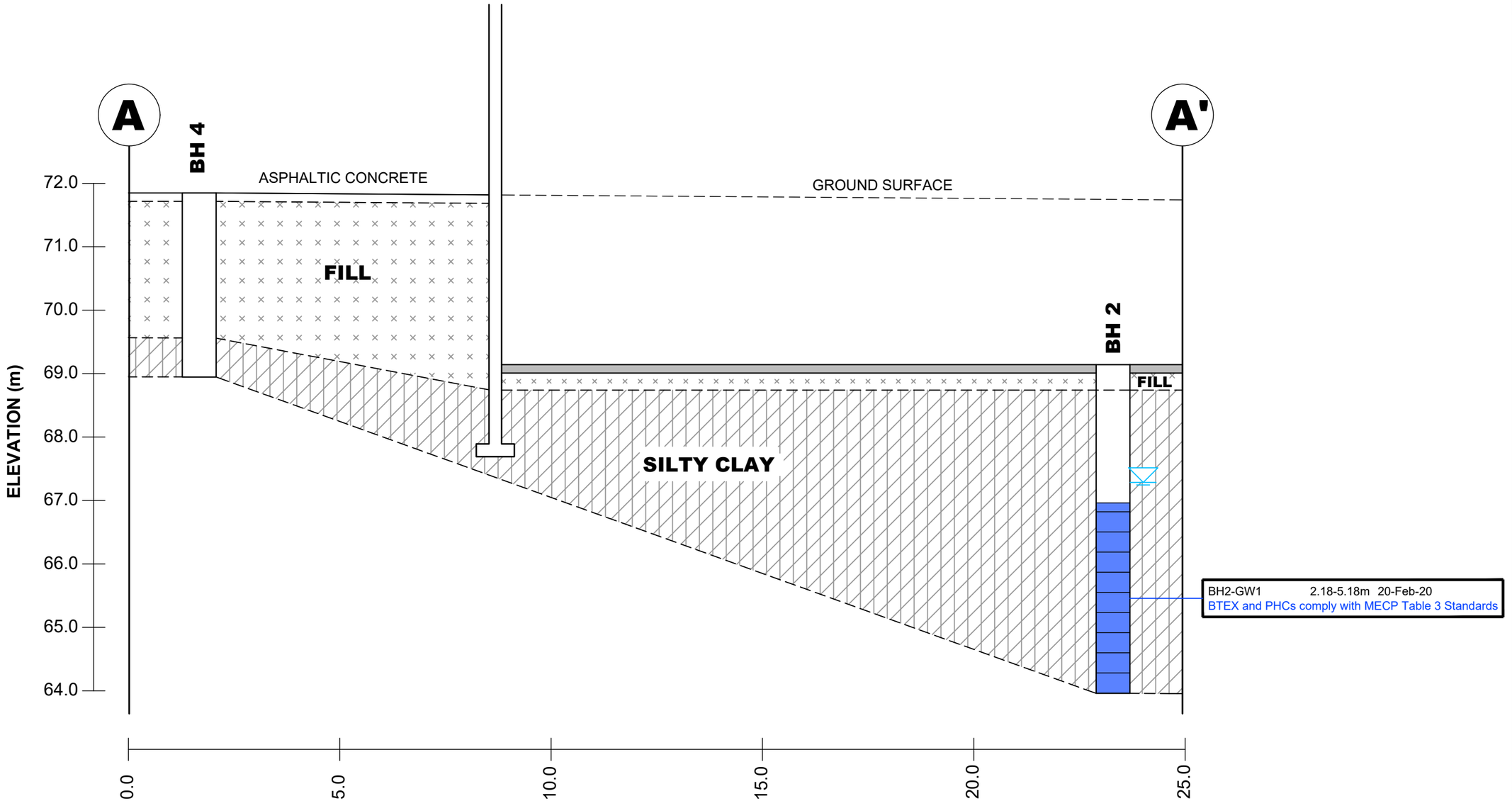

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL
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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

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

Scale: AS SHOWN	Date: 03/2020
Drawn by: MPG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-9A
Approved by: MSD	Revision No.:

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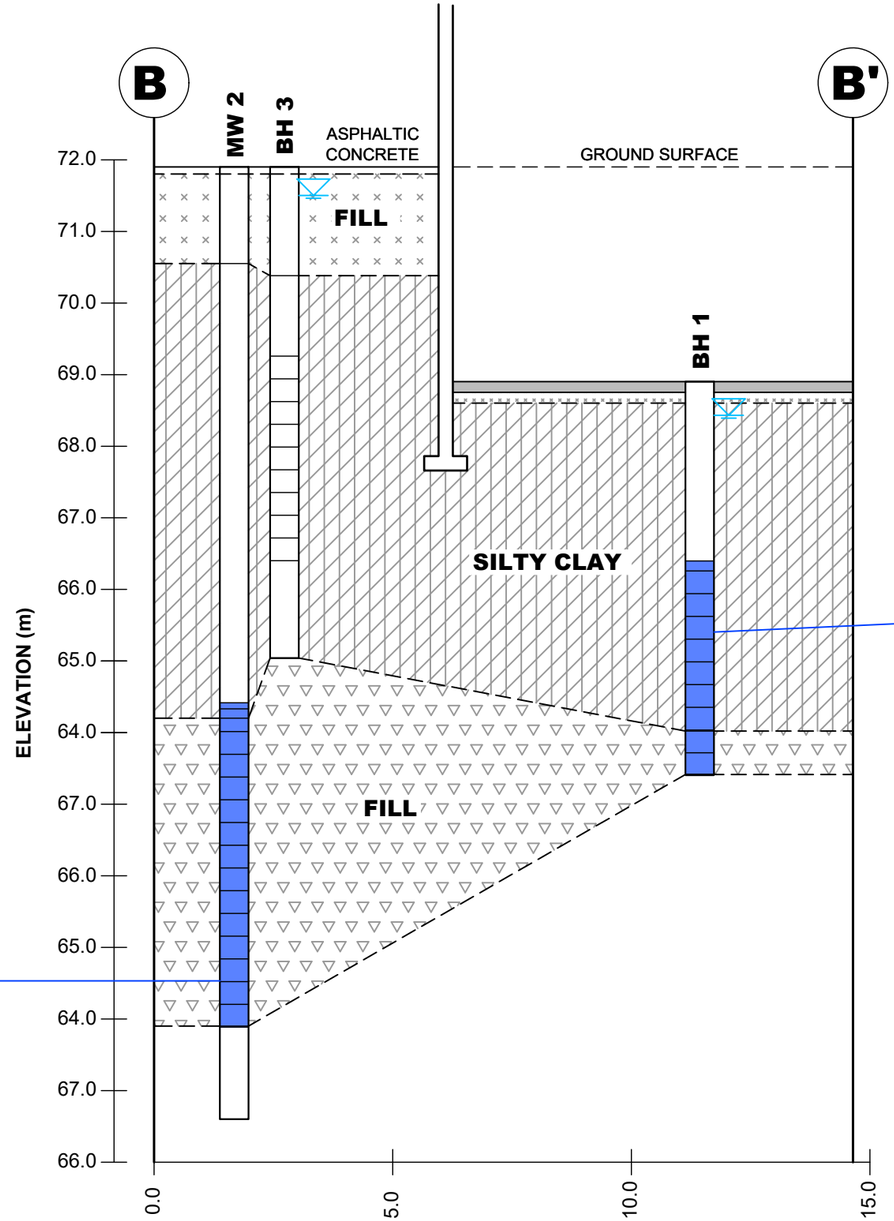

BH1-GW 2.49-5.49m 20-Dec-20
BTEX and PHCs comply with MECP Table 3 Standards

BH2-GW 7.5-12.0m 23-Dec-10
BTEX and PHCs comply with MECP Table 3 Standards

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

Title:
CROSS SECTION B-B - GROUNDWATER (BTEX,PHC)

Scale: AS SHOWN	Date: 03/2020
Drawn by: RCG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-9B
Approved by: MSD	Revision No.:

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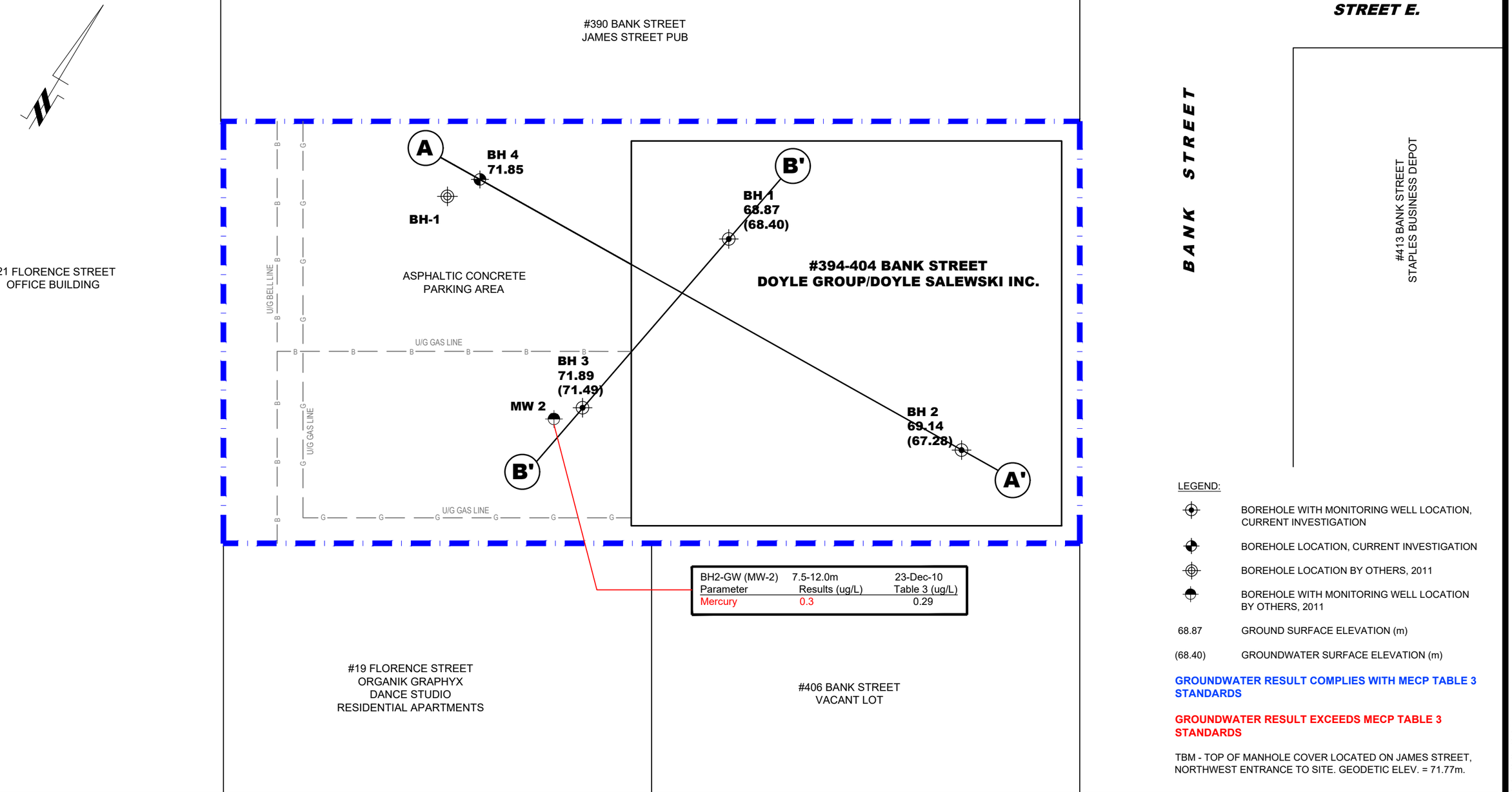

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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

Title:
ANALYTICAL TESTING PLAN - GROUNDWATER (METALS)

Scale: 1:150	Date: 03/2020
Drawn by: MPG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-10
Approved by: MSD	Revision No.:

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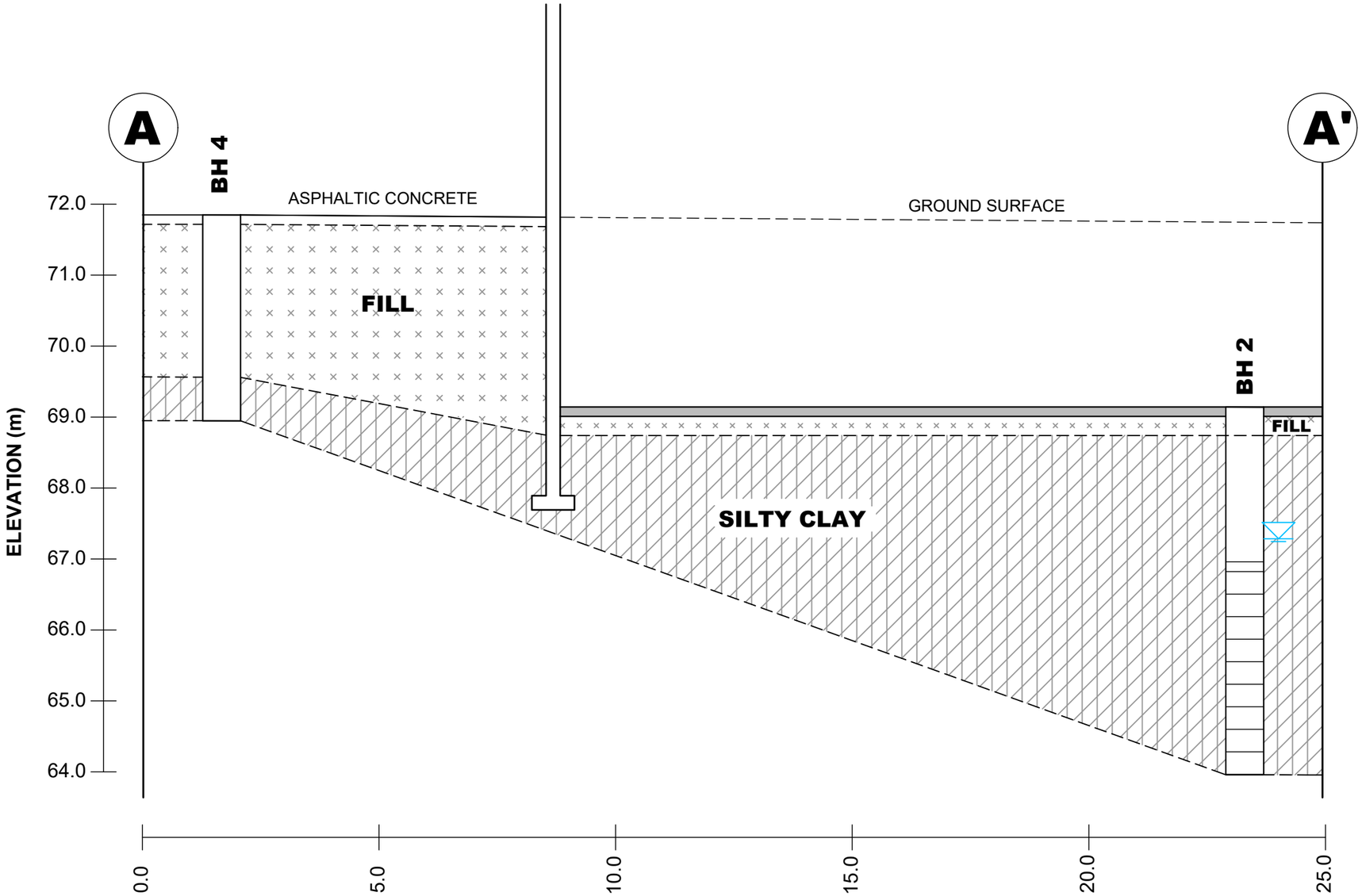

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

Title:

CROSS SECTION A-A - GROUNDWATER (METALS)

Scale: 1:150	Date: 03/2020
Drawn by: MPG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-10A
Approved by: MSD	Revision No.:

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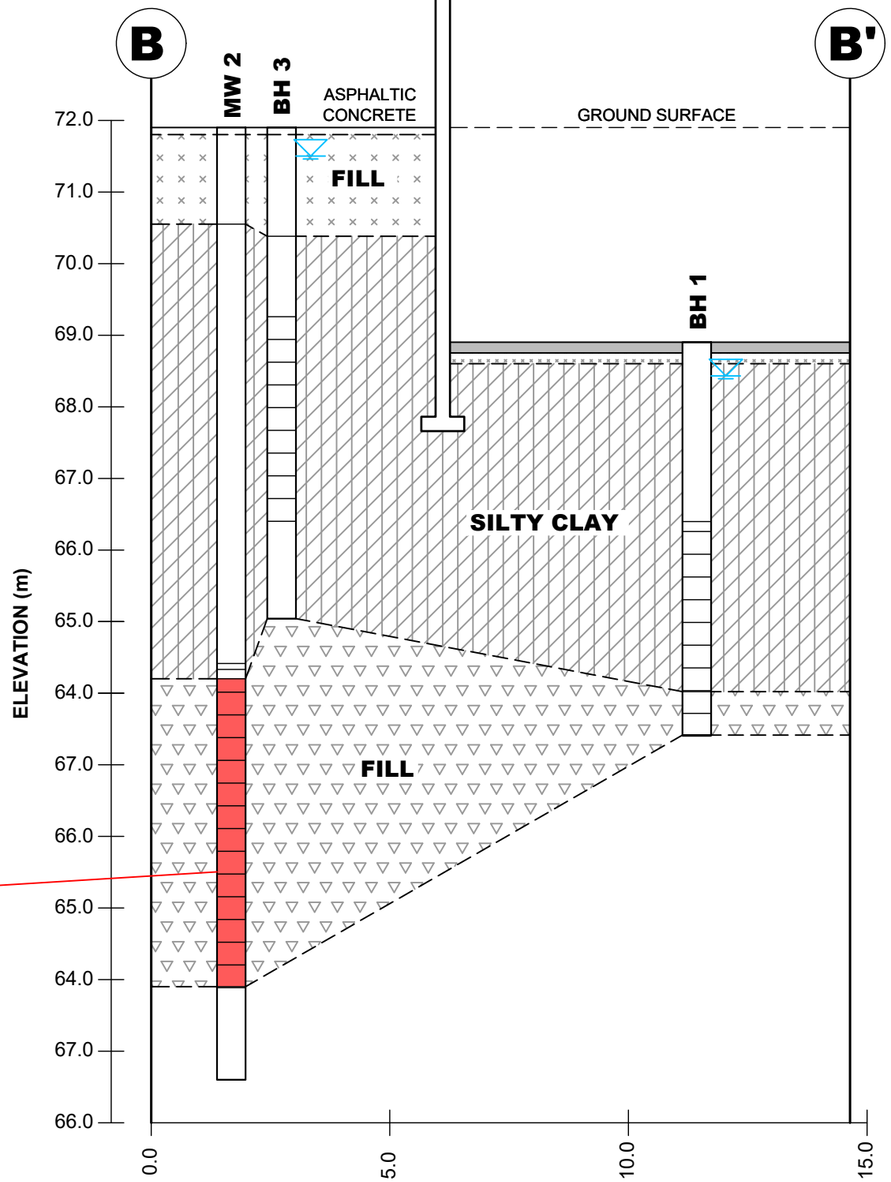

BH2-GW (MW-2)	7.5-12.0m	23-Dec-10
Parameter	Results (ug/L)	Table 3 (ug/L)
Mercury	0.3	0.29

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 3 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 3 STANDARDS

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NO.	REVISIONS	DATE	INITIAL
0			

URBAN CAPITAL PROPERTY GROUP

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
394-404 BANK STREET

OTTAWA, ONTARIO

Title:
CROSS SECTION B-B - GROUNDWATER (METALS)

Scale: 1:150	Date: 03/2020
Drawn by: MPG	Report No.: PE4650-3
Checked by: MW	Dwg. No.: PE4650-10B
Approved by: MSD	Revision No.:

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APPENDIX 1

SAMPLING AND ANALYSIS PLAN

SOIL PROFILE AND TEST DATA SHEETS

SYMBOLS AND TERMS

LABORATORY CERTIFICATES OF ANALYSIS

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

Archaeological Services

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Sampling & Analysis Plan

Phase II Environmental Site Assessment
394-404 Bank Street
Ottawa, Ontario

Prepared For

Urban Capital Group

February 2020

Report: PE4650-SAP

TABLE OF CONTENTS

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Urban Capital Group to conduct a Phase II Environmental Site Assessment (ESA) for the properties addressed 394-404 Bank Street, in the City of Ottawa, Ontario. Based on the Phase I ESA conducted by Paterson, a subsurface investigation program, consisting of borehole drilling, was developed as part of this Phase II ESA.

Borehole	Location & Rationale	Proposed Depth & Rationale
BH1	Place borehole in the interior of the subject building to address the historical paint store (APEC 1).	Drill to a depth of at least 5 m to access groundwater table for monitoring well installation.
BH2	Place borehole in the interior of the subject building to address the historical paint store (APEC 1).	Drill to a depth of at least 5 m to access groundwater table for monitoring well installation.
BH3	Place borehole at approximate location to address the historical off-site automotive repair garage (APEC 3).	Drill to a depth of at least 6 m to access groundwater table for monitoring well installation.
BH4	Place borehole at approximate location to access fill material (APEC 2).	Drill to a depth of 3 m.

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 and orientations of boreholes with respect to site features (buildings, roadways, etc.) must be provided. Distances should be measured using a measuring tape or wheel rather than paced off. Ground surface elevations at each borehole should be surveyed relative to the top grate of a catchbasin located on James Street with geodetic elevation of 71.77m above sea level (asl).

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 MOE site remediation standards by a large margin, the decision-making usefulness of the sample may not be considered to be impaired. The proximity of other samples which meet the DQOs must also be considered in developing the Phase II Conceptual Site Model; often there are enough data available to produce a reliable Phase II Conceptual Site Model even if DQOs are not met for certain individual samples.

These considerations are discussed in the body of the report.

6.0 PHYSICAL IMPEDIMENTS 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.

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
394-404 Bank Street
Ottawa, Ontario

DATUM TBM - Top of manhole cover located on James Street, northwest entrance to site. Geodetic elevation = 71.77m.

FILE NO. PE4650

REMARKS

HOLE NO. BH 1

BORINGS BY CME 55 Power Auger **DATE** 2020 February 13

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector ● Volatile Organic Rdg. (ppm) / ○ Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Tiles over concrete 0.15									
FILL: Brown silty clay with gravel 0.30		AU	1						
		SS	2	100		1	67.87		
		SS	3	100					
		SS	4	100		2	66.87		
Grey **SILTY CLAY**		SS	5	100		3	65.87		
		SS	6	100					
		SS	7	100		4	64.87		
		SS	8	100					
4.88									
GLACIAL TILL: Grey silty clay with sand, some gravel		SS	9	100		5	63.87		
5.49									
End of Borehole									
(GWL @ 0.47m - March 10, 2020)									

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

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
394-404 Bank Street
Ottawa, Ontario

DATUM TBM - Top of manhole cover located on James Street, northwest entrance to site. Geodetic elevation = 71.77m.

FILE NO. PE4650

REMARKS

HOLE NO. BH 2

BORINGS BY CME 55 Power Auger **DATE** 2020 February 13

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE						0	69.14		
Concrete 0.13									
FILL: Brown silty sand with gravel, some clay 0.38		AU	1						
		SS	2	100		1	68.14		
		SS	3	100					
		SS	4	100		2	67.14		
Grey **SILTY CLAY**		SS	5	100					
		SS	6	100		3	66.14		
		SS	7	100		4	65.14		
		SS	8	100					
5.18						5	64.14		
End of Borehole									
(GWL @ 1.86m - March 10, 2020)									

Lower Explosive Limit % scale: 20 40 60 80

RKI Eagle Rdg. (ppm): 100 200 300 400 500

▲ Full Gas Resp. △ Methane Elim.

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154 Colonnade Road South, Ottawa, Ontario K2E 7J5

SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
394-404 Bank Street
Ottawa, Ontario

DATUM TBM - Top of manhole cover located on James Street, northwest entrance to site. Geodetic elevation = 71.77m.

FILE NO. PE4650

REMARKS

HOLE NO. BH 3

BORINGS BY CME-55 Low Clearance Drill **DATE** 2020 March 6

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)
GROUND SURFACE							
Asphaltic concrete 0.10		AU	1			0	71.89
FILL: Brown silty sand with crushed stone, trace wood		SS	2	46	7	1	70.89
1.52							
Brown **SILTY CLAY/CLAYEY SILT**		SS	3	38	7	2	69.89
		SS	4	100	4		
3.05						3	68.89
Grey **SILTY CLAY**		SS	5	100	2		
		SS	6	100	2	4	67.89
		SS	7	100	2	5	66.89
		SS	8	100	W		
		SS	9	100	W	6	65.89
6.86							
End of Borehole							
(GWL @ 0.40m - March 10, 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

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SOIL PROFILE AND TEST DATA

Phase II - Environmental Site Assessment
394-404 Bank Street
Ottawa, Ontario

DATUM TBM - Top of manhole cover located on James Street, northwest entrance to site. Geodetic elevation = 71.77m.

FILE NO. PE4650

REMARKS

HOLE NO. BH 4

BORINGS BY CME-55 Low Clearance Drill **DATE** 2020 March 6

SOIL DESCRIPTION	STRATA PLOT	SAMPLE TYPE	SAMPLE NUMBER	SAMPLE % RECOVERY	SAMPLE N VALUE or RQD	DEPTH (m)	ELEV. (m)	Photo Ionization Detector: Volatile Organic Rdg. (ppm) / Lower Explosive Limit %	Monitoring Well Construction
GROUND SURFACE									
Asphaltic concrete 0.13		AU	1			0	71.85		
FILL: Brown silty sand with gravel		SS	2	38	8	1	70.85		
		SS	3	29	9	2	69.85		
2.29									
Brown **SILTY CLAY**		SS	4	58	8				
2.90									
End of Borehole									

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

100 200 300 400 500

RKI Eagle Rdg. (ppm)

▲ Full Gas Resp. △ Methane Elim.

SYMBOLS AND TERMS

SOIL DESCRIPTION

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

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

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

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

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

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

SYMBOLS AND TERMS (continued)

SOIL DESCRIPTION (continued)

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

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

ROCK DESCRIPTION

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

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

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

SAMPLE TYPES

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

SYMBOLS AND TERMS (continued)

PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

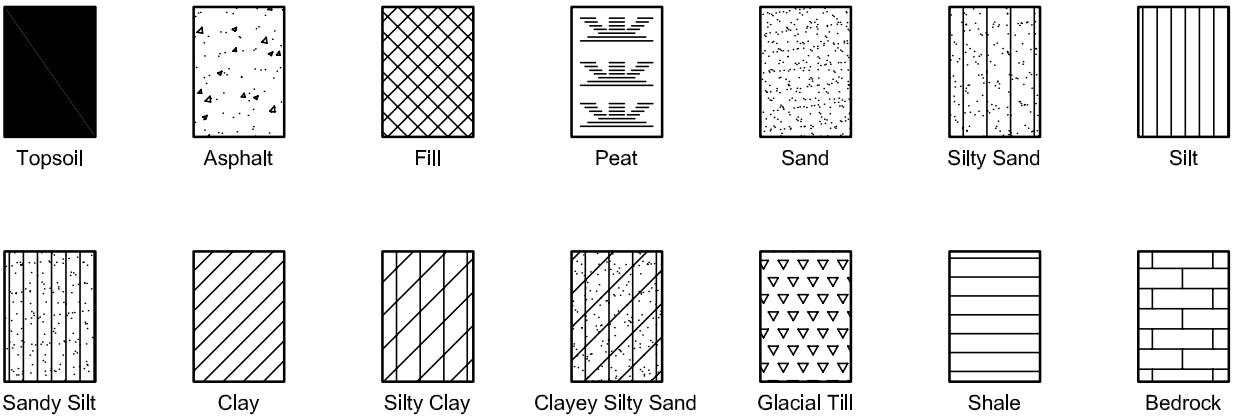
p'_o	-	Present effective overburden pressure at sample depth
p'_c	-	Preconsolidation pressure of (maximum past pressure on) sample
Ccr	-	Recompression index (in effect at pressures below p'_c)
Cc	-	Compression index (in effect at pressures above p'_c)
OC Ratio		Overconsolidaton ratio = p'_c / p'_o
Void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

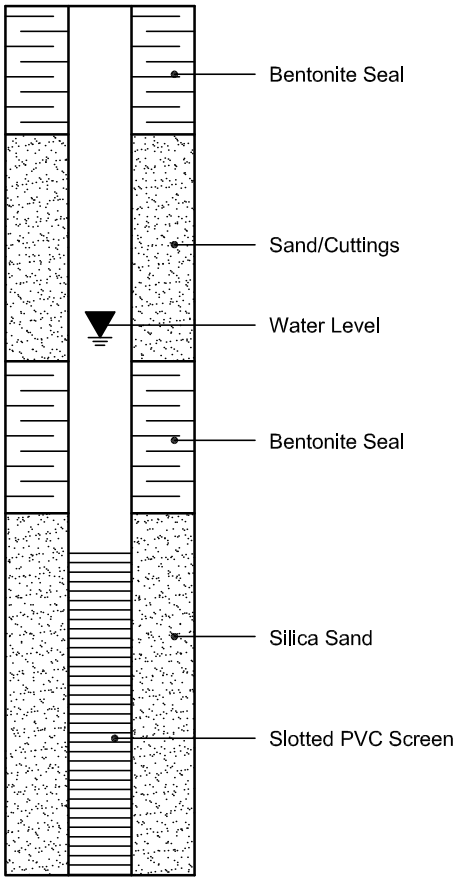
SYMBOLS AND TERMS (continued)

STRATA PLOT

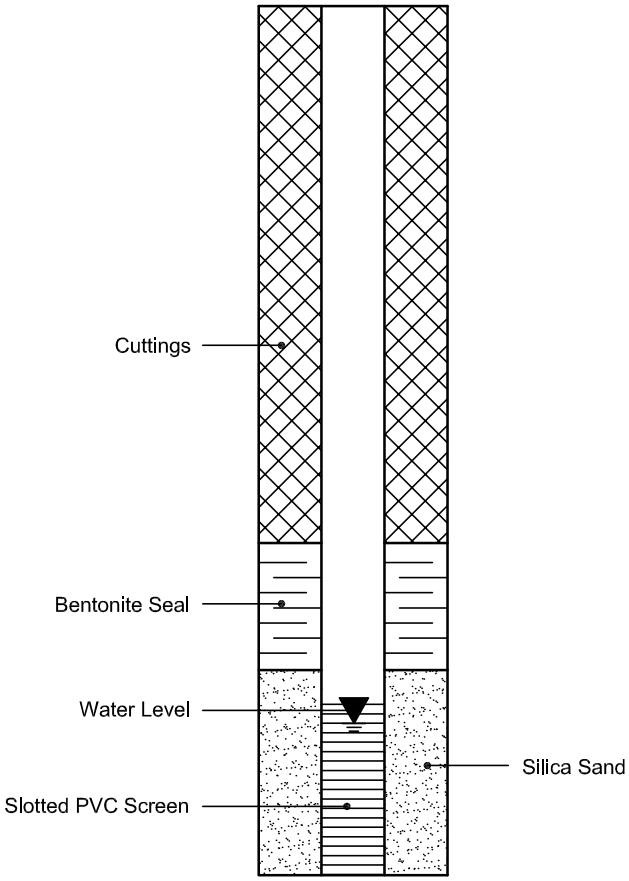


MONITORING WELL AND PIEZOMETER CONSTRUCTION

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: 29530
Project: PE4650
Custody: 126933

Report Date: 21-Feb-2020
Order Date: 14-Feb-2020

Order #: 2007645

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

Paracel ID	Client ID
2007645-01	BH1-SS7
2007645-02	BH2-AS1
2007645-03	Dup

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 21-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 14-Feb-2020

Client PO: 29530

Project Description: PE4650

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	18-Feb-20	19-Feb-20
Mercury by CVAA	EPA 7471B - CVAA, digestion	19-Feb-20	20-Feb-20
PHC F1	CWS Tier 1 - P&T GC-FID	19-Feb-20	20-Feb-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	18-Feb-20	20-Feb-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	19-Feb-20	19-Feb-20
REG 153: VOCs by P&T GC/MS	EPA 8260 - P&T GC-MS	19-Feb-20	20-Feb-20
Solids, %	Gravimetric, calculation	19-Feb-20	20-Feb-20

Certificate of Analysis

Report Date: 21-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 14-Feb-2020

Client PO: 29530

Project Description: PE4650

	Client ID:	BH1-SS7	BH2-AS1	Dup	-
	Sample Date:	13-Feb-20 09:00	13-Feb-20 09:00	13-Feb-20 09:00	-
	Sample ID:	2007645-01	2007645-02	2007645-03	-
	MDL/Units	Soil	Soil	Soil	-
Physical Characteristics					
% Solids	0.1 % by Wt.	54.1	58.3	53.9	-
Metals					
Antimony	1.0 ug/g dry	-	<1.0	-	-
Arsenic	1.0 ug/g dry	-	2.3	-	-
Barium	1.0 ug/g dry	-	363	-	-
Beryllium	0.5 ug/g dry	-	0.9	-	-
Boron	5.0 ug/g dry	-	6.1	-	-
Cadmium	0.5 ug/g dry	-	<0.5	-	-
Chromium	5.0 ug/g dry	-	141	-	-
Chromium (VI)	0.2 ug/g dry	-	0.3	-	-
Cobalt	1.0 ug/g dry	-	26.5	-	-
Copper	5.0 ug/g dry	-	61.1	-	-
Lead	1.0 ug/g dry	-	10.5	-	-
Mercury	0.1 ug/g dry	-	<0.1	-	-
Molybdenum	1.0 ug/g dry	-	<1.0	-	-
Nickel	5.0 ug/g dry	-	75.3	-	-
Selenium	1.0 ug/g dry	-	<1.0	-	-
Silver	0.3 ug/g dry	-	<0.3	-	-
Thallium	1.0 ug/g dry	-	<1.0	-	-
Uranium	1.0 ug/g dry	-	<1.0	-	-
Vanadium	10.0 ug/g dry	-	125	-	-
Zinc	20.0 ug/g dry	-	142	-	-
Volatiles					
Acetone	0.50 ug/g dry	<0.50	<0.50	<0.50	-
Benzene	0.02 ug/g dry	<0.02	<0.02	<0.02	-
Bromodichloromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Bromoform	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Bromomethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Carbon Tetrachloride	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Chlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Chloroform	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Dibromochloromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Dichlorodifluoromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,3-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-

Certificate of Analysis

Report Date: 21-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 14-Feb-2020

Client PO: 29530

Project Description: PE4650

	Client ID:	BH1-SS7	BH2-AS1	Dup	-
	Sample Date:	13-Feb-20 09:00	13-Feb-20 09:00	13-Feb-20 09:00	-
	Sample ID:	2007645-01	2007645-02	2007645-03	-
	MDL/Units	Soil	Soil	Soil	-
1,4-Dichlorobenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
cis-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
trans-1,2-Dichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,2-Dichloropropane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
cis-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
trans-1,3-Dichloropropylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,3-Dichloropropene, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Ethylbenzene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Ethylene dibromide (dibromoethane, 1,2-)	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Hexane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Methyl Ethyl Ketone (2-Butanone)	0.50 ug/g dry	<0.50	<0.50	<0.50	-
Methyl Isobutyl Ketone	0.50 ug/g dry	<0.50	<0.50	<0.50	-
Methyl tert-butyl ether	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Methylene Chloride	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Styrene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,1,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,2,2-Tetrachloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Tetrachloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Toluene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,1-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
1,1,2-Trichloroethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Trichloroethylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Trichlorofluoromethane	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Vinyl chloride	0.02 ug/g dry	<0.02	<0.02	<0.02	-
m,p-Xylenes	0.05 ug/g dry	<0.05	<0.05	<0.05	-
o-Xylene	0.05 ug/g dry	<0.05	<0.05	<0.05	-
Xylenes, total	0.05 ug/g dry	<0.05	<0.05	<0.05	-
4-Bromofluorobenzene	Surrogate	107%	116%	113%	-
Dibromofluoromethane	Surrogate	116%	112%	115%	-
Toluene-d8	Surrogate	115%	114%	117%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	<7	-	-	-
F2 PHCs (C10-C16)	4 ug/g dry	<4	-	-	-

Certificate of Analysis

Report Date: 21-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 14-Feb-2020

Client PO: 29530

Project Description: PE4650

	Client ID:	BH1-SS7	BH2-AS1	Dup	-
	Sample Date:	13-Feb-20 09:00	13-Feb-20 09:00	13-Feb-20 09:00	-
	Sample ID:	2007645-01	2007645-02	2007645-03	-
	MDL/Units	Soil	Soil	Soil	-
F3 PHCs (C16-C34)	8 ug/g dry	<8	-	-	-
F4 PHCs (C34-C50)	6 ug/g dry	<6	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
Volatiles									
Acetone	ND	0.50	ug/g						
Benzene	ND	0.02	ug/g						
Bromodichloromethane	ND	0.05	ug/g						
Bromoform	ND	0.05	ug/g						
Bromomethane	ND	0.05	ug/g						
Carbon Tetrachloride	ND	0.05	ug/g						
Chlorobenzene	ND	0.05	ug/g						
Chloroform	ND	0.05	ug/g						
Dibromochloromethane	ND	0.05	ug/g						
Dichlorodifluoromethane	ND	0.05	ug/g						
1,2-Dichlorobenzene	ND	0.05	ug/g						
1,3-Dichlorobenzene	ND	0.05	ug/g						
1,4-Dichlorobenzene	ND	0.05	ug/g						
1,1-Dichloroethane	ND	0.05	ug/g						
1,2-Dichloroethane	ND	0.05	ug/g						
1,1-Dichloroethylene	ND	0.05	ug/g						
cis-1,2-Dichloroethylene	ND	0.05	ug/g						
trans-1,2-Dichloroethylene	ND	0.05	ug/g						
1,2-Dichloropropane	ND	0.05	ug/g						
cis-1,3-Dichloropropylene	ND	0.05	ug/g						
trans-1,3-Dichloropropylene	ND	0.05	ug/g						
1,3-Dichloropropene, total	ND	0.05	ug/g						
Ethylbenzene	ND	0.05	ug/g						
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g						
Hexane	ND	0.05	ug/g						
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g						
Methyl Isobutyl Ketone	ND	0.50	ug/g						
Methyl tert-butyl ether	ND	0.05	ug/g						
Methylene Chloride	ND	0.05	ug/g						
Styrene	ND	0.05	ug/g						
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g						
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g						
Tetrachloroethylene	ND	0.05	ug/g						

Certificate of Analysis

Report Date: 21-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 14-Feb-2020

Client PO: 29530

Project Description: PE4650

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Toluene	ND	0.05	ug/g						
1,1,1-Trichloroethane	ND	0.05	ug/g						
1,1,2-Trichloroethane	ND	0.05	ug/g						
Trichloroethylene	ND	0.05	ug/g						
Trichlorofluoromethane	ND	0.05	ug/g						
Vinyl chloride	ND	0.02	ug/g						
m,p-Xylenes	ND	0.05	ug/g						
o-Xylene	ND	0.05	ug/g						
Xylenes, total	ND	0.05	ug/g						
Surrogate: 4-Bromofluorobenzene	*3.39*		*ug/g*		*106*	*50-140*			
Surrogate: Dibromofluoromethane	*2.78*		*ug/g*		*86.8*	*50-140*			
Surrogate: Toluene-d8	*3.36*		*ug/g*		*105*	*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	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Metals									
Antimony	1.8	1.0	ug/g dry	1.7			2.6	30	
Arsenic	1.9	1.0	ug/g dry	1.8			3.5	30	
Barium	177	1.0	ug/g dry	184			3.8	30	
Beryllium	1.1	0.5	ug/g dry	0.8			26.0	30	
Boron	5.8	5.0	ug/g dry	5.5			4.9	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	56.4	5.0	ug/g dry	56.8			0.7	30	
Cobalt	12.8	1.0	ug/g dry	13.2			2.8	30	
Copper	22.6	5.0	ug/g dry	22.8			1.1	30	
Lead	5.3	1.0	ug/g dry	5.7			6.8	30	
Mercury	ND	0.1	ug/g dry	ND			NC	30	
Molybdenum	ND	1.0	ug/g dry	ND			NC	30	
Nickel	29.5	5.0	ug/g dry	28.5			3.4	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	0.3	0.3	ug/g dry	0.3			7.1	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	67.3	10.0	ug/g dry	67.8			0.8	30	
Zinc	79.6	20.0	ug/g dry	80.5			1.2	30	
Physical Characteristics									
% Solids	91.2	0.1	% by Wt.	90.0			1.4	25	
Volatiles									
Acetone	ND	0.50	ug/g dry	ND			NC	50	
Benzene	ND	0.02	ug/g dry	ND			NC	50	
Bromodichloromethane	ND	0.05	ug/g dry	ND			NC	50	
Bromoform	ND	0.05	ug/g dry	ND			NC	50	
Bromomethane	ND	0.05	ug/g dry	ND			NC	50	
Carbon Tetrachloride	ND	0.05	ug/g dry	ND			NC	50	
Chlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
Chloroform	ND	0.05	ug/g dry	ND			NC	50	
Dibromochloromethane	ND	0.05	ug/g dry	ND			NC	50	
Dichlorodifluoromethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,3-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,4-Dichlorobenzene	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
cis-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,2-Dichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
1,2-Dichloropropane	ND	0.05	ug/g dry	ND			NC	50	
cis-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
trans-1,3-Dichloropropylene	ND	0.05	ug/g dry	ND			NC	50	
Ethylbenzene	ND	0.05	ug/g dry	ND			NC	50	
Ethylene dibromide (dibromoethane, 1,2	ND	0.05	ug/g dry	ND			NC	50	
Hexane	ND	0.05	ug/g dry	ND			NC	50	
Methyl Ethyl Ketone (2-Butanone)	ND	0.50	ug/g dry	ND			NC	50	
Methyl Isobutyl Ketone	ND	0.50	ug/g dry	ND			NC	50	
Methyl tert-butyl ether	ND	0.05	ug/g dry	ND			NC	50	
Methylene Chloride	ND	0.05	ug/g dry	ND			NC	50	

Method Quality Control: Duplicate

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Styrene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2,2-Tetrachloroethane	ND	0.05	ug/g dry	ND			NC	50	
Tetrachloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Toluene	ND	0.05	ug/g dry	ND			NC	50	
1,1,1-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
1,1,2-Trichloroethane	ND	0.05	ug/g dry	ND			NC	50	
Trichloroethylene	ND	0.05	ug/g dry	ND			NC	50	
Trichlorofluoromethane	ND	0.05	ug/g dry	ND			NC	50	
Vinyl chloride	ND	0.02	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: 4-Bromofluorobenzene	*4.14*		*ug/g dry*		*117*	*50-140*			
Surrogate: Dibromofluoromethane	*4.15*		*ug/g dry*		*117*	*50-140*			
Surrogate: Toluene-d8	*4.01*		*ug/g dry*		*113*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	166	7	ug/g	ND	83.2	80-120			
F2 PHCs (C10-C16)	109	4	ug/g	ND	97.9	60-140			
F3 PHCs (C16-C34)	283	8	ug/g	ND	104	60-140			
F4 PHCs (C34-C50)	165	6	ug/g	ND	96.0	60-140			
Metals									
Antimony	45.9	1.0	ug/g	ND	90.5	70-130			
Arsenic	47.4	1.0	ug/g	ND	93.4	70-130			
Barium	126	1.0	ug/g	73.5	104	70-130			
Beryllium	53.0	0.5	ug/g	ND	105	70-130			
Boron	48.9	5.0	ug/g	ND	93.4	70-130			
Cadmium	46.7	0.5	ug/g	ND	93.1	70-130			
Chromium (VI)	5.0	0.2	ug/g	ND	100	70-130			
Chromium	74.9	5.0	ug/g	22.7	104	70-130			
Cobalt	54.3	1.0	ug/g	5.3	98.0	70-130			
Copper	59.2	5.0	ug/g	9.1	100	70-130			
Lead	45.2	1.0	ug/g	2.3	85.8	70-130			
Mercury	1.78	0.1	ug/g	ND	119	70-130			
Molybdenum	49.5	1.0	ug/g	ND	98.6	70-130			
Nickel	60.5	5.0	ug/g	11.4	98.2	70-130			
Selenium	45.4	1.0	ug/g	ND	90.4	70-130			
Silver	47.7	0.3	ug/g	ND	95.0	70-130			
Thallium	39.9	1.0	ug/g	ND	79.5	70-130			
Uranium	42.6	1.0	ug/g	ND	84.4	70-130			
Vanadium	80.0	10.0	ug/g	27.1	106	70-130			
Zinc	81.0	20.0	ug/g	32.2	97.6	70-130			
Volatiles									
Acetone	8.10	0.50	ug/g	ND	81.0	50-140			
Benzene	2.46	0.02	ug/g	ND	61.5	60-130			
Bromodichloromethane	3.01	0.05	ug/g	ND	75.3	60-130			
Bromoform	3.63	0.05	ug/g	ND	90.9	60-130			
Bromomethane	2.78	0.05	ug/g	ND	69.6	50-140			
Carbon Tetrachloride	2.90	0.05	ug/g	ND	72.5	60-130			
Chlorobenzene	3.31	0.05	ug/g	ND	82.7	60-130			
Chloroform	3.01	0.05	ug/g	ND	75.3	60-130			
Dibromochloromethane	3.52	0.05	ug/g	ND	88.1	60-130			
Dichlorodifluoromethane	2.32	0.05	ug/g	ND	58.0	50-140			
1,2-Dichlorobenzene	3.04	0.05	ug/g	ND	76.0	60-130			
1,3-Dichlorobenzene	2.99	0.05	ug/g	ND	74.6	60-130			
1,4-Dichlorobenzene	3.07	0.05	ug/g	ND	76.6	60-130			
1,1-Dichloroethane	2.85	0.05	ug/g	ND	71.3	60-130			
1,2-Dichloroethane	3.26	0.05	ug/g	ND	81.5	60-130			
1,1-Dichloroethylene	3.31	0.05	ug/g	ND	82.6	60-130			
cis-1,2-Dichloroethylene	2.76	0.05	ug/g	ND	68.9	60-130			
trans-1,2-Dichloroethylene	2.56	0.05	ug/g	ND	64.1	60-130			
1,2-Dichloropropane	2.48	0.05	ug/g	ND	62.1	60-130			
cis-1,3-Dichloropropylene	2.73	0.05	ug/g	ND	68.3	60-130			
trans-1,3-Dichloropropylene	2.66	0.05	ug/g	ND	66.4	60-130			
Ethylbenzene	3.29	0.05	ug/g	ND	82.3	60-130			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Ethylene dibromide (dibromoethane, 1,2-	3.26	0.05	ug/g	ND	81.4	60-130			
Hexane	2.98	0.05	ug/g	ND	74.5	60-130			
Methyl Ethyl Ketone (2-Butanone)	6.44	0.50	ug/g	ND	64.4	50-140			
Methyl Isobutyl Ketone	6.28	0.50	ug/g	ND	62.8	50-140			
Methyl tert-butyl ether	6.42	0.05	ug/g	ND	64.2	50-140			
Methylene Chloride	2.94	0.05	ug/g	ND	73.6	60-130			
Styrene	3.22	0.05	ug/g	ND	80.4	60-130			
1,1,1,2-Tetrachloroethane	3.72	0.05	ug/g	ND	93.1	60-130			
1,1,2,2-Tetrachloroethane	2.51	0.05	ug/g	ND	62.9	60-130			
Tetrachloroethylene	3.15	0.05	ug/g	ND	78.8	60-130			
Toluene	3.16	0.05	ug/g	ND	78.9	60-130			
1,1,1-Trichloroethane	2.91	0.05	ug/g	ND	72.8	60-130			
1,1,2-Trichloroethane	2.74	0.05	ug/g	ND	68.6	60-130			
Trichloroethylene	3.08	0.05	ug/g	ND	77.1	60-130			
Trichlorofluoromethane	3.18	0.05	ug/g	ND	79.4	50-140			
Vinyl chloride	3.50	0.02	ug/g	ND	87.5	50-140			
m,p-Xylenes	6.81	0.05	ug/g	ND	85.1	60-130			
o-Xylene	3.59	0.05	ug/g	ND	89.8	60-130			
Surrogate: 4-Bromofluorobenzene	*2.83*		*ug/g*		*88.5*	*50-140*			
Surrogate: Dibromofluoromethane	*3.19*		*ug/g*		*99.6*	*50-140*			
Surrogate: Toluene-d8	*2.87*		*ug/g*		*89.5*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

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

CCME PHC additional information:

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

PARACEL LABORATORIES LTD.

Paracel ID: 2007645

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2007645	Nº 126933

Client Name: Paterson Group	Project Ref: PE4650	Page 1 of 1
Contact Name: Mark D'Arcy	Quote #:	Turnaround Time
Address: 154 Colonnade Road	PO #: 29530	☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone: 613-226-7381	E-mail: mdarcy@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)	PHCs (F2 - F4)
1	BH1-SS7	S		2	Feb 13/2020			X						X
2	BH2-AS1	S		2	↓			X		X	X	X		
3	Dup	S		2	↓			X						
4														
5														
6														
7														
8														
9														
10														

Comments: BH2-AS1 - VOCs included

Method of Delivery: Paracel

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Nicholas Doucette	Date/Time: 14/02/20 2 15	Date/Time: Feb/14/2020 16:45	Date/Time: Feb/14/2020 17:30
Date/Time: Feb 14th 2020 2:22 pm	Temperature: °C	Temperature: 7.6 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 29606
Project: PE4650
Custody:

Report Date: 13-Mar-2020
Order Date: 9-Mar-2020

Revised Report

Order #: 2011122

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

Paracel ID	Client ID
2011122-01	BH3-SS2
2011122-02	BH3-SS4
2011122-03	BH3-SS6
2011122-04	BH3-SS9
2011122-05	BH4-SS2

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 13-Mar-2020

Client: Paterson Group Consulting Engineers

Order Date: 9-Mar-2020

Client PO: 29606

Project Description: PE4650

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
BTEX by P&T GC-MS	EPA 8260 - P&T GC-MS	11-Mar-20	13-Mar-20
Chromium, hexavalent - soil	MOE E3056 - Extraction, colourimetric	10-Mar-20	13-Mar-20
Mercury by CVAA	EPA 7471B - CVAA, digestion	12-Mar-20	12-Mar-20
PHC F1	CWS Tier 1 - P&T GC-FID	11-Mar-20	13-Mar-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	10-Mar-20	12-Mar-20
REG 153: Metals by ICP/MS, soil	EPA 6020 - Digestion - ICP-MS	12-Mar-20	12-Mar-20
Solids, %	Gravimetric, calculation	12-Mar-20	12-Mar-20

Certificate of Analysis

Report Date: 13-Mar-2020

Client: Paterson Group Consulting Engineers

Order Date: 9-Mar-2020

Client PO: 29606

Project Description: PE4650

	Client ID:	BH3-SS2	BH3-SS4	BH3-SS6	BH3-SS9
	Sample Date:	06-Mar-20 09:00	06-Mar-20 09:00	06-Mar-20 09:00	06-Mar-20 09:00
	Sample ID:	2011122-01	2011122-02	2011122-03	2011122-04
	MDL/Units	Soil	Soil	Soil	Soil
Physical Characteristics					
% Solids	0.1 % by Wt.	74.1	63.5	55.1	56.9
Metals					
Antimony	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Arsenic	1.0 ug/g dry	6.1	3.5	3.4	3.5
Barium	1.0 ug/g dry	411	330	279	230
Beryllium	0.5 ug/g dry	0.6	0.8	0.7	0.8
Boron	5.0 ug/g dry	<5.0	5.8	8.1	11.1
Cadmium	0.5 ug/g dry	<0.5	<0.5	<0.5	<0.5
Chromium	5.0 ug/g dry	67.7	113	118	89.9
Chromium (VI)	0.2 ug/g dry	<0.2	-	-	-
Cobalt	1.0 ug/g dry	14.1	21.3	21.4	17.4
Copper	5.0 ug/g dry	44.0	49.4	43.0	36.4
Lead	1.0 ug/g dry	698	12.6	9.7	7.1
Mercury	0.1 ug/g dry	0.1	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Nickel	5.0 ug/g dry	33.5	61.1	65.1	48.0
Selenium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Silver	0.3 ug/g dry	<0.3	<0.3	<0.3	<0.3
Thallium	1.0 ug/g dry	<1.0	<1.0	<1.0	<1.0
Uranium	1.0 ug/g dry	<1.0	<1.0	<1.0	1.6
Vanadium	10.0 ug/g dry	64.9	98.5	92.8	82.3
Zinc	20.0 ug/g dry	219	118	107	99.4
Volatiles					
Benzene	0.02 ug/g dry	-	-	<0.02	-
Ethylbenzene	0.05 ug/g dry	-	-	<0.05	-
Toluene	0.05 ug/g dry	-	-	<0.05	-
m,p-Xylenes	0.05 ug/g dry	-	-	<0.05	-
o-Xylene	0.05 ug/g dry	-	-	<0.05	-
Xylenes, total	0.05 ug/g dry	-	-	<0.05	-
Toluene-d8	Surrogate	-	-	119%	-
Hydrocarbons					
F1 PHCs (C6-C10)	7 ug/g dry	-	-	<7	-
F2 PHCs (C10-C16)	4 ug/g dry	-	-	<4	-
F3 PHCs (C16-C34)	8 ug/g dry	-	-	<8	-
F4 PHCs (C34-C50)	6 ug/g dry	-	-	<6	-

Certificate of Analysis

Report Date: 13-Mar-2020

Client: Paterson Group Consulting Engineers

Order Date: 9-Mar-2020

Client PO: 29606

Project Description: PE4650

	Client ID:	BH4-SS2	-	-	-
	Sample Date:	06-Mar-20 09:00	-	-	-
	Sample ID:	2011122-05	-	-	-
	MDL/Units	Soil	-	-	-
Physical Characteristics					
% Solids	0.1 % by Wt.	85.6	-	-	-
Metals					
Antimony	1.0 ug/g dry	<1.0	-	-	-
Arsenic	1.0 ug/g dry	2.9	-	-	-
Barium	1.0 ug/g dry	58.6	-	-	-
Beryllium	0.5 ug/g dry	<0.5	-	-	-
Boron	5.0 ug/g dry	<5.0	-	-	-
Cadmium	0.5 ug/g dry	<0.5	-	-	-
Chromium	5.0 ug/g dry	29.9	-	-	-
Chromium (VI)	0.2 ug/g dry	<0.2	-	-	-
Cobalt	1.0 ug/g dry	6.0	-	-	-
Copper	5.0 ug/g dry	14.7	-	-	-
Lead	1.0 ug/g dry	15.7	-	-	-
Mercury	0.1 ug/g dry	<0.1	-	-	-
Molybdenum	1.0 ug/g dry	<1.0	-	-	-
Nickel	5.0 ug/g dry	13.6	-	-	-
Selenium	1.0 ug/g dry	<1.0	-	-	-
Silver	0.3 ug/g dry	<0.3	-	-	-
Thallium	1.0 ug/g dry	<1.0	-	-	-
Uranium	1.0 ug/g dry	<1.0	-	-	-
Vanadium	10.0 ug/g dry	50.1	-	-	-
Zinc	20.0 ug/g dry	63.5	-	-	-

Certificate of Analysis

Report Date: 13-Mar-2020

Client: Paterson Group Consulting Engineers

Order Date: 9-Mar-2020

Client PO: 29606

Project Description: PE4650

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	7	ug/g						
F2 PHCs (C10-C16)	ND	4	ug/g						
F3 PHCs (C16-C34)	ND	8	ug/g						
F4 PHCs (C34-C50)	ND	6	ug/g						
Metals									
Antimony	ND	1.0	ug/g						
Arsenic	ND	1.0	ug/g						
Barium	ND	1.0	ug/g						
Beryllium	ND	0.5	ug/g						
Boron	ND	5.0	ug/g						
Cadmium	ND	0.5	ug/g						
Chromium (VI)	ND	0.2	ug/g						
Chromium	ND	5.0	ug/g						
Cobalt	ND	1.0	ug/g						
Copper	ND	5.0	ug/g						
Lead	ND	1.0	ug/g						
Mercury	ND	0.1	ug/g						
Molybdenum	ND	1.0	ug/g						
Nickel	ND	5.0	ug/g						
Selenium	ND	1.0	ug/g						
Silver	ND	0.3	ug/g						
Thallium	ND	1.0	ug/g						
Uranium	ND	1.0	ug/g						
Vanadium	ND	10.0	ug/g						
Zinc	ND	20.0	ug/g						
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	*3.81*		*ug/g*		*119*	*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	4	ug/g dry	ND			NC	30	
F3 PHCs (C16-C34)	ND	8	ug/g dry	ND			NC	30	
F4 PHCs (C34-C50)	ND	6	ug/g dry	ND			NC	30	
Metals									
Antimony	ND	1.0	ug/g dry	ND			NC	30	
Arsenic	5.9	1.0	ug/g dry	6.1			3.3	30	
Barium	409	1.0	ug/g dry	411			0.5	30	
Beryllium	0.8	0.5	ug/g dry	0.6			24.6	30	
Boron	5.2	5.0	ug/g dry	ND			NC	30	
Cadmium	ND	0.5	ug/g dry	ND			NC	30	
Chromium (VI)	ND	0.2	ug/g dry	ND			NC	35	
Chromium	66.7	5.0	ug/g dry	67.7			1.5	30	
Cobalt	14.2	1.0	ug/g dry	14.1			0.6	30	
Copper	44.3	5.0	ug/g dry	44.0			0.8	30	
Lead	715	1.0	ug/g dry	698			2.5	30	
Mercury	0.209	0.1	ug/g dry	0.146			NC	30	
Molybdenum	1.2	1.0	ug/g dry	ND			NC	30	
Nickel	33.8	5.0	ug/g dry	33.5			0.8	30	
Selenium	ND	1.0	ug/g dry	ND			NC	30	
Silver	0.3	0.3	ug/g dry	ND			NC	30	
Thallium	ND	1.0	ug/g dry	ND			NC	30	
Uranium	ND	1.0	ug/g dry	ND			NC	30	
Vanadium	64.5	10.0	ug/g dry	64.9			0.6	30	
Zinc	223	20.0	ug/g dry	219			2.0	30	
Physical Characteristics									
% Solids	84.1	0.1	% by Wt.	84.5			0.5	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	*4.56*		*ug/g dry*		*120*	*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)	182	7	ug/g	ND	91.0	80-120			
F2 PHCs (C10-C16)	86	4	ug/g	ND	92.5	60-140			
F3 PHCs (C16-C34)	238	8	ug/g	ND	105	60-140			
F4 PHCs (C34-C50)	154	6	ug/g	ND	107	60-140			
Metals									
Antimony	38.8	1.0	ug/g	ND	77.3	70-130			
Arsenic	44.4	1.0	ug/g	2.4	84.0	70-130			
Barium	197	1.0	ug/g	164	65.6	70-130			QM-07
Beryllium	40.5	0.5	ug/g	ND	80.5	70-130			
Boron	37.9	5.0	ug/g	ND	72.4	70-130			
Cadmium	40.8	0.5	ug/g	ND	81.3	70-130			
Chromium (VI)	4.2	0.2	ug/g	ND	72.0	70-130			
Chromium	67.1	5.0	ug/g	27.1	80.0	70-130			
Cobalt	48.2	1.0	ug/g	5.6	85.2	70-130			
Copper	56.5	5.0	ug/g	17.6	77.8	70-130			
Lead	312	1.0	ug/g	279	65.9	70-130			QM-07
Mercury	1.63	0.1	ug/g	0.146	99.0	70-130			
Molybdenum	41.4	1.0	ug/g	ND	82.1	70-130			
Nickel	53.4	5.0	ug/g	13.4	80.0	70-130			
Selenium	41.2	1.0	ug/g	ND	82.2	70-130			
Silver	41.8	0.3	ug/g	ND	83.5	70-130			
Thallium	39.6	1.0	ug/g	ND	79.1	70-130			
Uranium	41.9	1.0	ug/g	ND	83.3	70-130			
Vanadium	67.2	10.0	ug/g	26.0	82.5	70-130			
Zinc	122	20.0	ug/g	87.5	68.9	70-130			QM-07
Volatiles									
Benzene	4.73	0.02	ug/g	ND	118	60-130			
Ethylbenzene	4.69	0.05	ug/g	ND	117	60-130			
Toluene	4.43	0.05	ug/g	ND	111	60-130			
m,p-Xylenes	8.96	0.05	ug/g	ND	112	60-130			
o-Xylene	4.79	0.05	ug/g	ND	120	60-130			
Surrogate: Toluene-d8	*3.19*		*ug/g*		*99.8*	*50-140*			

Qualifier Notes:

QC Qualifiers :

QM-07 : The spike recovery was outside acceptance limits for the MS and/or MSD. The batch was accepted based on other acceptable QC.

Sample Data Revisions

None

Work Order Revisions / Comments:

Revision 1- This report includes corrected values for %Solids

Other Report Notes:

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

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

CCME PHC additional information:

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

PARAC LABORATORIES

Paracel ID: 2011122

Head Office
800-2319 St. Laurent Blvd
Ottawa, Ontario K1G 4J8
1-800-749-1947
paracel@paracellabs.com
www.paracellabs.com

Paracel Order Number (Lab Use Only): 2011122

Chain Of Custody (Lab Use Only)

Client Name: Paterson Group
Contact Name: Mandy Witteman or Mark d'Arcy
Address: 154 Colonnade Rd S. Ottawa ON
Telephone: (613) 226-7381

Project Ref: PE4650
Quote #:
PO #: 29606
E-mail: mwitteman@patersongroup.ca
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)	Required Analysis
1	BH3-SS2	S		1	March 6/20					X	X	X		
2	BH3-SS4	S		1	"					X				
3	BH3-SS6	S		3	"		X			X				
4	BH3-SS9	S		1	"					X				
5	BH4-SS2	S		1	"					X	X	X		
6														
7														
8														
9														
10														

Comments:

Method of Delivery: Paracel

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Mandy Witteman	Date/Time: 09/03/20 4:00	Date/Time: 03/09/2020 16:40	Date/Time: 10 Mar 2020 8:30
Date/Time: March 6, 2020.	Temperature: °C	Temperature: 14.4 °C	pH Verified: ☐ By: NA

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 29584
Project: PE4650
Custody: 52336

Report Date: 28-Feb-2020
Order Date: 26-Feb-2020

Order #: 2009338

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

Paracel ID	Client ID
2009338-01	BH1-GW1
2009338-02	BH2-GW1
2009338-03	Dup

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 28-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 26-Feb-2020

Client PO: 29584

Project Description: PE4650

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	27-Feb-20	28-Feb-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	28-Feb-20	28-Feb-20
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	27-Feb-20	28-Feb-20

Certificate of Analysis

Report Date: 28-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 26-Feb-2020

Client PO: 29584

Project Description: PE4650

	Client ID:	BH1-GW1	BH2-GW1	Dup	-
	Sample Date:	20-Feb-20 16:00	20-Feb-20 15:10	20-Feb-20 00:00	-
	Sample ID:	2009338-01	2009338-02	2009338-03	-
	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	6.4	6.8	-
Dibromochloromethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	<1.0	<1.0	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,2-Dichloropropane	0.5 ug/L	<0.5	<0.5	<0.5	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylbenzene	0.5 ug/L	<0.5	<0.5	<0.5	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	<0.2	<0.2	-
Hexane	1.0 ug/L	<1.0	<1.0	<1.0	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	<5.0	<5.0	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	<2.0	<2.0	-
Methylene Chloride	5.0 ug/L	<5.0	<5.0	<5.0	-
Styrene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-
Tetrachloroethylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Toluene	0.5 ug/L	<0.5	<0.5	<0.5	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	<0.5	<0.5	-

Certificate of Analysis

Report Date: 28-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 26-Feb-2020

Client PO: 29584

Project Description: PE4650

	Client ID:	BH1-GW1	BH2-GW1	Dup	-
	Sample Date:	20-Feb-20 16:00	20-Feb-20 15:10	20-Feb-20 00:00	-
	Sample ID:	2009338-01	2009338-02	2009338-03	-
	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	<0.5	-
o-Xylene	0.5 ug/L	<0.5	<0.5	<0.5	-
Xylenes, total	0.5 ug/L	<0.5	<0.5	<0.5	-
4-Bromofluorobenzene	Surrogate	119%	125%	120%	-
Dibromofluoromethane	Surrogate	103%	109%	106%	-
Toluene-d8	Surrogate	108%	107%	109%	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	<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-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 26-Feb-2020

Client PO: 29584

Project Description: PE4650

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	*88.9*		*ug/L*		*111*	*50-140*			
Surrogate: Dibromofluoromethane	*81.9*		*ug/L*		*102*	*50-140*			
Surrogate: Toluene-d8	*89.1*		*ug/L*		*111*	*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	5.04	0.5	ug/L	5.45			7.8	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	*96.6*		*ug/L*		*121*	*50-140*			
Surrogate: Dibromofluoromethane	*86.6*		*ug/L*		*108*	*50-140*			
Surrogate: Toluene-d8	*86.2*		*ug/L*		*108*	*50-140*			

Method Quality Control: Spike

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	1820	25	ug/L	ND	91.2	68-117			
F2 PHCs (C10-C16)	1040	100	ug/L	ND	65.0	60-140			
F3 PHCs (C16-C34)	3140	100	ug/L	ND	80.1	60-140			
F4 PHCs (C34-C50)	1680	100	ug/L	ND	67.7	60-140			
Volatiles									
Acetone	72.2	5.0	ug/L	ND	72.2	50-140			
Benzene	32.8	0.5	ug/L	ND	82.1	60-130			
Bromodichloromethane	36.2	0.5	ug/L	ND	90.6	60-130			
Bromoform	38.5	0.5	ug/L	ND	96.2	60-130			
Bromomethane	15.9	0.5	ug/L	ND	39.8	50-140			
Carbon Tetrachloride	36.0	0.2	ug/L	ND	90.1	60-130			
Chlorobenzene	35.2	0.5	ug/L	ND	88.1	60-130			
Chloroform	34.7	0.5	ug/L	ND	86.7	60-130			
Dibromochloromethane	38.5	0.5	ug/L	ND	96.2	60-130			
Dichlorodifluoromethane	36.1	1.0	ug/L	ND	90.2	50-140			
1,2-Dichlorobenzene	36.2	0.5	ug/L	ND	90.6	60-130			
1,3-Dichlorobenzene	37.7	0.5	ug/L	ND	94.2	60-130			
1,4-Dichlorobenzene	34.2	0.5	ug/L	ND	85.4	60-130			
1,1-Dichloroethane	27.4	0.5	ug/L	ND	68.6	60-130			
1,2-Dichloroethane	35.2	0.5	ug/L	ND	88.1	60-130			
1,1-Dichloroethylene	28.4	0.5	ug/L	ND	71.0	60-130			
cis-1,2-Dichloroethylene	33.2	0.5	ug/L	ND	83.0	60-130			
trans-1,2-Dichloroethylene	29.1	0.5	ug/L	ND	72.8	60-130			
1,2-Dichloropropane	33.1	0.5	ug/L	ND	82.8	60-130			
cis-1,3-Dichloropropylene	37.2	0.5	ug/L	ND	93.0	60-130			
trans-1,3-Dichloropropylene	39.3	0.5	ug/L	ND	98.2	60-130			
Ethylbenzene	37.0	0.5	ug/L	ND	92.6	60-130			
Ethylene dibromide (dibromoethane, 1,2-	36.9	0.2	ug/L	ND	92.3	60-130			
Hexane	28.1	1.0	ug/L	ND	70.2	60-130			
Methyl Ethyl Ketone (2-Butanone)	72.2	5.0	ug/L	ND	72.2	50-140			
Methyl Isobutyl Ketone	86.2	5.0	ug/L	ND	86.2	50-140			
Methyl tert-butyl ether	79.8	2.0	ug/L	ND	79.8	50-140			
Methylene Chloride	27.2	5.0	ug/L	ND	68.0	60-130			
Styrene	41.6	0.5	ug/L	ND	104	60-130			
1,1,1,2-Tetrachloroethane	36.9	0.5	ug/L	ND	92.4	60-130			
1,1,2,2-Tetrachloroethane	34.1	0.5	ug/L	ND	85.2	60-130			
Tetrachloroethylene	37.1	0.5	ug/L	ND	92.7	60-130			
Toluene	32.8	0.5	ug/L	ND	82.0	60-130			
1,1,1-Trichloroethane	36.4	0.5	ug/L	ND	90.9	60-130			
1,1,2-Trichloroethane	36.0	0.5	ug/L	ND	89.9	60-130			
Trichloroethylene	33.5	0.5	ug/L	ND	83.8	60-130			
Trichlorofluoromethane	31.5	1.0	ug/L	ND	78.6	60-130			
Vinyl chloride	35.2	0.5	ug/L	ND	88.1	50-140			
m,p-Xylenes	75.0	0.5	ug/L	ND	93.7	60-130			
o-Xylene	38.2	0.5	ug/L	ND	95.5	60-130			
Surrogate: 4-Bromofluorobenzene	*81.4*		*ug/L*		*102*	*50-140*			
Surrogate: Dibromofluoromethane	*82.9*		*ug/L*		*104*	*50-140*			
Surrogate: Toluene-d8	*80.8*		*ug/L*		*101*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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

PARA LABORATORI

Paracel ID: 2009338

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@paracellabs.com
cellabs.com

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2009338	Nº 52336

Client Name: Paterson Group	Project Ref: PE4650	Page 1 of 1
Contact Name: Mandy Witteman	Quote #:	Turnaround Time
Address: 154 Colonnade Rd S.	PO #: 29584	☐ 1 day ☐ 3 day ☐ 2 day ☒ Regular
Telephone: (613) 226-7381	E-mail: 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	Required Analysis PHCs (F1-F4)	Required Analysis VOCs
1	BH1-GW1	GW		3	Feb 19/20	4:00	X	X
2	BH2-GW1	↓		3	↓	3:10	X	X
3	DUP	↓		2	↓			X
4								
5								
6								
7								
8								
9								
10								

Comments:

Method of Delivery: Paracel

Relinquished By (Sign):	Received By Driver/Depot:	Received at Lab:	Verified By:
Relinquished By (Print): Mandy Witteman	Date/Time: 26/02/20 11:10	Date/Time: 02-26-20 12:22	Date/Time: 02-26-20 12:40
Date/Time: Feb. 26/20.	Temperature: °C	Temperature: 3.1 °C	pH Verified: ☐ By:

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Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 29559
Project: PE4650
Custody: 126361

Report Date: 16-Mar-2020
Order Date: 12-Mar-2020

Order #: 2011496

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

Paracel ID	Client ID
2011496-01	BH3-GW1

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 16-Mar-2020

Client: Paterson Group Consulting Engineers

Order Date: 12-Mar-2020

Client PO: 29559

Project Description: PE4650

Analysis Summary Table

Analysis	Method Reference/Description	Extraction Date	Analysis Date
PHC F1	CWS Tier 1 - P&T GC-FID	13-Mar-20	14-Mar-20
PHCs F2 to F4	CWS Tier 1 - GC-FID, extraction	13-Mar-20	13-Mar-20
REG 153: VOCs by P&T GC/MS	EPA 624 - P&T GC-MS	13-Mar-20	14-Mar-20

Certificate of Analysis

Report Date: 16-Mar-2020

Client: Paterson Group Consulting Engineers

Order Date: 12-Mar-2020

Client PO: 29559

Project Description: PE4650

	Client ID:	BH3-GW1	-	-	-
	Sample Date:	10-Mar-20 12:00	-	-	-
	Sample ID:	2011496-01	-	-	-
	MDL/Units	Water	-	-	-
Volatiles					
Acetone	5.0 ug/L	<5.0	-	-	-
Benzene	0.5 ug/L	<0.5	-	-	-
Bromodichloromethane	0.5 ug/L	<0.5	-	-	-
Bromoform	0.5 ug/L	<0.5	-	-	-
Bromomethane	0.5 ug/L	<0.5	-	-	-
Carbon Tetrachloride	0.2 ug/L	<0.2	-	-	-
Chlorobenzene	0.5 ug/L	<0.5	-	-	-
Chloroform	0.5 ug/L	<0.5	-	-	-
Dibromochloromethane	0.5 ug/L	<0.5	-	-	-
Dichlorodifluoromethane	1.0 ug/L	<1.0	-	-	-
1,2-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,3-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,4-Dichlorobenzene	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,2-Dichloroethane	0.5 ug/L	<0.5	-	-	-
1,1-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
cis-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
trans-1,2-Dichloroethylene	0.5 ug/L	<0.5	-	-	-
1,2-Dichloropropane	0.5 ug/L	<0.5	-	-	-
cis-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
trans-1,3-Dichloropropylene	0.5 ug/L	<0.5	-	-	-
1,3-Dichloropropene, total	0.5 ug/L	<0.5	-	-	-
Ethylbenzene	0.5 ug/L	<0.5	-	-	-
Ethylene dibromide (dibromoethane, 1,2-)	0.2 ug/L	<0.2	-	-	-
Hexane	1.0 ug/L	<1.0	-	-	-
Methyl Ethyl Ketone (2-Butanone)	5.0 ug/L	<5.0	-	-	-
Methyl Isobutyl Ketone	5.0 ug/L	<5.0	-	-	-
Methyl tert-butyl ether	2.0 ug/L	<2.0	-	-	-
Methylene Chloride	5.0 ug/L	<5.0	-	-	-
Styrene	0.5 ug/L	<0.5	-	-	-
1,1,1,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
1,1,2,2-Tetrachloroethane	0.5 ug/L	<0.5	-	-	-
Tetrachloroethylene	0.5 ug/L	<0.5	-	-	-
Toluene	0.5 ug/L	<0.5	-	-	-
1,1,1-Trichloroethane	0.5 ug/L	<0.5	-	-	-

Certificate of Analysis

Report Date: 16-Mar-2020

Client: Paterson Group Consulting Engineers

Order Date: 12-Mar-2020

Client PO: 29559

Project Description: PE4650

	Client ID:	BH3-GW1	-	-	-
	Sample Date:	10-Mar-20 12:00	-	-	-
	Sample ID:	2011496-01	-	-	-
	MDL/Units	Water	-	-	-
1,1,2-Trichloroethane	0.5 ug/L	<0.5	-	-	-
Trichloroethylene	0.5 ug/L	<0.5	-	-	-
Trichlorofluoromethane	1.0 ug/L	<1.0	-	-	-
Vinyl chloride	0.5 ug/L	<0.5	-	-	-
m,p-Xylenes	0.5 ug/L	<0.5	-	-	-
o-Xylene	0.5 ug/L	<0.5	-	-	-
Xylenes, total	0.5 ug/L	<0.5	-	-	-
4-Bromofluorobenzene	Surrogate	108%	-	-	-
Dibromofluoromethane	Surrogate	110%	-	-	-
Toluene-d8	Surrogate	107%	-	-	-
Hydrocarbons					
F1 PHCs (C6-C10)	25 ug/L	<25	-	-	-
F2 PHCs (C10-C16)	100 ug/L	<100	-	-	-
F3 PHCs (C16-C34)	100 ug/L	<100	-	-	-
F4 PHCs (C34-C50)	100 ug/L	<100	-	-	-

Method Quality Control: Blank

Analyte	Result	Reporting Limit	Units	Source Result	%REC	%REC Limit	RPD	RPD Limit	Notes
Hydrocarbons									
F1 PHCs (C6-C10)	ND	25	ug/L						
F2 PHCs (C10-C16)	ND	100	ug/L						
F3 PHCs (C16-C34)	ND	100	ug/L						
F4 PHCs (C34-C50)	ND	100	ug/L						
Volatiles									
Acetone	ND	5.0	ug/L						
Benzene	ND	0.5	ug/L						
Bromodichloromethane	ND	0.5	ug/L						
Bromoform	ND	0.5	ug/L						
Bromomethane	ND	0.5	ug/L						
Carbon Tetrachloride	ND	0.2	ug/L						
Chlorobenzene	ND	0.5	ug/L						
Chloroform	ND	0.5	ug/L						
Dibromochloromethane	ND	0.5	ug/L						
Dichlorodifluoromethane	ND	1.0	ug/L						
1,2-Dichlorobenzene	ND	0.5	ug/L						
1,3-Dichlorobenzene	ND	0.5	ug/L						
1,4-Dichlorobenzene	ND	0.5	ug/L						
1,1-Dichloroethane	ND	0.5	ug/L						
1,2-Dichloroethane	ND	0.5	ug/L						
1,1-Dichloroethylene	ND	0.5	ug/L						
cis-1,2-Dichloroethylene	ND	0.5	ug/L						
trans-1,2-Dichloroethylene	ND	0.5	ug/L						
1,2-Dichloropropane	ND	0.5	ug/L						
cis-1,3-Dichloropropylene	ND	0.5	ug/L						
trans-1,3-Dichloropropylene	ND	0.5	ug/L						
1,3-Dichloropropene, total	ND	0.5	ug/L						
Ethylbenzene	ND	0.5	ug/L						
Ethylene dibromide (dibromoethane, 1,2	ND	0.2	ug/L						
Hexane	ND	1.0	ug/L						
Methyl Ethyl Ketone (2-Butanone)	ND	5.0	ug/L						
Methyl Isobutyl Ketone	ND	5.0	ug/L						
Methyl tert-butyl ether	ND	2.0	ug/L						
Methylene Chloride	ND	5.0	ug/L						
Styrene	ND	0.5	ug/L						
1,1,1,2-Tetrachloroethane	ND	0.5	ug/L						
1,1,2,2-Tetrachloroethane	ND	0.5	ug/L						
Tetrachloroethylene	ND	0.5	ug/L						
Toluene	ND	0.5	ug/L						
1,1,1-Trichloroethane	ND	0.5	ug/L						
1,1,2-Trichloroethane	ND	0.5	ug/L						
Trichloroethylene	ND	0.5	ug/L						
Trichlorofluoromethane	ND	1.0	ug/L						
Vinyl chloride	ND	0.5	ug/L						
m,p-Xylenes	ND	0.5	ug/L						
o-Xylene	ND	0.5	ug/L						
Xylenes, total	ND	0.5	ug/L						
Surrogate: 4-Bromofluorobenzene	*84.3*		*ug/L*		*105*	*50-140*			
Surrogate: Dibromofluoromethane	*80.5*		*ug/L*		*101*	*50-140*			
Surrogate: Toluene-d8	*86.6*		*ug/L*		*108*	*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	*85.8*		*ug/L*		*107*	*50-140*			
Surrogate: Dibromofluoromethane	*86.2*		*ug/L*		*108*	*50-140*			
Surrogate: Toluene-d8	*85.5*		*ug/L*		*107*	*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)	1810	25	ug/L	ND	90.3	68-117			
F2 PHCs (C10-C16)	1380	100	ug/L	ND	86.2	60-140			
F3 PHCs (C16-C34)	3650	100	ug/L	ND	93.0	60-140			
F4 PHCs (C34-C50)	2160	100	ug/L	ND	87.0	60-140			
Volatiles									
Acetone	83.6	5.0	ug/L	ND	83.6	50-140			
Benzene	39.8	0.5	ug/L	ND	99.6	60-130			
Bromodichloromethane	37.6	0.5	ug/L	ND	93.9	60-130			
Bromoform	32.6	0.5	ug/L	ND	81.5	60-130			
Bromomethane	34.4	0.5	ug/L	ND	85.9	50-140			
Carbon Tetrachloride	34.3	0.2	ug/L	ND	85.7	60-130			
Chlorobenzene	35.8	0.5	ug/L	ND	89.6	60-130			
Chloroform	38.4	0.5	ug/L	ND	96.1	60-130			
Dibromochloromethane	35.0	0.5	ug/L	ND	87.5	60-130			
Dichlorodifluoromethane	38.6	1.0	ug/L	ND	96.6	50-140			
1,2-Dichlorobenzene	34.9	0.5	ug/L	ND	87.2	60-130			
1,3-Dichlorobenzene	35.2	0.5	ug/L	ND	88.0	60-130			
1,4-Dichlorobenzene	33.7	0.5	ug/L	ND	84.3	60-130			
1,1-Dichloroethane	37.9	0.5	ug/L	ND	94.8	60-130			
1,2-Dichloroethane	35.0	0.5	ug/L	ND	87.4	60-130			
1,1-Dichloroethylene	44.0	0.5	ug/L	ND	110	60-130			
cis-1,2-Dichloroethylene	39.3	0.5	ug/L	ND	98.2	60-130			
trans-1,2-Dichloroethylene	40.2	0.5	ug/L	ND	101	60-130			
1,2-Dichloropropane	40.4	0.5	ug/L	ND	101	60-130			
cis-1,3-Dichloropropylene	43.1	0.5	ug/L	ND	108	60-130			
trans-1,3-Dichloropropylene	38.1	0.5	ug/L	ND	95.2	60-130			
Ethylbenzene	38.4	0.5	ug/L	ND	95.9	60-130			
Ethylene dibromide (dibromoethane, 1,2-	37.2	0.2	ug/L	ND	92.9	60-130			
Hexane	39.7	1.0	ug/L	ND	99.2	60-130			
Methyl Ethyl Ketone (2-Butanone)	85.9	5.0	ug/L	ND	85.9	50-140			
Methyl Isobutyl Ketone	98.6	5.0	ug/L	ND	98.6	50-140			
Methyl tert-butyl ether	61.4	2.0	ug/L	ND	61.4	50-140			
Methylene Chloride	38.2	5.0	ug/L	ND	95.6	60-130			
Styrene	31.7	0.5	ug/L	ND	79.2	60-130			
1,1,1,2-Tetrachloroethane	33.0	0.5	ug/L	ND	82.6	60-130			
1,1,2,2-Tetrachloroethane	35.9	0.5	ug/L	ND	89.8	60-130			
Tetrachloroethylene	36.8	0.5	ug/L	ND	92.0	60-130			
Toluene	34.9	0.5	ug/L	ND	87.3	60-130			
1,1,1-Trichloroethane	33.6	0.5	ug/L	ND	83.9	60-130			
1,1,2-Trichloroethane	40.4	0.5	ug/L	ND	101	60-130			
Trichloroethylene	38.6	0.5	ug/L	ND	96.5	60-130			
Trichlorofluoromethane	32.7	1.0	ug/L	ND	81.8	60-130			
Vinyl chloride	35.0	0.5	ug/L	ND	87.4	50-140			
m,p-Xylenes	72.5	0.5	ug/L	ND	90.6	60-130			
o-Xylene	35.3	0.5	ug/L	ND	88.2	60-130			
Surrogate: 4-Bromofluorobenzene	*75.3*		*ug/L*		*94.1*	*50-140*			
Surrogate: Dibromofluoromethane	*81.0*		*ug/L*		*101*	*50-140*			
Surrogate: Toluene-d8	*76.9*		*ug/L*		*96.2*	*50-140*			

Qualifier Notes:

None

Sample Data Revisions

None

Work Order Revisions / Comments:

None

Other Report Notes:

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

CCME PHC additional information:

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

PARACEL LABORATORIES LTD.

Paracel ID: 2011496

Paracel Order Number (Lab Use Only)	Chain Of Custody (Lab Use Only)
2011496	Nº 126361

Client Name: Paterson Group	Project Ref: PE4650	Page 1 of 1
Contact Name: ~~Dave Katz~~ Mandy Witteman	Quote #:	Turnaround Time
Address: 154 Colonnade Rd. S.	PO #: 29559	☐ 1 day ☐ 3 day
	E-mail: mwitteman@patersongroup.ca	☐ 2 day ☒ Regular
Telephone: 613-226-7381		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	BH3-GW1	GW		3	Mar 10/20	PM	X	X											
2																			
3																			
4																			
5																			
6																			
7																			
8																			
9																			
10																			

Comments:

Method of Delivery: Paracel

Relinquished By (Sign):	Received By Driver/Depot: M. Jeanse	Received at Lab: Soneeporn Dolmai	Verified By:
Relinquished By (Print): Mark St Pierre	Date/Time: 12/03/20 3:20	Date/Time: Mar 12, 2020 04:30	Date/Time: Mar 12/2020 16:50
Date/Time: Mar. 12. 2020	Temperature: °C	Temperature: 11.1 °C	pH Verified: ☐ By: