



Geotechnical
Engineering

Environmental
Engineering

Hydrogeology

Geological
Engineering

Materials Testing

Building Science

Archaeological
Services

Phase II Environmental Site Assessment

1330 Carling Avenue and 815 Archibald Street
Ottawa, Ontario

Prepared For

1343678 Ontario Limited

Paterson Group Inc.

Consulting Engineers
154 Colonnade Road South
Ottawa (Nepean), Ontario
Canada K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

March 4, 2020

Report: PE4789-2

TABLE OF CONTENTS

EXECUTIVE SUMMARY iii

1.0 INTRODUCTION 1

 1.1 Site Description 1

 1.2 Property Ownership 1

 1.3 Current and Proposed Future Uses 2

 1.4 Applicable Site Condition Standard 2

2.0 BACKGROUND INFORMATION 2

 2.1 Physical Setting 2

 2.2 Past Investigations 3

3.0 SCOPE OF INVESTIGATION 4

 3.1 Overview of Site Investigation 4

 3.2 Media Investigated 4

 3.3 Phase I Conceptual Site Model 4

 3.4 Deviations from Sampling and Analysis Plan 6

 3.5 Impediments 6

4.0 INVESTIGATION METHOD 7

 4.1 Subsurface Investigation 7

 4.2 Soil Sampling 7

 4.3 Field Screening Measurements 8

 4.4 Groundwater Monitoring Well Installation 8

 4.5 Groundwater Sampling 8

 4.7 Residue Management 10

 4.8 Elevation Surveying 10

 4.9 Quality Assurance and Quality Control Measures 10

5.0 REVIEW AND EVALUATION 11

 5.1 Geology 11

 5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient 11

 5.3 Fine-Coarse Soil Texture 11

 5.4 Soil: Field Screening 12

 5.5 Soil Quality 12

 5.6 Groundwater Quality 14

 5.7 Quality Assurance and Quality Control Results 15

 5.8 Phase II Conceptual Site Model 16

6.0 CONCLUSIONS 21

7.0 STATEMENT OF LIMITATIONS 22

List of Figures

Figure 1 - Key Plan

Drawing PE4789-3 - Test Hole Location Plan

Drawing PE4789-4 – Groundwater Contour Plan

Drawing PE4789-5 – Analytical Testing Plan – Soil

Drawing PE4789-6 – Analytical Testing Plan – Groundwater

Drawing PE4789- 7 –Cross section A-A' – Soil

Drawing PE4789- 8 –Cross section A-A' –Groundwater

Drawing PE4789- 9 –Cross section B-B' – Soil

Drawing PE4789- 10 –Cross section B-B' – Groundwater

List of Appendices

Appendix 1 Sampling and Analysis Plan

 Soil Profile and Test Data Sheets

 Symbols and Terms

 Laboratory Certificates of Analysis

EXECUTIVE SUMMARY

Assessment

A Phase II ESA was conducted for the property addressed 1330 Carling Avenue and 815 Archibald Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address areas of potential environmental concerns (APECs) that were identified on the Phase II Property during the Phase I ESA.

The Phase II ESA was carried out in conjunction with a Geotechnical Investigation and consisted of drilling six (6) boreholes across the Phase II Property, three (3) of which were constructed with groundwater monitoring well installations.

The soil profile generally consisted of an asphalt pavement, followed by fill material consisting of silty sand and granular material, underlain by native silty clay, followed by glacial till. Boreholes were terminated at depths ranging between 4.57 and 9.60 m below the ground surface. Soil samples were obtained from the boreholes and screened using combustible vapour measurements along with visual and olfactory observations.

Based on the screening results in combination with sample depth and location, six (6) soil samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), petroleum hydrocarbons (PHCs, F₁-F₄) or metals. All parameter concentrations in the soil samples analyzed were in compliance with the MECP Table 3 Residential Standards for coarse grain soils.

Groundwater samples from BH1 to BH3 were recovered and analyzed for BTEX and PHCs. No free-phase product was observed on the groundwater at any of the monitoring well locations during the groundwater sampling event. All parameter concentrations in the groundwater samples analyzed were in compliance with the MECP Table 3 Standards.

Recommendations

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 upon request in this regard

1.0 INTRODUCTION

At the request of 1343678 Ontario Limited, Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the properties addressed 1330 Carling Avenue and 815 Archibald Street, in the City of Ottawa, Ontario, herein referred to as the Phase II Property. The purpose of this Phase II ESA was to address areas of potential environmental concern (APECs) identified in the Phase I ESA conducted by Paterson in February of 2020.

1.1 Site Description

| | |
|----------------------------------|---|
| Address: | 1330 Carling Avenue and 815 Archibald Street, Ottawa, Ontario |
| Legal Description: | Part of Block 8 on Plan 221; Lot 8 and Part of Lot 7 on Plan 529, in the City of Ottawa, Ontario |
| Property Identification Numbers: | 04002-0008 and 04002-0009 |
| Location: | The Phase II Property is located on the southeast corner of Archibald Street at Carling Avenue, in the City of Ottawa, Ontario. Refer to Figure 1 - Key Plan in the Figures section following the text. |
| Latitude and Longitude: | 45° 23' 6.16" N, 75° 44' 7.00" W |
| Configuration: | Rectangular |
| Site Area: | 1,968m ² (approximately) |

1.2 Property Ownership

The subject property is currently owned by 1343678 Ontario Limited. Paterson was retained by Mr. Kevin Mulligan of 1343678 Ontario Limited, to complete this Phase II ESA. Mr. Mulligan can be contacted by telephone at (613) 223-4040.

1.3 Current and Proposed Future Uses

The Phase II Property is currently used for commercial purposes: a used car lot and sales office. It is our understanding that the Phase II Property will be redeveloped with a multi-storey mixed-use building consisting of ground-floor commercial and residential units above.

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 located in an arterial main street zone, surrounded by various commercial buildings (retailers and offices) and residential buildings. The southern portion of the Phase II Property is occupied by a sales office and carwash bay. The remaining northern portion of the site is occupied by a paved car lot with car park barriers surrounding the northern and western property line and some light posts.

Site drainage typically occurs through sheet flow to an on-site catch basin located on the central portion of the lot, as well as to catch basins along the adjacent street (Archibald Street).

The site topography along the northern and southern sides of the property dip down towards the centre of the site and down towards Archibald Street. The regional topography slopes down in a northerly direction towards the Ottawa River.

2.2 Past Investigations

A Phase I-ESA was completed by Paterson in February of 2020 in general accordance with the Ontario Regulation (O.Reg.) 153/04. Based on the findings of the Phase I ESA, several historical potentially contaminating activities (PCAs) were considered to result in four (4) areas of potential environmental concern (APECs) on the Phase I Property, as shown in Table 1 below.

| 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 service centre | Central east portion of the Phase I Property | PCA 52 – Storage, maintenance, fuelling and repairing of equipment, vehicles, and materials used to maintain transportation systems | On-site | BTEX PHCs | Soil, Groundwater |
| APEC 2 Resulting from former on-site USTs | Central west portion of the Phase I Property | PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks | On-site | BTEX PHCs | Soil, Groundwater |
| APEC 3 Resulting from former on-site pump island | Northeast portion of the Phase I Property | PCA 28 – Gasoline and Associated Products Storage in Fixed Tanks | On-site | BTEX PHCs | Soil, Groundwater |
| APEC 4 Resulting from fill material used to backfill remediation excavation | 1330 Carling Avenue portion of the Phase I Property | PCA 30 – Importation of Fill Material of Unknown Quality | On-site | BTEX PHCs Metals | Soil |

A Phase II ESA was recommended to address the aforementioned APECs. The APECs are outlined in red on Drawing PE4789-1 – Site Plan, appended to the Phase I ESA report.

3.0 SCOPE OF INVESTIGATION

3.1 Overview of Site Investigation

The subsurface investigation was carried out for the Phase II Property in conjunction with a Geotechnical Investigation on February 5 and 6, 2020. The field program consisted of drilling six (6) boreholes across the Phase II Property. The boreholes were completed to depths ranging from approximately 4.57 to 6.1m below ground surface (mbgs). Three (3) of the boreholes were completed with monitoring well installations in order 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/or groundwater include benzene, toluene, ethylbenzene and xylenes (BTEX), petroleum hydrocarbons (PHCs, fractions F₁-F₄) and metals (including mercury and hexavalent chromium).

3.3 Phase I Conceptual Site Model

Geological and Hydrogeological Setting

Based on the 1992 Phase II-ESA, the reported stratigraphy for the Phase I Property consists of a pavement structure over fill material, underlain by native silty clay or glacial till. Bedrock was not encountered during the subsurface program.

According to the Geological Survey of Canada website, the bedrock in the area of the Phase I Property is reported to consist of interbedded limestone and dolomite of the Gull Formation. The overburden is reported to consist of Glacial Till of depths ranging from 5 to 10 m over the entire site.

The regional topography slopes down in a northerly direction towards the Ottawa River. The local groundwater flow beneath the Phase I Property is inferred to be in a north-westerly/northerly direction.

Water Bodies and Areas of Natural Significance

No natural water bodies or areas of natural significance are known to exist on the Phase I Property or within the Phase I Study Area.

Potable Water Well Records

No potable well records were identified for the Phase I Property.

Monitoring Well Records

No monitoring well records were identified for the Phase I Property. Three (3) monitoring well records were identified for the property across Carling Avenue were a couple of historical PCAs were identified.

Existing Buildings and Structures

The southern portion of the Phase I Property is currently occupied by a semi-2 storey commercial building used as a car showroom with offices on the second level and a garage bay used for detailing and washing cars. The remaining lot is an asphaltic paved concrete car lot.

Subsurface Structures and Utilities

Historical subsurface structures on the Phase I Property include former USTs and ancillary equipment associated with the retail fuel outlet. Presently, underground services include natural gas, water and sewer services entering the west face of the subject building from Archibald Street. Former subsurface infrastructure may have potentially contributed to the contaminant distribution at the Phase I Property.

Neighbouring Land Use

Neighbouring land use within the Phase I Study Area consists primarily of commercial offices and retailers along Carling Avenue and residential along the adjacent side streets.

Potentially Contaminating Activities and Areas of Potential Environmental Concern

As presented in Table 1 in Section 2.2 of this report, several historical PCAs are considered to have resulted in four (4) APECs on the Phase I Property.

Contaminants of Potential Concern

As noted in Table 1, the contaminants of potential concern (CPCs) in soil and/or groundwater, and associated with the APECs identified in this Phase I ESA include:

- Benzene, ethylbenzene, toluene and xylenes (BTEX);
- Petroleum hydrocarbons (PHCs, Fractions F₁-F₄); and
- Metals (including hexavalent chromium and mercury).

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. While several other historical and/or existing PCAs were identified within the study area during this assessment, they were not considered to generate areas of potential environmental concern to 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 inclement weather conditions at the time. There were no other deviations from the Sampling and Analysis Plan.

3.5 Impediments

Underground service utilities on-site (sewer and underground electricity) presented an issue with regard to placing one BH, as shown on the Drawing

PE4789-3 – Test Hole Location Plan. 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 conducted on February 5 and 6, 2020. The drilling program consisted of drilling a six (6) boreholes across the Phase II Property, three (3) of which were completed with monitoring well installations.

The boreholes were placed to address the aforementioned areas of potential environmental concern (APECs) and to provide coverage of the proposed building footprint. The boreholes were drilled with a truck mounted CME 55 power auger drill rig. The truck mounted drill rig was provided by George Downing Estate Drilling of Hawkesbury, Ontario. Borehole locations are shown on Drawing PE4789-3 – Test Hole Location Plan, appended to this report.

4.2 Soil Sampling

A total of 42 soil samples were obtained from the boreholes by means of direct sampling from auger flights and split spoon sampling. The depths at which auger and split spoon samples were obtained from the boreholes are shown as “**AU**” and “**SS**” on the Soil Profile and Test Data Sheets, appended to this report.

Site soils consist of fill material underlain by native silty clay and/or silty sand, followed by glacial till. The fill material present beneath the pavement structure generally consisted of silty sand with gravel and extended to depths ranging from approximately 0.6 to 3.15m below grade. No deleterious materials or signs of potential contamination were identified in the fill material, which is primarily associated with the pavement structure and the decommissioning and removal of the former underground storage tanks and pump islands. The boreholes were terminated in glacial till at depths ranging from approximately 4.57 to 9.60m below grade.

4.3 Field Screening Measurements

A gastech, calibrated to Hexane, was used to measure the combustible vapour concentrations in the headspace of all soil samples obtained from the boreholes. The soil vapours were measured by inserting the analyzer probe into the nominal headspace above the soil sample. Samples were then agitated, and the peak readings recorded.

The combustible vapour readings were in the range of 5 to 140ppm in the soil samples obtained and are not necessarily considered to be indicative of potential hydrocarbon impacts. A petroleum hydrocarbon odour was noted at BH1 at approximately 2.5 m below the ground surface (mbgs). Obvious staining was observed in some of the soil samples retrieved from BH2 at approximately 2.29 mgbs.

Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

4.4 Groundwater Monitoring Well Installation

Groundwater monitoring wells were installed in three (3) boreholes placed on the Phase II Property. The monitoring wells consisted of 51 mm diameter Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed below in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

| Table 2: Monitoring Well Construction Details | | | | | | |
|--|---------------------------------|----------------------------|----------------------------------|--------------------------|-------------------------------|--------------------|
| Well ID | Ground Surface Elevation | Total Depth (m BGS) | Screened Interval (m BGS) | Sand Pack (m BGS) | Bentonite Seal (m BGS) | Casing Type |
| BH1 | 73.20 | 4.57 | 1.57-4.57 | 1.22-4.57 | 0.30-1.22 | Flushmount |
| BH2 | 73.26 | 5.18 | 2.18-5.18 | 1.22-5.18 | 0.30-1.22 | Flushmount |
| BH3 | 73.39 | 5.18 | 2.15-5.18 | 1.22-5.18 | 0.30-1.22 | 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 in Appendix 1, the soil and groundwater samples submitted for analytical testing are presented in Tables 3 and 4.

| Table 3: Soil Samples Submitted | | | | | |
|--|-------------------------------------|---------------------|--|---------------------|---|
| Sample ID | Sample Depth and Stratigraphic Unit | Parameters Analyzed | | | Rationale |
| | | BTEX | PHC (F ₁ – F ₄) | Metals ¹ | |
| February 5, 2020 | | | | | |
| BH1-SS2 | 0.76-1.37m Fill | | | X | Sample selected to test the quality of fill material. |
| BH1-SS5 | 3.04-3.66m Till | X | X | | Sample selected for analysis based on vapour reading and location just below the water table. |
| February 6, 2020 | | | | | |
| BH2-SS2 | 0.76-1.37m Fill | | | X | Sample selected to test the quality of fill material. |
| BH2-SS4 | 2.32-2.92m Till | X | X | | Sample selected based on location near water table (sample wet). |
| BH3-SS2 | 0.76-1.37m Fill | | | X | Sample selected to test the quality of fill material. |
| BH3-SS6 | 3.84-4.45m Till | X | X | | Sample selected for analysis based on vapour reading and location just below the water table. |
| Note: ¹ Metals may include mercury (Hg) and hexavalent chromium (CrVI) | | | | | |

| Table 4: Groundwater Samples Submitted | | | | |
|---|--|---------------------|--|---|
| Sample ID | Screened Interval and Stratigraphic Unit | Parameters Analyzed | | Rationale |
| | | BTEX | PHCs (F ₁ -F ₄) | |
| February 13, 2020 | | | | |
| MW1-GW1 | 1.57-4.57m Till | X | X | Assessment of potential impacts on the western portion of the site from on and off-site retail fuel outlets. |
| MW2-GW1 | 2.18-5.18m Till | X | X | Assessment of potential impacts on the northern portion of the site from on and off-site retail fuel outlets. |
| MW3-GW1 | 2.15-5.18m Till | X | X | Assessment of potential impacts on the eastern portion of the site from on and off-site retail fuel outlets. |
| Note: MW1, MW2 and MW3 correspond to BH1, BH2 and BH3. | | | | |

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 south corner of the garage floor slab, with a geodetic elevation of 73.60 m.

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 and/or silty sand with gravel (till). Bedrock was not encountered during the subsurface program; however, refusal on inferred bedrock was encountered at 9.60m and 8.41m in BH4 and BH5, respectively by means of DCP testing.

Groundwater was encountered in the till material at depths ranging from approximately 2.21 to 2.28m below existing grade.

5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling event on February 13, 2020 using an electronic water level meter. Groundwater levels are summarized below in Table 5.

All measurements are relative to the slab-on-grad foundation of the southern side of the garage bay, with geodetic elevation of 100m,

| 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 | 73.20 | 2.21 | 70.99 | February 13, 2020 |
| BH2 | 73.26 | 2.23 | 71.03 | February 13, 2020 |
| BH3 | 73.39 | 2.28 | 71.11 | February 13, 2020 |

Groundwater contour mapping was completed for groundwater levels measured on February 13, 2020. The groundwater contours are shown on Drawing PE4789-4 - Groundwater Contour Plan. Based on the contour mapping, groundwater beneath the Phase II Property appears to flow in a westerly direction. An average horizontal hydraulic gradient of approximately 0.005m/m was calculated.

5.3 Fine-Coarse Soil Texture

Based on field soil observations, fine-grained soil standards are not applicable to the Phase II Property.

5.4 Soil: Field Screening

The combustible vapour readings were generally less than 140ppm in the soil samples obtained and were not necessarily considered to be indicative of potential hydrocarbon impacts. A petroleum hydrocarbon odour was noted at BH1 at approximately 2.5 m below the ground surface (mbgs). Obvious staining was observed in some of the soil samples retrieved from BH2 at approximately 2.29 mbgs.

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 6 soil samples were submitted for analysis of a combination of BTEX, PHC (F1-F4) and/or metals. The results of the analytical testing, and the selected soil standards, are presented in Tables 6, 7 and 8. The laboratory certificates of analysis are provided in Appendix 1.

| Table 6: 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 5, 2020 | February 6, 2020 | | |
| | | BH1-SS5 (3.04-3.66m) | BH2-SS4 (2.32-2.92m) | BH3-SS6 (3.84-4.45m) | |
| Benzene | 0.02 | nd | nd | nd | 0.2 |
| 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 | 44 | nd | nd | 55 |
| PHC F2 | 4 | 21 | nd | nd | 98 |
| PHC F3 | 8 | 18 | 71 | nd | 300 |
| PHC F4 | 6 | nd | 214 | nd | 2,800 |

Notes:

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

No detectable BTEX concentrations were identified in the soil samples analyzed. PHC concentrations detected in the soil samples analyzed are in compliance with the MECP Table 3 Residential Standards. All soil samples comply with the selected MECP Standards.

| Table 7: Analytical Test Results – Soil Metals | | | | | |
|---|------------|----------------------|----------------------|----------------------|---|
| Parameter | MDL (µg/g) | Soil Sample (µg/g) | | | MECP Table 3 Residential Standards (µg/g) |
| | | February 5, 2020 | February 6, 2020 | | |
| | | BH1-SS2 (0.76-1.23m) | BH2-SS2 (0.76-1.23m) | BH3-SS2 (0.76-1.23m) | |
| Antimony | 1.0 | nd | nd | nd | 7.5 |
| Arsenic | 1.0 | 2.1 | 1.8 | 3.9 | 18 |
| Barium | 1.0 | 72.9 | 48 | 236 | 390 |
| Beryllium | 1.0 | nd | nd | 0.7 | 4 |
| Boron | 1.0 | 8.8 | 6.8 | 6.2 | 120 |
| Cadmium | 0.5 | nd | nd | nd | 1.2 |
| Chromium | 1.0 | 13.8 | 11.8 | 70.1 | 160 |
| Chromium VI | 0.2 | nd | nd | nd | 8 |
| Cobalt | 1.0 | 5.8 | 4.4 | 19 | 22 |
| Copper | 1.0 | 17.1 | 11.9 | 24.8 | 140 |
| Lead | 1.0 | 6.8 | 3.8 | 12.5 | 120 |
| Mercury | 0.1 | nd | nd | nd | 0.27 |
| Molybdenum | 1.0 | nd | nd | nd | 6.9 |
| Nickel | 1.0 | 11.3 | 6.8 | 36.9 | 100 |
| Selenium | 1.0 | nd | nd | nd | 2.4 |
| Silver | 0.5 | nd | nd | nd | 20 |
| Thallium | 1.0 | nd | nd | nd | 1 |
| Uranium | 1.0 | nd | nd | nd | 23 |
| Vanadium | 1.0 | 24.2 | 19.1 | 72.9 | 86 |
| Zinc | 1.0 | 24.3 | nd | 80.9 | 340 |

Notes:

- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – Parameter not analyzed

Metal concentrations identified in the soil samples analyzed are in compliance with the MECP Table 3 Residential Standards.

The maximum concentrations of analyzed parameters in the soil at the Phase II Property are summarized below in Table 8.

| Table 8: Maximum Concentrations – Soil | | | |
|---|-------------------------------------|-----------------|-------------------------------|
| Parameter | Maximum Concentration (µg/g) | Borehole | Depth Interval (m BGS) |
| PHC F1 | 44 | BH1-SS5 | 3.04-3.66 Till |
| PHC F2 | 21 | | |
| PHC F3 | 71 | BH2-SS4 | 2.32-2.92 Till |
| PHC F4 | 214 | | |
| Arsenic | 3.9 | BH3-SS2 | 0.76-1.23 Fill |
| Barium | 236 | | |
| Beryllium | 0.7 | | |
| Boron | 8.8 | BH1-SS2 | 0.76-1.23; Fill |
| Chromium | 70.1 | BH3-SS2 | 0.76-1.23 Till |
| Cobalt | 19 | | |
| Copper | 24.8 | | |
| Lead | 12.5 | | |
| Nickel | 36.9 | | |
| Vanadium | 72.9 | | |
| Zinc | 80.9 | | |

All other parameter concentrations were undetectable above the laboratory detection limits.

5.6 Groundwater Quality

Groundwater samples from all of the monitoring wells installed on the Phase II Property were submitted for laboratory analysis of BTEX and PHCs (fraction F1-F4). The groundwater samples were obtained from the screened intervals noted on Table 2. The results of the analytical testing are presented below in Table 9. The laboratory certificates of analysis are provided in Appendix 1.

| Table 9: 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 13, 2020 | | | |
| | | MW1-GW1 (1.57-4.57m) | MW2-GW1 (2.18-5.18m) | MW3-GW1 (2.18-5.18m) | |
| Benzene | 0.5 | nd | nd | nd | 44 |
| Ethylbenzene | 0.5 | 2.8 | nd | nd | 2,300 |
| Toluene | 0.5 | nd | nd | nd | 18,000 |
| Xylenes | 0.5 | nd | nd | nd | 4,200 |
| PHC F1 | 25 | 140 | 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
- MW1, MW2 and MW3 correspond to BH1, BH2 and BH3.

BTEX and PHC concentrations identified in the groundwater samples analyzed are in compliance with the MECP Table 3 Standards.

The maximum concentrations of analyzed parameters in the groundwater at the Phase II Property are summarized below in Table 10.

| Table 10: Maximum Concentrations – Groundwater | | | |
|---|------------------------------|-----------------|------------------------|
| Parameter | Maximum Concentration (µg/L) | Monitoring Well | Depth Interval (m BGS) |
| Ethylbenzene | 2.8 | BH1 | 1.57-4.57 |
| PHC F1 | 140 | | |

All other parameter concentrations were undetectable above the laboratory detection limits.

5.7 Quality Assurance and Quality Control Results

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

As per the sampling and analysis plan, duplicate samples (DUP and DUP1) from BH2-SS4 and BH1-GW1, respectively, were obtained and analyzed for BTEX and PHC-F1 parameters.

The relative percent different (RPD) for the original and the duplicate soil sample for PHC-F1 concentration detected above the laboratory limit is 8.82%. The RDPs for the original and the duplicate groundwater sample for ethylbenzene and PHC-F1 concentrations detected above the laboratory limits are 3.36% and 10.53%, respectively.

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 on-site PCAs are considered to have resulted 4 APECs on the Phase II Property:

- PCA 52 – “Storage, maintenance, fuelling and repair of equipment, vehicles, and material used to maintain transportation systems,” associated with a historical automotive service garage on the central east side of the Phase I Property (APEC 1);
- PCA 28 – “Gasoline and Associated Products Storage in Fixed Tanks,” associated with 5 historical underground storage tanks situated along the central west side of the Phase I Property (APEC 2);
- PCA 28 – “Gasoline and Associated Products Storage in Fixed Tanks,” associated with a historical pump island situated along the northeastern portion of the Phase I Property (APEC 3); and
- PCA 30 – “Importation of Fill Material of Unknown quality,” associated with infilling the remediation excavations at 1330 Carling Avenue (APEC 4).

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 F₁-F₄); and
- Metals (including hexavalent chromium and mercury).

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. The services enter the Phase II Property from Archibald Street.

Historical subsurface structures on the Phase II Property include former USTs and ancillary equipment associated with the retail fuel outlet. Former subsurface infrastructure may have potentially contributed to the contaminant distribution at the Phase II Property.

Physical Setting

Site Stratigraphy

The site stratigraphy consists of the following:

- Pavement structure consisting of asphaltic concrete over crushed stone with silt and sand, extending to depths ranging from approximately 0.03 to 0.61m below grade.
- Fill material generally consisting of brown silty sand or coarse brown sand with some gravel was identified at each borehole location and extended to depths of approximately 1.52 to 3.15m below grade.
- Native silty clay with traces of gravel was encountered beneath the fill material in BH4, BH5 and BH6 and extended to depths of approximately 2.13 to 2.39m below grade.
- Glacial till primarily containing silty clay with some gravel was identified either beneath the fill material or native silty clay from approximately 4.57 to 6.40m below grade at each borehole location.

- Boreholes were terminated in the glacial till later at depths ranging from 4.57 to 9.60m below grade. Groundwater was identified in this stratigraphic unit.

Bedrock was inferred from DCP Test in BH4 and BH5 at 9.60 and 8.41 mbgs, respectively.

Hydrogeological Characteristics

Groundwater at the Phase II Property was encountered primarily within the fill layer. This unit is interpreted to function as the shallow aquifer at the subject site.

Water levels were measured at the Phase II Property on February 13, 2020. Groundwater levels ranged in depths from approximately 2.21 to 2.28 m below grade. Groundwater contour mapping was conducted for groundwater elevations identified during the February 2020 sampling event. Groundwater flow at the Phase II Property was in a westerly direction, with an average hydraulic gradient of approximately 0.005 m/m.

Approximate Depth to Bedrock

Bedrock was inferred from DCP Test in BH4 and BH5 at 9.60 and 8.41 mbgs, respectively.

Approximate Depth to Water Table

Depth to water table at the Phase II Property varies between approximately 2.21 and 2.28m 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, and the pH of the surface soil is between 5 and 9, while the pH of the subsurface soil is between 5 and 11.

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 1.52 to 3.15m below grade. The fill material generally consists of silty sand, gravel with some crushed stone and trace of organics, and is considered to be associated with the pavement structure as well as backfill used post-remediation of the former retail fuel outlets.

No contamination was 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.

Existing Buildings and Structures

The site is occupied by a semi-2 storey slab-on-grade building that was constructed in 2000. The subject building is situated on the southeast corner with a garage entrance located on the west side of the building fronting Archibald Street.

The exterior is finished in light grey-to-white stucco with large glass windows that extend to the from the ground to second storey and a flat style tar and gravel roof. The subject building is heated with natural gas-fired equipment. No other buildings or structures are present on the Phase II 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, soil and groundwater beneath the Phase II Property is in compliance with MECP Table 3 Residential Standards, as shown on Drawings PE4789-5 – Analytical Testing Plan (Soil) and PE4789-6 – Analytical Testing Plan (Groundwater). There are no contaminants on the Phase II Property.

Types of Contaminants

Based on the findings of the Phase II ESA, soil and groundwater is in compliance with MECP Table 3 Residential Standards. There are no contaminants of concern on the Phase II Property.

Contaminated Media

Soil and groundwater analyses conducted as part of the Phase II ESA were in compliance with MECP Table 3 Residential Standards. No contaminated media is present on the Phase II Property.

What Is Known About Areas Where Contaminants Are Present

Contaminants are not present in the soil or in the groundwater beneath the Phase II Property.

Distribution and Migration of Contaminants

Based on the findings of the Phase II ESA, there has been no distribution or migration of contaminants on the Phase II Property.

Discharge of Contaminants

Based on the findings of the Phase II ESA, contaminants have not been discharged to the Phase II Property.

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.

Soil and groundwater beneath the Phase II Property are 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 property addressed 1330 Carling Avenue and 815 Archibald Street, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address areas of potential environmental concerns (APECs) that were identified on the Phase II Property during the Phase I ESA.

The Phase II ESA was carried out in conjunction with a Geotechnical Investigation and consisted of drilling six (6) boreholes across the Phase II Property, three (3) of which were constructed with groundwater monitoring well installations.

The soil profile generally consisted of an asphalt pavement, followed by fill material consisting of silty sand and granular material, underlain by native silty clay, followed by glacial till. Boreholes were terminated at depths ranging between 4.57 and 9.60 m below the ground surface. Soil samples were obtained from the boreholes and screened using combustible vapour measurements along with visual and olfactory observations.

Based on the screening results in combination with sample depth and location, six (6) soil samples were submitted for laboratory analysis of benzene, toluene, ethylbenzene, and xylenes (BTEX), petroleum hydrocarbons (PHCs, F₁-F₄) or metals. All parameter concentrations in the soil samples analyzed were in compliance with the MECP Table 3 Residential Standards for coarse grain soils.

Groundwater samples from BH1 to BH3 were recovered and analyzed for BTEX and PHCs. No free-phase product was observed on the groundwater at any of the monitoring well locations during the groundwater sampling event. All parameter concentrations in the groundwater samples analyzed were in compliance with the MECP Table 3 Standards.

Recommendations

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 1343678 Ontario Limited. Notification from 1343678 Ontario Limited 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:

- 1343678 Ontario Limited
- Paterson Group

FIGURES

FIGURE 1 – KEY PLAN

Drawing PE4789-3 - Test Hole Location Plan

Drawing PE4789-4– Groundwater Contour Plan

Drawing PE4789-5 – Analytical Testing Plan – Soil

Drawing PE4789-6 – Analytical Testing Plan – Groundwater

Drawing PE4789- 7 –Cross section A-A' – Soil

Drawing PE4789- 8 –Cross section A-A' –Groundwater

Drawing PE4789- 9 –Cross section B-B' – Soil

Drawing PE4789- 10 –Cross section B-B' –Groundwater

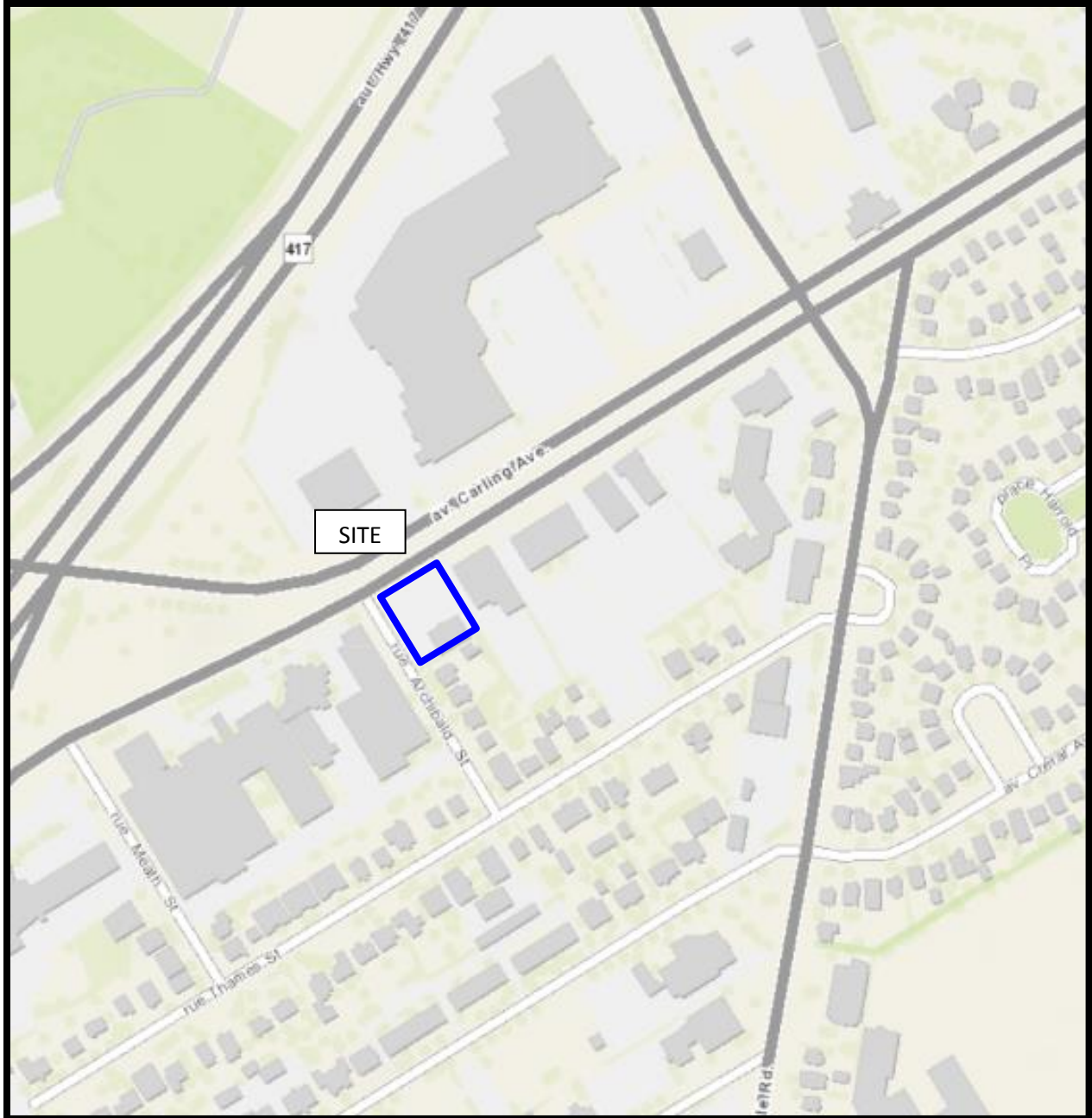
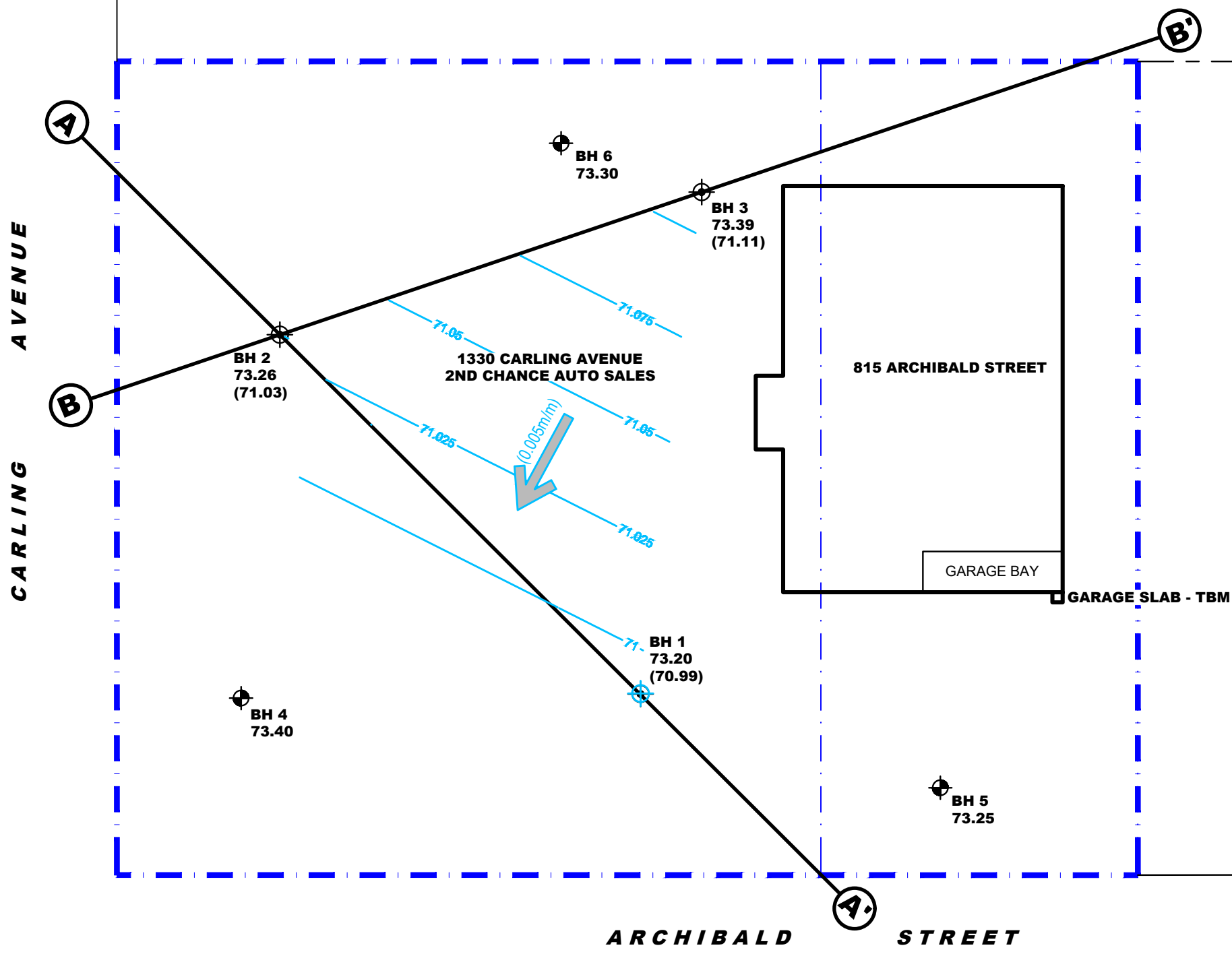
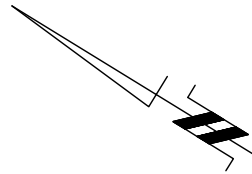


FIGURE 1
KEY PLAN



- LEGEND:**
- BOREHOLE LOCATION
 - BOREHOLE WITH MONITORING WELL LOCATION
 - 73.20 GROUND SURFACE ELEVATION (m)
 - (70.99) GROUNDWATER SURFACE ELEVATION (m)

TBM-CONCRETE GARAGE BAY SLAB LOCATED ON SOUTHERN CORNER OF EXISTING BUILDING. GEODETIC ELEVATION = 73.60m



patersongroup
consulting engineers

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

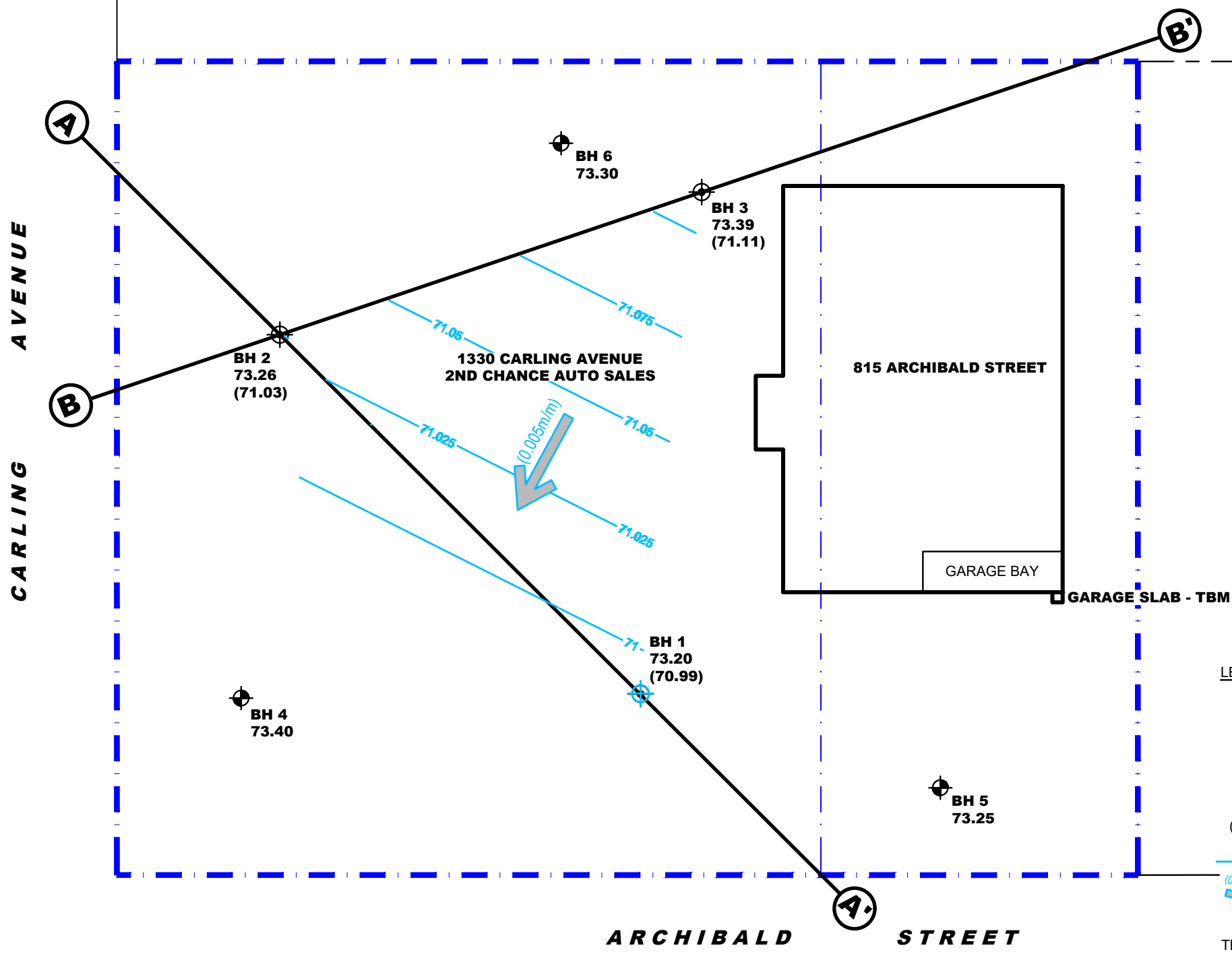
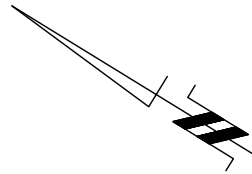
| NO. | REVISIONS | DATE | INITIAL |
|-----|-----------|------|---------|
| | | | |
| | | | |
| | | | |

1343678 ONTARIO LTD.
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1330 CARLING AVENUE & 815 ARCHIBALD STREET
ONTARIO

OTTAWA,
Title:
TEST HOLE LOCATION PLAN

| | | | |
|--------------|-------|---------------|-----------------|
| Scale: | 1:250 | Date: | 02/2020 |
| Drawn by: | NFRV | Report No.: | PE4789-2 |
| Checked by: | MW | Dwg. No.: | PE4789-3 |
| Approved by: | MSD | Revision No.: | |

p:\autocad drawings\environmental\pe4789-3 test hole location plan and x sections.dwg



- LEGEND:**
- BOREHOLE LOCATION
 - BOREHOLE WITH MONITORING WELL LOCATION
 - 73.20 GROUND SURFACE ELEVATION (m)
 - (70.99) GROUNDWATER SURFACE ELEVATION (m)
 - 97.7— GROUNDWATER CONTOUR(m)
 - (0.005m/m) APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

TBM-CONCRETE GARAGE BAY SLAB LOCATED ON SOUTHERN CORNER OF EXISTING BUILDING. GEODETIC ELEVATION = 73.60m



patersongroup
consulting engineers

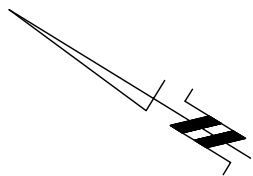
154 Colonnade Road South
Ottawa, Ontario K2E 7J5
Tel: (613) 226-7381 Fax: (613) 226-6344

| NO. | REVISIONS | DATE | INITIAL |
|-----|-----------|------|---------|
| | | | |
| | | | |
| | | | |

1343678 ONTARIO LTD.
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
 1330 CARLING AVENUE & 815 ARCHIBALD STREET
 OTTAWA, ONTARIO
GROUNDWATER CONTOUR PLAN

| | | | |
|--------------|-------|---------------|-----------------|
| Scale: | 1:250 | Date: | 02/2020 |
| Drawn by: | NFRV | Report No.: | PE4789-2 |
| Checked by: | MW | Dwg. No.: | PE4789-4 |
| Approved by: | MSD | Revision No.: | |

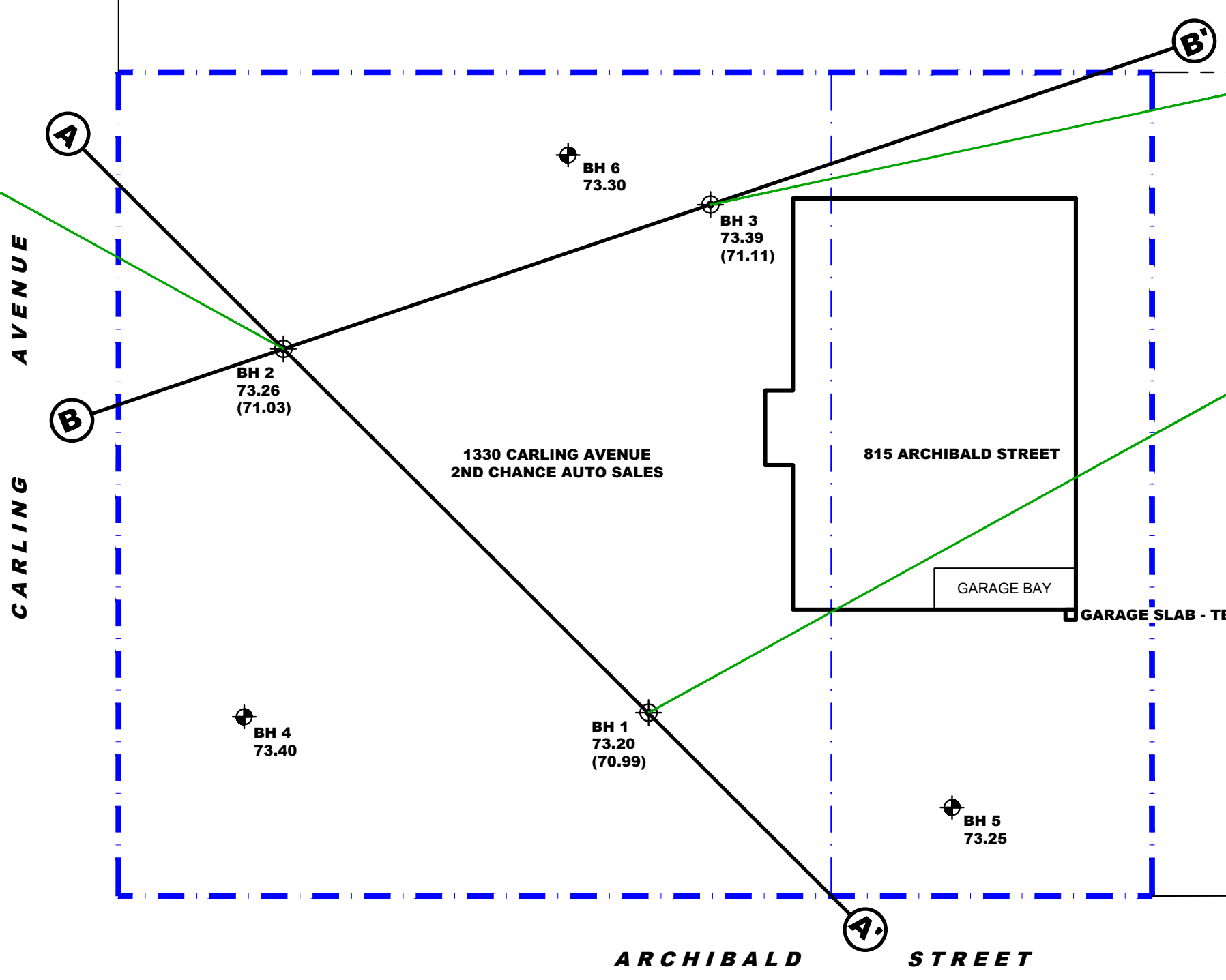
p:\autocad drawings\environmental\pe4789-4\pe4789-3 test hole location plan and x sections.dwg



| | | |
|---|------------|----------|
| BH2-SS2 | 0.76-1.37m | 6-Feb-20 |
| Metals comply with MECP Table 3 Standards | | |
| BH2-SS4 | 2.32-2.92m | 6-Feb-20 |
| BTEX comply with MECP Table 3 Standards | | |
| PHCs comply with MECP Table 3 Standards | | |

| | | |
|---|------------|----------|
| BH3-SS2 | 0.76-1.37m | 6-Feb-20 |
| Metals comply with MECP Table 3 Standards | | |
| BH3-SS6 | 3.84-4.45m | 6-Feb-20 |
| BTEX comply with MECP Table 3 Standards | | |
| PHCs comply with MECP Table 3 Standards | | |

| | | |
|---|------------|----------|
| BH1-SS2 | 0.76-1.37m | 5-Feb-20 |
| Metals comply with MECP Table 3 Standards | | |
| BH1-SS5 | 3.04-3.66m | 5-Feb-20 |
| BTEX comply with MECP Table 3 Standards | | |
| PHCs comply with MECP Table 3 Standards | | |



LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 73.20 GROUND SURFACE ELEVATION (m)
- (70.99) GROUNDWATER SURFACE ELEVATION (m)

TBM-CONCRETE GARAGE BAY SLAB LOCATED ON SOUTHERN CORNER OF EXISTING BUILDING. GEODETIC ELEVATION = 73.60m

SCALE: 1:250

patersongroup
consulting engineers

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

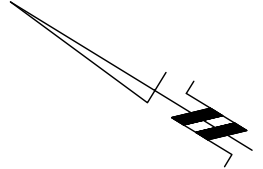
| NO. | REVISIONS | DATE | INITIAL |
|-----|-----------|------|---------|
| | | | |
| | | | |
| | | | |

1343678 ONTARIO LTD.
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
 1330 CARLING AVENUE & 815 ARCHIBALD STREET
 OTTAWA, ONTARIO
ANALYTICAL TESTING PLAN - SOIL (BTEX, PHCs, METALS)

Scale: 1:250
 Drawn by: NFRV
 Checked by: MW
 Approved by: MSD

Date: 02/2020
 Report No.: PE4789-2
Dwg. No.: PE4789-5
 Revision No.:

p:\autocad drawings\environmental\pe4789\pe4789-3 test hole location plan and x sections.dwg



BH2-GW1 2.18-5.18m 13-Feb-20
 BTEX comply with MECP Table 3 Standards
 PHCs comply with MECP Table 3 Standards

BH3-GW1 2.18-5.18m 13-Feb-20
 BTEX comply with MECP Table 3 Standards
 PHCs comply with MECP Table 3 Standards

BH1-GW1 1.57-4.57m 13-Feb-20
 BTEX comply with MECP Table 3 Standards
 PHCs comply with MECP Table 3 Standards

CARLING AVENUE

ARCHIBALD STREET

1330 CARLING AVENUE
 2ND CHANCE AUTO SALES

815 ARCHIBALD STREET

GARAGE BAY

GARAGE SLAB - TBM

BH 2
 73.26
 (71.03)

BH 6
 73.30

BH 3
 73.39
 (71.11)

BH 4
 73.40

BH 1
 73.20
 (70.99)

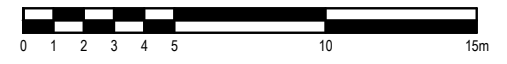
BH 5
 73.25

LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- 73.20 GROUND SURFACE ELEVATION (m)
- (70.99) GROUNDWATER SURFACE ELEVATION (m)

TBM-CONCRETE GARAGE BAY SLAB LOCATED ON SOUTHERN CORNER OF EXISTING BUILDING.
 GEODETIC ELEVATION = 73.60m

SCALE: 1:250



patersongroup
 consulting engineers

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

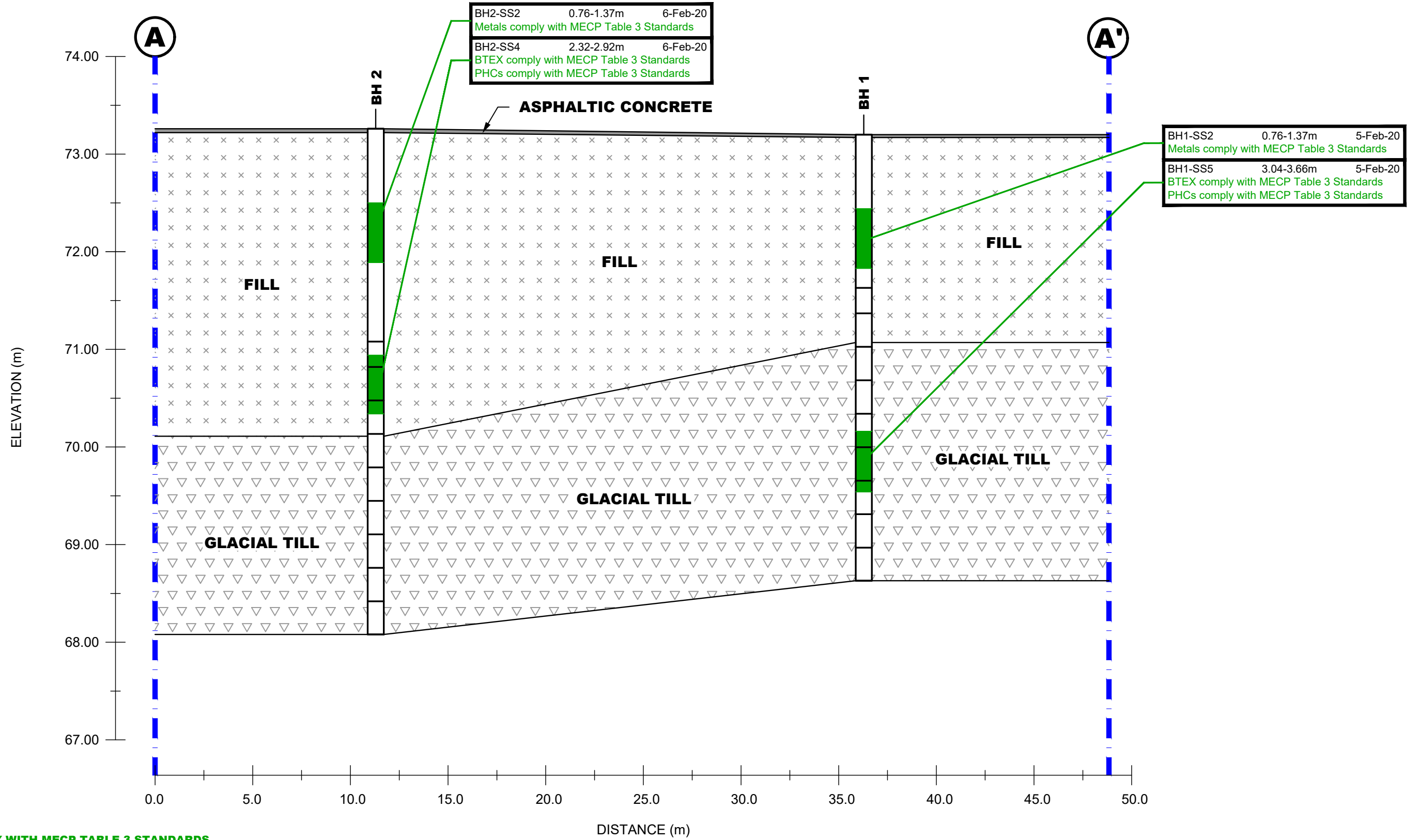
| NO. | REVISIONS | DATE | INITIAL |
|-----|-----------|------|---------|
| | | | |
| | | | |
| | | | |

1343678 ONTARIO LTD.
 PHASE II - ENVIRONMENTAL SITE ASSESSMENT
 1330 CARLING AVENUE & 815 ARCHIBALD STREET
 OTTAWA, ONTARIO
 Title:
ANALYTICAL TESTING PLAN - GROUNDWATER (BTEX, PHCs)

Scale: 1:250
 Drawn by: NFRV
 Checked by: MW
 Approved by: MSD

Date: 02/2020
 Report No.: PE4789-2
 Dwg. No.: **PE4789-6**
 Revision No.:

p:\autocad drawings\environmental\pe4789-3 test hole location plan and x sections.dwg



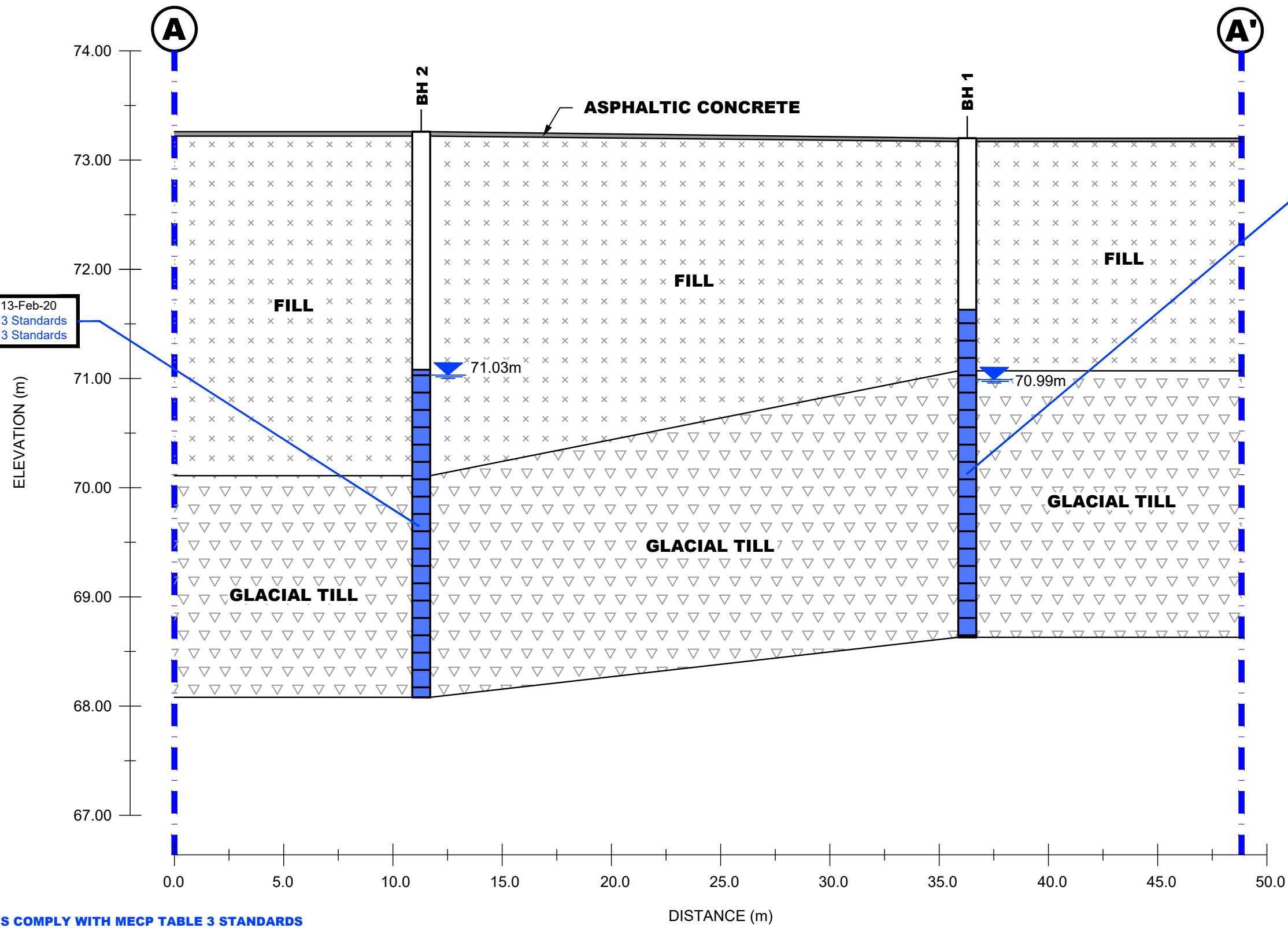
patersongroup
consulting engineers

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

| NO. | REVISIONS | DATE | INITIAL |
|-----|-----------|------|---------|
| | | | |
| | | | |
| | | | |

1343678 ONTARIO LTD.
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
 1330 CARLING AVENUE & 815 ARCHIBALD STREET
 OTTAWA, ONTARIO
CROSS SECTION A-A' - SOIL (BTEX, PHCs, METALS)

| | | | |
|--------------|----------|---------------|-----------------|
| Scale: | AS SHOWN | Date: | 02/2020 |
| Drawn by: | NFRV | Report No.: | PE4789-2 |
| Checked by: | MW | Dwg. No.: | PE4789-7 |
| Approved by: | MSD | Revision No.: | |



patersongroup
 consulting engineers

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

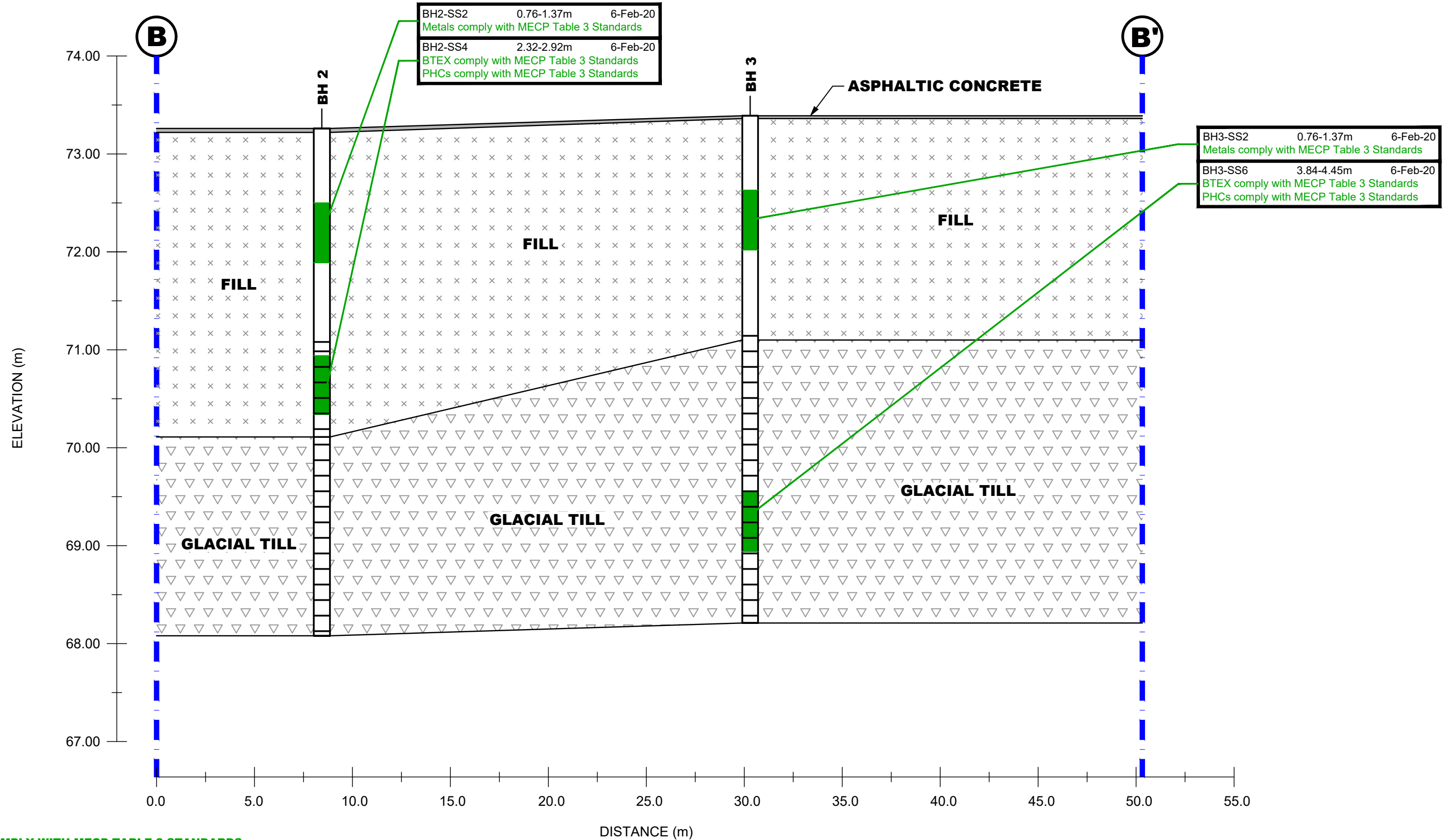
| NO. | REVISIONS | DATE | INITIAL |
|-----|-----------|------|---------|
| | | | |
| | | | |
| | | | |

1343678 ONTARIO LTD.
 PHASE II - ENVIRONMENTAL SITE ASSESSMENT
 1330 CARLING AVENUE & 815 ARCHIBALD STREET
 OTTAWA, ONTARIO

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

| | | | |
|--------------|----------|---------------|-----------------|
| Scale: | AS SHOWN | Date: | 02/2020 |
| Drawn by: | NFRV | Report No.: | PE4789-2 |
| Checked by: | MW | Dwg. No.: | PE4789-8 |
| Approved by: | MSD | Revision No.: | |

p:\autocad drawings\environmental\pe4789-3 test hole location plan and x sections.dwg



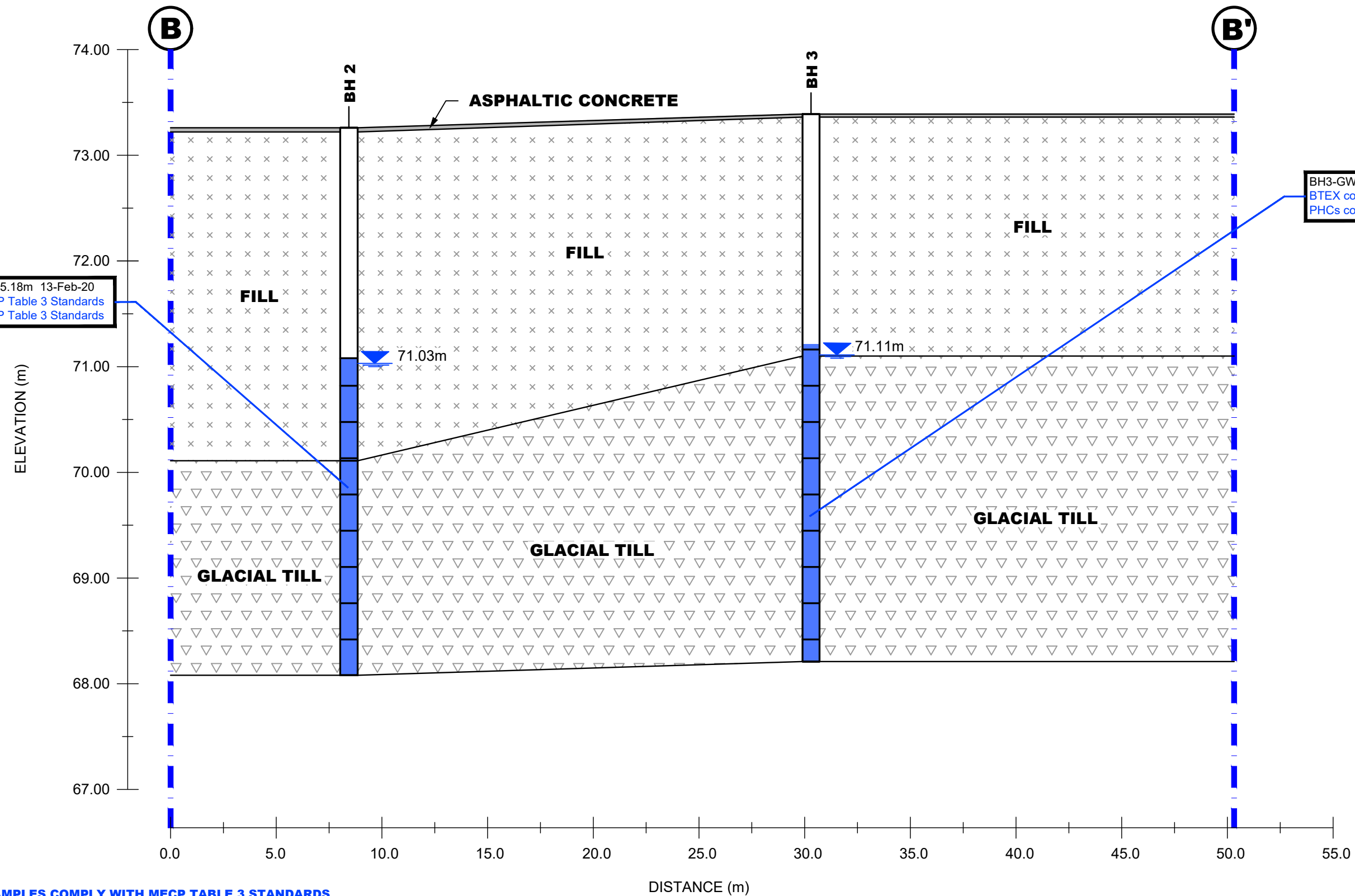
patersongroup
consulting engineers

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

| NO. | REVISIONS | DATE | INITIAL |
|-----|-----------|------|---------|
| | | | |
| | | | |
| | | | |

1343678 ONTARIO LTD.
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
 1330 CARLING AVENUE & 815 ARCHIBALD STREET
 OTTAWA, ONTARIO
CROSS SECTION B-B' - SOIL (BTEX, PHCs, METALS)

| | | | |
|--------------|----------|---------------|-----------------|
| Scale: | AS SHOWN | Date: | 02/2020 |
| Drawn by: | NFRV | Report No.: | PE4789-2 |
| Checked by: | MW | Dwg. No.: | PE4789-9 |
| Approved by: | MSD | Revision No.: | |



GROUNDWATER SAMPLES COMPLY WITH MECP TABLE 3 STANDARDS

patersongroup
consulting engineers

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

| NO. | REVISIONS | DATE | INITIAL |
|-----|-----------|------|---------|
| | | | |
| | | | |
| | | | |

1343678 ONTARIO LTD.
PHASE II - ENVIRONMENTAL SITE ASSESSMENT
1330 CARLING AVENUE & 815 ARCHIBALD STREET
OTTAWA, ONTARIO
Title: **CROSS SECTION B-B' - GROUNDWATER (BTEX, PHCs)**

| | | | |
|--------------|----------|---------------|------------------|
| Scale: | AS SHOWN | Date: | 02/2020 |
| Drawn by: | NFRV | Report No.: | PE4789-2 |
| Checked by: | MW | Dwg. No.: | PE4789-10 |
| Approved by: | MSD | Revision No.: | |

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

Sampling & Analysis Plan

Phase II Environmental Site Assessment
1330 Carling Avenue and 815 Archibald Street
Ottawa, Ontario

Prepared For

1343678 Ontario Limited

Paterson Group Inc.

Consulting Engineers
154 Colonnade Road South
Ottawa (Nepean), Ontario
Canada K2E 7J5

Tel: (613) 226-7381
Fax: (613) 226-6344
www.patersongroup.ca

February 2020

Report: PE4789-SAP

TABLE OF CONTENTS

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

1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by 1343678 Ontario Limited to conduct a Phase II Environmental Site Assessment (ESA) for the properties addressed 1330 Carling Avenue and 815 Archibald 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 in conjunction with the Geotechnical Investigation.

| Borehole | Location & Rationale | Proposed Depth & Rationale |
|-----------------|--|---|
| BH1 | Place borehole on the central west side of the Phase II Property to address the former UST nests and importation of fill material (APEC 2 and 4). | Drill to a depth of at least 2m to access groundwater table for monitoring well installation. |
| BH2 | Place borehole on the northern portion of the Phase II Property to address the former pump island and importation of fill material (APEC 3 and 4). | Drill to a depth of at least 2m to access groundwater table for monitoring well installation. |
| BH3 | Place borehole on the central east portion of the Phase II Property to address the former automotive garage and importation of fill material (APEC 1 and 4). | Drill to a depth of at least 2m to access groundwater table for monitoring well installation. |
| BH4 | Place borehole for general coverage. | Drill until practical auger refusal is reached. |
| BH5 | Place borehole for general coverage. | Drill until practical auger refusal is reached. |
| BH6 | Place borehole for general coverage. | Drill until practical auger refusal is reached. |

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 were surveyed relative to the garage floor slab located on the south corner of the subject building, with geodetic elevation of 73.60m 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.

DATUM Referenced to a TBM consisting of the southeast corner of the building slab.
Geodetic: 73.60m

FILE NO.
PE4789

REMARKS

HOLE NO.
BH 1

BORINGS BY CME 55 Power Auger

DATE 2020 February 5

| SOIL DESCRIPTION | STRATA PLOT | SAMPLE | | | | DEPTH (m) | ELEV. (m) | Photo Ionization Detector | | | | Monitoring Well Construction |
|--|-------------|--------|--------|------------|----------------|-----------|-----------|-------------------------------|---------------------------|----|--|------------------------------|
| | | TYPE | NUMBER | RECOVERY % | N VALUE or RQD | | | ● Volatile Organic Rdg. (ppm) | ○ Lower Explosive Limit % | | | |
| | | | | | | | 20 | 40 | 60 | 80 | | |
| UNDERSIDE OF FOOTING | | | | | | | | | | | | |
| ASPHALTIC CONCRETE | 0.03 | AU | 1 | | | 0 | 73.20 | | | | | |
| FILL: Brown silty sand with gravel and occasional cobbles, some clay | | SS | 2 | 67 | 19 | 1 | 72.20 | | | | | |
| | | SS | 3 | 50 | 12 | 2 | 71.20 | | | | | |
| | 2.13 | SS | 4 | 8 | 6 | 3 | 70.20 | | | | | |
| GLACIAL TILL: Grey silty clay with sand, gravel and occasional cobbles | | SS | 5 | 17 | 6 | 4 | 69.20 | | | | | |
| | | SS | 6 | 42 | 18 | | | | | | | |
| | 4.57 | | | | | | | | | | | |
| End of Borehole | | | | | | | | | | | | |
| (GWL @ 2.21m depth - Feb. 13/2020) | | | | | | | | | | | | |

100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

DATUM Referenced to a TBM consisting of the southeast corner of the building slab.
Geodetic: 73.60m

REMARKS

BORINGS BY CME 55 Power Auger

DATE 2020 February 6

FILE NO.
PE4789

HOLE NO.
BH 3

| SOIL DESCRIPTION | STRATA PLOT | SAMPLE | | | | DEPTH (m) | ELEV. (m) | Photo Ionization Detector | | | | Monitoring Well Construction | |
|--|--------------|--------|--------|------------|----------------|-----------|-----------|-------------------------------|---------------------------|----|----|------------------------------|--|
| | | TYPE | NUMBER | RECOVERY % | N VALUE or RQD | | | ● Volatile Organic Rdg. (ppm) | ○ Lower Explosive Limit % | | | | |
| | | | | | | | | 20 | 40 | 60 | 80 | | |
| UNDERSIDE OF FOOTING | | | | | | | | | | | | | |
| ASPHALTIC CONCRETE FILL: Brown silty sand with gravel | 0.03 0.61 | AU | 1 | | | 0 | 73.39 | | | | | | |
| FILL: Brown silty sand with gravel and clay | 1.52 | SS | 2 | 42 | 11 | 1 | 72.39 | | | | | | |
| FILL: Brown/grey silty clay with sand, gravel and occasional cobbles | 2.29 | SS | 3 | 63 | 7 | 2 | 71.39 | | | | | | |
| GLACIAL TILL: Grey silty clay with sand, gravel and occasional cobbles | 5.18 | SS | 4 | 67 | 27 | 3 | 70.39 | | | | | | |
| | | SS | 5 | 13 | 11 | 4 | 69.39 | | | | | | |
| | | SS | 6 | 63 | 6 | 5 | 68.39 | | | | | | |
| | | SS | 7 | 29 | 15 | 5 | 68.39 | | | | | | |
| End of Borehole (GWL @ 2.28m depth - Feb. 13/2020) | | | | | | | | | | | | | |

100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

DATUM Referenced to a TBM consisting of the southeast corner of the building slab.
Geodetic: 73.60m

REMARKS

BORINGS BY CME 55 Power Auger

DATE 2020 February 5

FILE NO.
PE4789

HOLE NO.
BH 4

| SOIL DESCRIPTION | STRATA PLOT | SAMPLE | | | | DEPTH (m) | ELEV. (m) | Photo Ionization Detector | | | | Monitoring Well Construction |
|---|-------------|--------|--------|------------|----------------|-----------|-----------|-------------------------------|---------------------------|----|----|------------------------------|
| | | TYPE | NUMBER | RECOVERY % | N VALUE or RQD | | | ● Volatile Organic Rdg. (ppm) | ○ Lower Explosive Limit % | | | |
| | | | | | | | | 20 | 40 | 60 | 80 | |
| UNDERSIDE OF FOOTING | | | | | | | | | | | | |
| ASPHALTIC CONCRETE | 0.03 | AU | 1 | | | 0 | 73.40 | | | | | |
| FILL: Brown silty sand with gravel | | SS | 2 | 50 | 20 | 1 | 72.40 | | | | | |
| | 1.52 | | | | | | | | | | | |
| Brown SILTY CLAY, trace gravel | 2.13 | SS | 3 | 42 | 12 | 2 | 71.40 | | | | | |
| | | SS | 4 | 50 | 8 | 3 | 70.40 | | | | | |
| GLACIAL TILL: Grey silty clay with sand, gravel and occasional cobbles | | SS | 5 | 58 | 18 | 4 | 69.40 | | | | | |
| | | SS | 6 | 75 | 8 | 5 | 68.40 | | | | | |
| | | SS | 7 | 67 | 19 | 6 | 67.40 | | | | | |
| | | SS | 8 | 75 | 31 | 7 | 66.40 | | | | | |
| | 6.10 | | | | | 8 | 65.40 | | | | | |
| Dynamic Cone Penetration Test commenced at 6.10m depth. | | | | | | 9 | 64.40 | | | | | |
| | | | | | | | | | | | | |
| | 9.60 | | | | | | | | | | | |
| End of Borehole | | | | | | | | | | | | |
| Practical refusal to DCPT @ 9.60m depth | | | | | | | | | | | | |

100 200 300 400 500
RKI Eagle Rdg. (ppm)
▲ Full Gas Resp. △ Methane Elim.

DATUM Referenced to a TBM consisting of the southeast corner of the building slab.
Geodetic: 73.60m

REMARKS

BORINGS BY CME 55 Power Auger

DATE 2020 February 6

FILE NO.
PE4789

HOLE NO.
BH 6

| SOIL DESCRIPTION | STRATA PLOT | SAMPLE | | | | DEPTH (m) | ELEV. (m) | Photo Ionization Detector | | | | Monitoring Well Construction |
|--|-------------|--------|--------|------------|----------------|-----------|-----------|-------------------------------|---------------------------|----|--|------------------------------|
| | | TYPE | NUMBER | RECOVERY % | N VALUE or RQD | | | ● Volatile Organic Rdg. (ppm) | ○ Lower Explosive Limit % | | | |
| | | | | | | | 20 | 40 | 60 | 80 | | |
| UNDERSIDE OF FOOTING | | | | | | | | | | | | |
| ASPHALTIC CONCRETE | 0.05 | | | | | 0 | 73.30 | | | | | |
| FILL: Brown silty sand with gravel | 0.61 | AU | 1 | | | | | | | | | |
| FILL: Brown silty sand, trace gravel | | SS | 2 | 67 | 8 | 1 | 72.30 | | | | | |
| FILL: Brown silty sand with gravel, some black sand | 1.52 | SS | 3 | 13 | 12 | 2 | 71.30 | | | | | |
| | 2.39 | SS | 4 | 67 | 8 | 3 | 70.30 | | | | | |
| GLACIAL TILL: Grey silty clay with sand, gravel and occasional cobbles | | SS | 5 | 25 | 21 | 4 | 69.30 | | | | | |
| | | SS | 6 | 42 | 18 | 5 | 68.30 | | | | | |
| | | SS | 7 | 0 | 13 | 6 | 67.30 | | | | | |
| | | SS | 8 | 13 | 7 | 6 | 67.30 | | | | | |
| End of Borehole | 6.40 | | | | | | | | | | | |

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) |
| D _{xx} | - | 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 |
| D ₁₀ | - | Grain size at which 10% of the soil is finer (effective grain size) |
| D ₆₀ | - | Grain size at which 60% of the soil is finer |
| C _c | - | Concavity coefficient = $(D_{30})^2 / (D_{10} \times D_{60})$ |
| C _u | - | Uniformity coefficient = D_{60} / D_{10} |

C_c and C_u are used to assess the grading of sands and gravels:

Well-graded gravels have: $1 < C_c < 3$ and $C_u > 4$

Well-graded sands have: $1 < C_c < 3$ and $C_u > 6$

Sands and gravels not meeting the above requirements are poorly-graded or uniformly-graded.

C_c and C_u 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

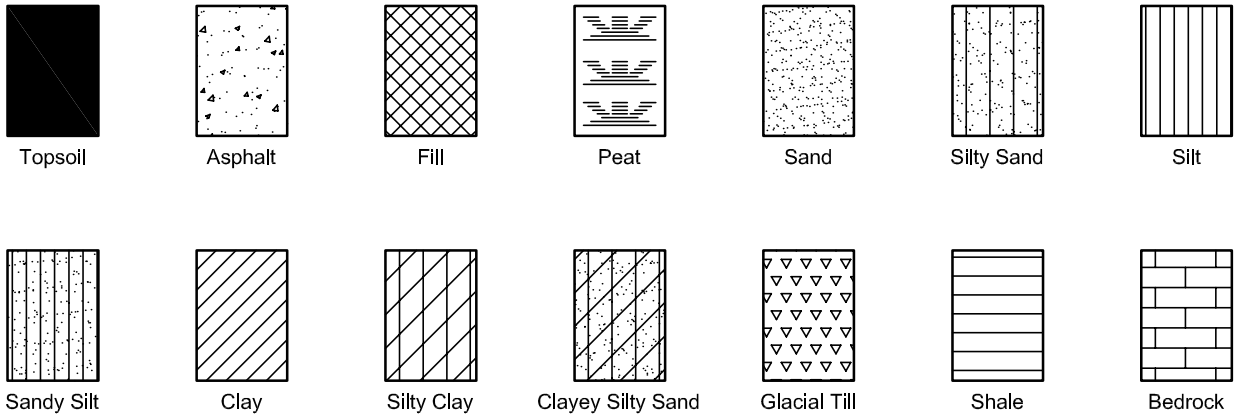
| | | |
|-----------------|---|---|
| p' _o | - | Present effective overburden pressure at sample depth |
| p' _c | - | Preconsolidation pressure of (maximum past pressure on) sample |
| C _{cr} | - | Recompression index (in effect at pressures below p' _c) |
| C _c | - | Compression index (in effect at pressures above p' _c) |
| OC Ratio | | Overconsolidation ratio = p'_c / p'_o |
| Void Ratio | | Initial sample void ratio = volume of voids / volume of solids |
| W _o | - | 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. |
|---|---|--|

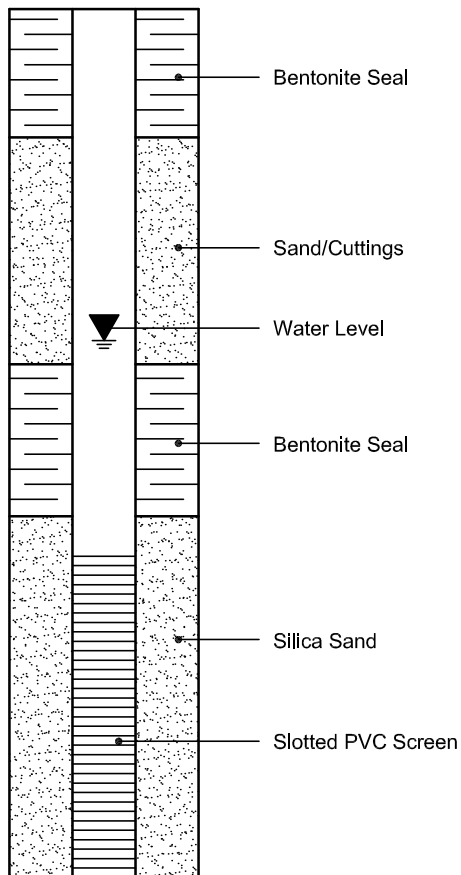
SYMBOLS AND TERMS (continued)

STRATA PLOT

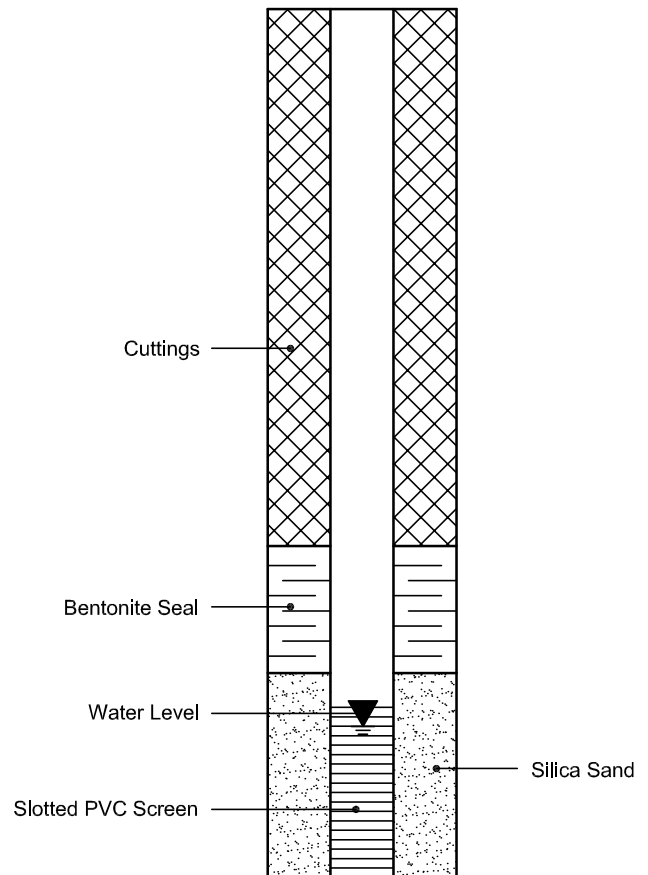


MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION



PIEZOMETER CONSTRUCTION



Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 29452
Project: PE4789
Custody: 126916

Report Date: 20-Feb-2020
Order Date: 7-Feb-2020

Revised Report

Order #: 2007020

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

| Paracel ID | Client ID |
|------------|-----------|
| 2007020-01 | BH1-SS2 |
| 2007020-02 | BH1-SS5 |
| 2007020-03 | BH2-SS2 |
| 2007020-04 | BH2-SS4 |
| 2007020-05 | BH3-SS2 |
| 2007020-06 | BH3-SS6 |

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Feb-2020

Client PO: 29452

Project Description: PE4789

Analysis Summary Table

| Analysis | Method Reference/Description | Extraction Date | Analysis Date |
|---------------------------------|--|-----------------|---------------|
| BTEX by P&T GC-MS | EPA 8260 - P&T GC-MS | 12-Feb-20 | 12-Feb-20 |
| Chromium, hexavalent - soil | MOE E3056 - Extraction, colourimetric | 10-Feb-20 | 11-Feb-20 |
| Mercury by CVAA | EPA 7471B - CVAA, digestion | 11-Feb-20 | 11-Feb-20 |
| pH, soil | EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext. | 18-Feb-20 | 19-Feb-20 |
| PHC F1 | CWS Tier 1 - P&T GC-FID | 12-Feb-20 | 12-Feb-20 |
| PHC F4G (gravimetric) | CWS Tier 1 - Extraction Gravimetric | 12-Feb-20 | 12-Feb-20 |
| PHCs F2 to F4 | CWS Tier 1 - GC-FID, extraction | 10-Feb-20 | 11-Feb-20 |
| REG 153: Metals by ICP/MS, soil | EPA 6020 - Digestion - ICP-MS | 11-Feb-20 | 11-Feb-20 |
| Solids, % | Gravimetric, calculation | 11-Feb-20 | 12-Feb-20 |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Feb-2020

Client PO: 29452

Project Description: PE4789

| Client ID: | BH1-SS2 | BH1-SS5 | BH2-SS2 | BH2-SS4 |
|--------------|-----------------|-----------------|-----------------|-----------------|
| Sample Date: | 05-Feb-20 09:00 | 05-Feb-20 09:00 | 06-Feb-20 09:00 | 06-Feb-20 09:00 |
| Sample ID: | 2007020-01 | 2007020-02 | 2007020-03 | 2007020-04 |
| MDL/Units | Soil | Soil | Soil | Soil |

Physical Characteristics

| | | | | | |
|----------|--------------|------|------|------|------|
| % Solids | 0.1 % by Wt. | 95.0 | 89.4 | 97.0 | 85.2 |
|----------|--------------|------|------|------|------|

General Inorganics

| | | | | | |
|----|---------------|------|------|---|---|
| pH | 0.05 pH Units | 7.75 | 7.65 | - | - |
|----|---------------|------|------|---|---|

Metals

| | | | | | |
|---------------|---------------|------|---|-------|---|
| Antimony | 1.0 ug/g dry | <1.0 | - | <1.0 | - |
| Arsenic | 1.0 ug/g dry | 2.1 | - | 1.8 | - |
| Barium | 1.0 ug/g dry | 72.9 | - | 48.0 | - |
| Beryllium | 0.5 ug/g dry | <0.5 | - | <0.5 | - |
| Boron | 5.0 ug/g dry | 8.8 | - | 6.8 | - |
| Cadmium | 0.5 ug/g dry | <0.5 | - | <0.5 | - |
| Chromium | 5.0 ug/g dry | 13.8 | - | 11.8 | - |
| Chromium (VI) | 0.2 ug/g dry | <0.2 | - | <0.2 | - |
| Cobalt | 1.0 ug/g dry | 5.8 | - | 4.4 | - |
| Copper | 5.0 ug/g dry | 17.1 | - | 11.9 | - |
| Lead | 1.0 ug/g dry | 6.8 | - | 3.8 | - |
| Mercury | 0.1 ug/g dry | <0.1 | - | <0.1 | - |
| Molybdenum | 1.0 ug/g dry | <1.0 | - | <1.0 | - |
| Nickel | 5.0 ug/g dry | 11.3 | - | 8.6 | - |
| Selenium | 1.0 ug/g dry | <1.0 | - | <1.0 | - |
| Silver | 0.3 ug/g dry | <0.3 | - | <0.3 | - |
| Thallium | 1.0 ug/g dry | <1.0 | - | <1.0 | - |
| Uranium | 1.0 ug/g dry | <1.0 | - | <1.0 | - |
| Vanadium | 10.0 ug/g dry | 24.2 | - | 19.1 | - |
| Zinc | 20.0 ug/g dry | 24.3 | - | <20.0 | - |

Volatiles

| | | | | | |
|----------------|---------------|---|-------|---|-------|
| Benzene | 0.02 ug/g dry | - | <0.02 | - | <0.02 |
| Ethylbenzene | 0.05 ug/g dry | - | <0.05 | - | <0.05 |
| Toluene | 0.05 ug/g dry | - | <0.05 | - | <0.05 |
| m,p-Xylenes | 0.05 ug/g dry | - | <0.05 | - | <0.05 |
| o-Xylene | 0.05 ug/g dry | - | <0.05 | - | <0.05 |
| Xylenes, total | 0.05 ug/g dry | - | <0.05 | - | <0.05 |
| Toluene-d8 | Surrogate | - | 102% | - | 112% |

Hydrocarbons

| | | | | | |
|-------------------|------------|---|----|---|----|
| F1 PHCs (C6-C10) | 7 ug/g dry | - | 44 | - | <7 |
| F2 PHCs (C10-C16) | 4 ug/g dry | - | 27 | - | <4 |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Feb-2020

Client PO: 29452

Project Description: PE4789

| | Client ID: | BH1-SS2 | BH1-SS5 | BH2-SS2 | BH2-SS4 |
|------------------------|--------------|-----------------|-----------------|-----------------|-----------------|
| | Sample Date: | 05-Feb-20 09:00 | 05-Feb-20 09:00 | 06-Feb-20 09:00 | 06-Feb-20 09:00 |
| | Sample ID: | 2007020-01 | 2007020-02 | 2007020-03 | 2007020-04 |
| | MDL/Units | Soil | Soil | Soil | Soil |
| F3 PHCs (C16-C34) | 8 ug/g dry | - | 18 | - | 71 |
| F4 PHCs (C34-C50) | 6 ug/g dry | - | <6 | - | 214 [1] |
| F4G PHCs (gravimetric) | 50 ug/g dry | - | - | - | 508 |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Feb-2020

Client PO: 29452

Project Description: PE4789

| | | | | |
|---------------------|-----------------|-----------------|---|---|
| Client ID: | BH3-SS2 | BH3-SS6 | - | - |
| Sample Date: | 06-Feb-20 09:00 | 06-Feb-20 09:00 | - | - |
| Sample ID: | 2007020-05 | 2007020-06 | - | - |
| MDL/Units | Soil | Soil | - | - |

Physical Characteristics

| | | | | | |
|----------|--------------|------|------|---|---|
| % Solids | 0.1 % by Wt. | 76.6 | 93.5 | - | - |
|----------|--------------|------|------|---|---|

Metals

| | | | | | |
|---------------|---------------|------|---|---|---|
| Antimony | 1.0 ug/g dry | <1.0 | - | - | - |
| Arsenic | 1.0 ug/g dry | 3.9 | - | - | - |
| Barium | 1.0 ug/g dry | 236 | - | - | - |
| Beryllium | 0.5 ug/g dry | 0.7 | - | - | - |
| Boron | 5.0 ug/g dry | 6.2 | - | - | - |
| Cadmium | 0.5 ug/g dry | <0.5 | - | - | - |
| Chromium | 5.0 ug/g dry | 70.1 | - | - | - |
| Chromium (VI) | 0.2 ug/g dry | <0.2 | - | - | - |
| Cobalt | 1.0 ug/g dry | 19.0 | - | - | - |
| Copper | 5.0 ug/g dry | 24.8 | - | - | - |
| Lead | 1.0 ug/g dry | 12.5 | - | - | - |
| Mercury | 0.1 ug/g dry | <0.1 | - | - | - |
| Molybdenum | 1.0 ug/g dry | <1.0 | - | - | - |
| Nickel | 5.0 ug/g dry | 36.9 | - | - | - |
| 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 | 72.9 | - | - | - |
| Zinc | 20.0 ug/g dry | 80.9 | - | - | - |

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 | - | 112% | - | - |

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: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Feb-2020

Client PO: 29452

Project Description: PE4789

Method Quality Control: Blank

| Analyte | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|------------------------|--------|-----------------|-------|---------------|------|------------|-----|-----------|-------|
| Hydrocarbons | | | | | | | | | |
| F1 PHCs (C6-C10) | ND | 7 | ug/g | | | | | | |
| F2 PHCs (C10-C16) | ND | 4 | ug/g | | | | | | |
| F3 PHCs (C16-C34) | ND | 8 | ug/g | | | | | | |
| F4 PHCs (C34-C50) | ND | 6 | ug/g | | | | | | |
| F4G PHCs (gravimetric) | ND | 50 | ug/g | | | | | | |
| 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 | 3.73 | | ug/g | | 117 | 50-140 | | | |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Feb-2020

Client PO: 29452

Project Description: PE4789

Method Quality Control: Duplicate

| Analyte | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|---------------------------------|--------|-----------------|----------|---------------|------|------------|------|-----------|-------|
| General Inorganics | | | | | | | | | |
| pH | 7.54 | 0.05 | pH Units | 7.50 | | | 0.5 | 2.3 | |
| Hydrocarbons | | | | | | | | | |
| F1 PHCs (C6-C10) | 38 | 7 | ug/g dry | 44 | | | 14.5 | 40 | |
| F2 PHCs (C10-C16) | ND | 4 | ug/g dry | ND | | | NC | 30 | |
| F3 PHCs (C16-C34) | ND | 8 | ug/g dry | ND | | | NC | 30 | |
| F4 PHCs (C34-C50) | ND | 6 | ug/g dry | ND | | | NC | 30 | |
| Metals | | | | | | | | | |
| Antimony | 2.1 | 1.0 | ug/g dry | ND | | | NC | 30 | |
| Arsenic | 1.9 | 1.0 | ug/g dry | 2.1 | | | 9.8 | 30 | |
| Barium | 61.7 | 1.0 | ug/g dry | 72.9 | | | 16.6 | 30 | |
| Beryllium | 0.8 | 0.5 | ug/g dry | ND | | | NC | 30 | |
| Boron | 8.8 | 5.0 | ug/g dry | 8.8 | | | 0.5 | 30 | |
| Cadmium | ND | 0.5 | ug/g dry | ND | | | NC | 30 | |
| Chromium (VI) | ND | 0.2 | ug/g dry | ND | | | NC | 35 | |
| Chromium | 12.1 | 5.0 | ug/g dry | 13.8 | | | 13.0 | 30 | |
| Cobalt | 5.2 | 1.0 | ug/g dry | 5.8 | | | 9.6 | 30 | |
| Copper | 15.2 | 5.0 | ug/g dry | 17.1 | | | 11.7 | 30 | |
| Lead | 6.3 | 1.0 | ug/g dry | 6.8 | | | 8.0 | 30 | |
| Mercury | ND | 0.1 | ug/g dry | ND | | | NC | 30 | |
| Molybdenum | ND | 1.0 | ug/g dry | ND | | | NC | 30 | |
| Nickel | 10.3 | 5.0 | ug/g dry | 11.3 | | | 9.4 | 30 | |
| Selenium | ND | 1.0 | ug/g dry | ND | | | NC | 30 | |
| Silver | ND | 0.3 | ug/g dry | ND | | | NC | 30 | |
| Thallium | ND | 1.0 | ug/g dry | ND | | | NC | 30 | |
| Uranium | ND | 1.0 | ug/g dry | ND | | | NC | 30 | |
| Vanadium | 20.2 | 10.0 | ug/g dry | 24.2 | | | 18.0 | 30 | |
| Zinc | 22.1 | 20.0 | ug/g dry | 24.3 | | | 9.6 | 30 | |
| Physical Characteristics | | | | | | | | | |
| % Solids | 82.8 | 0.1 | % by Wt. | 86.7 | | | 4.6 | 25 | |
| Volatiles | | | | | | | | | |
| Benzene | ND | 0.02 | ug/g dry | ND | | | NC | 50 | |
| Ethylbenzene | ND | 0.05 | ug/g dry | ND | | | NC | 50 | |
| Toluene | ND | 0.05 | ug/g dry | ND | | | NC | 50 | |
| m,p-Xylenes | ND | 0.05 | ug/g dry | ND | | | NC | 50 | |
| o-Xylene | ND | 0.05 | ug/g dry | ND | | | NC | 50 | |
| Surrogate: Toluene-d8 | 3.72 | | ug/g dry | | 104 | 50-140 | | | |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Feb-2020

Client PO: 29452

Project Description: PE4789

Method Quality Control: Spike

| Analyte | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|------------------------|--------|-----------------|-------|---------------|------|------------|-----|-----------|-------|
| Hydrocarbons | | | | | | | | | |
| F1 PHCs (C6-C10) | 178 | 7 | ug/g | ND | 88.9 | 80-120 | | | |
| F2 PHCs (C10-C16) | 96 | 4 | ug/g | ND | 105 | 60-140 | | | |
| F3 PHCs (C16-C34) | 251 | 8 | ug/g | ND | 112 | 60-140 | | | |
| F4 PHCs (C34-C50) | 169 | 6 | ug/g | ND | 119 | 60-140 | | | |
| F4G PHCs (gravimetric) | 820 | 50 | ug/g | ND | 82.0 | 80-120 | | | |
| Metals | | | | | | | | | |
| Antimony | 49.5 | 1.0 | ug/g | ND | 98.8 | 70-130 | | | |
| Arsenic | 47.5 | 1.0 | ug/g | ND | 93.3 | 70-130 | | | |
| Barium | 80.1 | 1.0 | ug/g | 29.2 | 102 | 70-130 | | | |
| Beryllium | 51.9 | 0.5 | ug/g | ND | 104 | 70-130 | | | |
| Boron | 52.4 | 5.0 | ug/g | ND | 97.8 | 70-130 | | | |
| Cadmium | 50.6 | 0.5 | ug/g | ND | 101 | 70-130 | | | |
| Chromium (VI) | 0.1 | 0.2 | ug/g | ND | 60.0 | 70-130 | | | QM-05 |
| Chromium | 56.9 | 5.0 | ug/g | 5.5 | 103 | 70-130 | | | |
| Cobalt | 51.5 | 1.0 | ug/g | 2.3 | 98.4 | 70-130 | | | |
| Copper | 56.2 | 5.0 | ug/g | 6.8 | 98.8 | 70-130 | | | |
| Lead | 51.3 | 1.0 | ug/g | 2.7 | 97.2 | 70-130 | | | |
| Mercury | 1.70 | 0.1 | ug/g | ND | 113 | 70-130 | | | |
| Molybdenum | 51.6 | 1.0 | ug/g | ND | 103 | 70-130 | | | |
| Nickel | 53.4 | 5.0 | ug/g | ND | 97.7 | 70-130 | | | |
| Selenium | 47.1 | 1.0 | ug/g | ND | 94.0 | 70-130 | | | |
| Silver | 51.9 | 0.3 | ug/g | ND | 104 | 70-130 | | | |
| Thallium | 44.5 | 1.0 | ug/g | ND | 89.0 | 70-130 | | | |
| Uranium | 47.2 | 1.0 | ug/g | ND | 94.0 | 70-130 | | | |
| Vanadium | 59.2 | 10.0 | ug/g | ND | 99.1 | 70-130 | | | |
| Zinc | 57.8 | 20.0 | ug/g | ND | 96.2 | 70-130 | | | |
| Volatiles | | | | | | | | | |
| Benzene | 3.60 | 0.02 | ug/g | ND | 89.9 | 60-130 | | | |
| Ethylbenzene | 3.91 | 0.05 | ug/g | ND | 97.6 | 60-130 | | | |
| Toluene | 3.71 | 0.05 | ug/g | ND | 92.8 | 60-130 | | | |
| m,p-Xylenes | 8.21 | 0.05 | ug/g | ND | 103 | 60-130 | | | |
| o-Xylene | 4.34 | 0.05 | ug/g | ND | 108 | 60-130 | | | |
| Surrogate: Toluene-d8 | 3.13 | | ug/g | | 97.7 | 50-140 | | | |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 7-Feb-2020

Client PO: 29452

Project Description: PE4789

Qualifier Notes:

Sample Qualifiers :

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

QC Qualifiers :

QM-05 : The spike recovery was outside acceptance limits for the matrix spike due to matrix interference.

Sample Data Revisions

None

Work Order Revisions / Comments:

Revision 1 This report includes an updated parameter list.

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.



Parcel ID: 2007020



ent Blvd.
1G 4J8

ilabs.com
.com

Parcel Order Number
(Lab Use Only)

Chain Of Custody

(Lab Use Only)

Nº 126916

2007020

| | | |
|--|--|--|
| Client Name: <i>Peterson Group</i> | Project Ref: <i>PE4789</i> | Page <u> </u> of <u> </u> |
| Contact Name: <i>Mandy Witterman / Mark D'Arcy</i> | Quote #: | Turnaround Time <input type="checkbox"/> 1 day <input type="checkbox"/> 3 day <input type="checkbox"/> 2 day <input checked="" type="checkbox"/> Regular |
| Address: <i>15A Colonnade Rd. S.</i> | PO #: <i>29452</i> | |
| Telephone: <i>(613) 226-7381</i> | E-mail: <i>mwitterman@petersongroup.ca</i> | |
| Date Required: _____ | | |

| Regulation 153/04 | | Other Regulation | | Matrix Type: S (Soil/Sed.) GW (Ground Water) SW (Surface Water) SS (Storm/Sanitary Sewer) P (Paint) A (Air) O (Other) | | Required Analysis | | | | | | | | | | | | | | | |
|---|---|-----------------------------------|------------------------------------|---|--------|-------------------|-----------------|--------------------------------|----------|-----------------|------|---------------|---------------|----|------|-------------------|--------------------|--|--|--|--|
| <input type="checkbox"/> Table 1 | <input type="checkbox"/> Res/Park | <input type="checkbox"/> Med/Fine | <input type="checkbox"/> REG 558 | <input type="checkbox"/> PWQD | Matrix | Air Volume | # of Containers | Sample Taken Date Time | | PHCs F1-F4+BTEX | VOCs | PAHs | Metals by ICP | Hg | CrVI | B (HWS) | | | | | |
| <input type="checkbox"/> Table 2 | <input type="checkbox"/> Ind/Comm | <input type="checkbox"/> Coarse | <input type="checkbox"/> CCME | <input type="checkbox"/> MISA | | | | | | | | | | | | | | | | | |
| <input checked="" type="checkbox"/> Table 3 | <input type="checkbox"/> Agri/Other | | <input type="checkbox"/> SU - Sani | <input type="checkbox"/> SU - Storm | | | | | | | | | | | | | | | | | |
| <input type="checkbox"/> Table _____ | For RSC: <input type="checkbox"/> Yes <input type="checkbox"/> No | | Mun: _____ | | | | | | | | | | | | | | | | | | |
| Sample ID/Location Name | | | | | | | | | | | | | | | | | | | | | |
| 1 | <i>BH1-SS2</i> | | | <i>S</i> | | <i>1</i> | <i>Feb 5/20</i> | <i>AM</i> | | | | | <i>XXX</i> | | | | | | | | |
| 2 | <i>BH1-SS5</i> | | | <i>S</i> | | <i>2</i> | <i>↓</i> | <i>↓</i> | <i>X</i> | | | | | | | | | | | | |
| 3 | <i>BH1-SS6</i> | | | <i>S</i> | | <i>2</i> | <i>↓</i> | <i>↓</i> | <i>X</i> | | | <i>ignore</i> | <i>(HOLD)</i> | | | | | | | | |
| 4 | <i>BH2-SS2</i> | | | <i>S</i> | | <i>1</i> | <i>Feb 6/20</i> | | | | | | <i>XXX</i> | | | | | | | | |
| 5 | <i>BH2-SS4</i> | | | <i>S</i> | | <i>2</i> | <i>↓</i> | | <i>X</i> | | | | | | | | | | | | |
| 6 | <i>BH3-SS2</i> | | | <i>S</i> | | <i>1</i> | <i>↓</i> | | | | | | <i>XXX</i> | | | <i>10' extend</i> | <i>2'6"-4'6"</i> | | | | |
| 7 | <i>BH3-SS6</i> | | | <i>S</i> | | <i>2</i> | <i>↓</i> | | <i>X</i> | | | | | | | <i>11'</i> | <i>12'6"-14'6"</i> | | | | |
| 8 | | | | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | | | | |

| | | | |
|---|---------------------------|-------------------------------------|---|
| Comments: | | Method of Delivery: <i>Parcel</i> | |
| Relinquished By (Sign): <i>[Signature]</i> | Received By Driver/Depot: | Received at Lab: <i>[Signature]</i> | Verified By: <i>[Signature]</i> |
| Relinquished By (Print): <i>Mandy Witterman</i> | Date/Time: | Date/Time: <i>07 Feb 2020 16:30</i> | Date/Time: <i>10 Feb 2020/008</i> |
| Date/Time: <i>Feb 7, 2020</i> | Temperature: _____ °C | Temperature: <i>9.2</i> °C | pH Verified: <input type="checkbox"/> By: <i>NA</i> |

Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 29529
Project: PE4789
Custody: 126934

Report Date: 20-Feb-2020
Order Date: 14-Feb-2020

Order #: 2007643

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

| Paracel ID | Client ID |
|------------|-----------|
| 2007643-01 | Dup |

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 14-Feb-2020

Client PO: 29529

Project Description: PE4789

Analysis Summary Table

| Analysis | Method Reference/Description | Extraction Date | Analysis Date |
|-------------------|------------------------------|-----------------|---------------|
| BTEX by P&T GC-MS | EPA 8260 - P&T GC-MS | 19-Feb-20 | 20-Feb-20 |
| PHC F1 | CWS Tier 1 - P&T GC-FID | 19-Feb-20 | 20-Feb-20 |
| Solids, % | Gravimetric, calculation | 19-Feb-20 | 20-Feb-20 |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 14-Feb-2020

Client PO: 29529

Project Description: PE4789

| | | | | |
|---------------------|-----------------|---|---|---|
| Client ID: | Dup | - | - | - |
| Sample Date: | 06-Feb-20 09:00 | - | - | - |
| Sample ID: | 2007643-01 | - | - | - |
| MDL/Units | Soil | - | - | - |

Physical Characteristics

| | | | | | |
|----------|--------------|------|---|---|---|
| % Solids | 0.1 % by Wt. | 82.7 | - | - | - |
|----------|--------------|------|---|---|---|

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 | 107% | - | - | - |

Hydrocarbons

| | | | | | |
|------------------|------------|----|---|---|---|
| F1 PHCs (C6-C10) | 7 ug/g dry | 10 | - | - | - |
|------------------|------------|----|---|---|---|

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 14-Feb-2020

Client PO: 29529

Project Description: PE4789

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 | | | | | | |
| 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 | 3.36 | | ug/g | | 105 | 50-140 | | | |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 14-Feb-2020

Client PO: 29529

Project Description: PE4789

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 | |
| Physical Characteristics | | | | | | | | | |
| % Solids | 91.2 | 0.1 | % by Wt. | 90.0 | | | 1.4 | 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 | 4.01 | | ug/g dry | | 113 | 50-140 | | | |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 14-Feb-2020

Client PO: 29529

Project Description: PE4789

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 | | | |
| Volatiles | | | | | | | | | |
| Benzene | 2.46 | 0.02 | ug/g | ND | 61.5 | 60-130 | | | |
| Ethylbenzene | 3.29 | 0.05 | ug/g | ND | 82.3 | 60-130 | | | |
| Toluene | 3.16 | 0.05 | ug/g | ND | 78.9 | 60-130 | | | |
| 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: Toluene-d8 | 2.87 | | ug/g | | 89.5 | 50-140 | | | |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 14-Feb-2020

Client PO: 29529

Project Description: PE4789

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.

Certificate of Analysis

Paterson Group Consulting Engineers

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

Client PO: 29526
Project: PE4789
Custody: 126930

Report Date: 20-Feb-2020
Order Date: 13-Feb-2020

Order #: 2007563

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

| Paracel ID | Client ID |
|------------|-----------|
| 2007563-01 | MW1-GW1 |
| 2007563-02 | MW2-GW1 |
| 2007563-03 | MW3-GW1 |
| 2007563-04 | Dup 1 |

Approved By:



Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Feb-2020

Client PO: 29526

Project Description: PE4789

Analysis Summary Table

| Analysis | Method Reference/Description | Extraction Date | Analysis Date |
|-------------------|---------------------------------|-----------------|---------------|
| BTEX by P&T GC-MS | EPA 624 - P&T GC-MS | 15-Feb-20 | 15-Feb-20 |
| PHC F1 | CWS Tier 1 - P&T GC-FID | 14-Feb-20 | 15-Feb-20 |
| PHCs F2 to F4 | CWS Tier 1 - GC-FID, extraction | 18-Feb-20 | 18-Feb-20 |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Feb-2020

Client PO: 29526

Project Description: PE4789

| | | | | |
|---------------------|-----------------|-----------------|-----------------|-----------------|
| Client ID: | MW1-GW1 | MW2-GW1 | MW3-GW1 | Dup 1 |
| Sample Date: | 13-Feb-20 09:00 | 13-Feb-20 09:40 | 13-Feb-20 10:30 | 13-Feb-20 09:00 |
| Sample ID: | 2007563-01 | 2007563-02 | 2007563-03 | 2007563-04 |
| MDL/Units | Water | Water | Water | Water |

Volatiles

| | | | | | |
|----------------|-----------|-------|-------|-------|-------|
| Benzene | 0.5 ug/L | <0.5 | <0.5 | <0.5 | <0.5 |
| Ethylbenzene | 0.5 ug/L | 2.8 | <0.5 | <0.5 | 2.7 |
| Toluene | 0.5 ug/L | <0.5 | <0.5 | <0.5 | <0.5 |
| m,p-Xylenes | 0.5 ug/L | <0.5 | <0.5 | <0.5 | <0.5 |
| o-Xylene | 0.5 ug/L | <0.5 | <0.5 | <0.5 | <0.5 |
| Xylenes, total | 0.5 ug/L | <0.5 | <0.5 | <0.5 | <0.5 |
| Toluene-d8 | Surrogate | 88.3% | 87.5% | 88.2% | 91.1% |

Hydrocarbons

| | | | | | |
|-------------------|----------|------|------|------|-----|
| F1 PHCs (C6-C10) | 25 ug/L | 140 | <25 | <25 | 126 |
| F2 PHCs (C10-C16) | 100 ug/L | <100 | <100 | <100 | - |
| F3 PHCs (C16-C34) | 100 ug/L | <100 | <100 | <100 | - |
| F4 PHCs (C34-C50) | 100 ug/L | <100 | <100 | <100 | - |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Feb-2020

Client PO: 29526

Project Description: PE4789

Method Quality Control: Blank

| Analyte | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|-----------------------|--------|-----------------|-------|---------------|------|------------|-----|-----------|-------|
| Hydrocarbons | | | | | | | | | |
| F1 PHCs (C6-C10) | ND | 25 | ug/L | | | | | | |
| F2 PHCs (C10-C16) | ND | 100 | ug/L | | | | | | |
| F3 PHCs (C16-C34) | ND | 100 | ug/L | | | | | | |
| F4 PHCs (C34-C50) | ND | 100 | ug/L | | | | | | |
| Volatiles | | | | | | | | | |
| Benzene | ND | 0.5 | ug/L | | | | | | |
| Ethylbenzene | ND | 0.5 | ug/L | | | | | | |
| Toluene | ND | 0.5 | ug/L | | | | | | |
| m,p-Xylenes | ND | 0.5 | ug/L | | | | | | |
| o-Xylene | ND | 0.5 | ug/L | | | | | | |
| Xylenes, total | ND | 0.5 | ug/L | | | | | | |
| Surrogate: Toluene-d8 | 71.6 | | ug/L | | 89.5 | 50-140 | | | |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Feb-2020

Client PO: 29526

Project Description: PE4789

Method Quality Control: Duplicate

| Analyte | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|-----------------------|--------|-----------------|-------|---------------|------|------------|-----|-----------|-------|
| Hydrocarbons | | | | | | | | | |
| F1 PHCs (C6-C10) | ND | 25 | ug/L | ND | | | NC | 30 | |
| Volatiles | | | | | | | | | |
| Benzene | ND | 0.5 | ug/L | ND | | | NC | 30 | |
| Ethylbenzene | ND | 0.5 | ug/L | ND | | | NC | 30 | |
| Toluene | ND | 0.5 | ug/L | ND | | | NC | 30 | |
| m,p-Xylenes | ND | 0.5 | ug/L | ND | | | NC | 30 | |
| o-Xylene | ND | 0.5 | ug/L | ND | | | NC | 30 | |
| Surrogate: Toluene-d8 | 69.3 | | ug/L | | 86.6 | 50-140 | | | |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Feb-2020

Client PO: 29526

Project Description: PE4789

Method Quality Control: Spike

| Analyte | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|-----------------------|--------|-----------------|-------|---------------|------|------------|-----|-----------|-------|
| Hydrocarbons | | | | | | | | | |
| F1 PHCs (C6-C10) | 1960 | 25 | ug/L | ND | 98.0 | 68-117 | | | |
| F2 PHCs (C10-C16) | 1630 | 100 | ug/L | ND | 102 | 60-140 | | | |
| F3 PHCs (C16-C34) | 4120 | 100 | ug/L | ND | 105 | 60-140 | | | |
| F4 PHCs (C34-C50) | 2480 | 100 | ug/L | ND | 99.8 | 60-140 | | | |
| Volatiles | | | | | | | | | |
| Benzene | 28.1 | 0.5 | ug/L | ND | 70.2 | 60-130 | | | |
| Ethylbenzene | 35.0 | 0.5 | ug/L | ND | 87.6 | 60-130 | | | |
| Toluene | 27.7 | 0.5 | ug/L | ND | 69.3 | 60-130 | | | |
| m,p-Xylenes | 72.9 | 0.5 | ug/L | ND | 91.2 | 60-130 | | | |
| o-Xylene | 38.2 | 0.5 | ug/L | ND | 95.6 | 60-130 | | | |
| Surrogate: Toluene-d8 | 66.7 | | ug/L | | 83.4 | 50-140 | | | |

Certificate of Analysis

Report Date: 20-Feb-2020

Client: Paterson Group Consulting Engineers

Order Date: 13-Feb-2020

Client PO: 29526

Project Description: PE4789

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.

