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# Phase II - Environmental Site Assessment

439 Churchill Avenue North
Ottawa, Ontario

Prepared For

Grepault Development Ltd

December 1, 2021

Report: PE5189-2

**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

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# EXECUTIVE SUMMARY

## Assessment

A Phase II ESA was conducted for the property addressed 439 Churchill Avenue North, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

The subsurface investigation consisted of four boreholes, two of which were constructed with groundwater monitoring wells. The general site stratigraphy encountered during the field program generally consists of a pavement structure over fill material. Native glacial till was identified at one borehole location. Limestone bedrock was identified at shallow depths beneath the overburden. No unusual staining or odour was noted at the time of the field program.

A total of four soil samples (including one duplicate) were submitted for laboratory analysis of Metals (including Hg and CrVI), and Polycyclic Aromatic Hydrocarbons (PAHs). Various metal and PAH parameter concentrations were identified in the soil samples analyzed. All parameter concentrations analyzed in the soil samples comply with the selected MECP Table 7 Residential Standards.

Three (3) groundwater samples (including one duplicate) from monitoring wells BH2-21 and BH2-21 were collected during the September 9, 2021 sampling event. No sheen, free product or odour was noted during the groundwater sampling event.

Groundwater samples were analyzed for BTEX and PHCs. All analyzed parameters were not detected above the laboratory detection limit. All groundwater results comply with the selected MECP Table 7 Residential Standards.

Based on the findings of this Phase II ESA, no further environmental investigation is required.

## Recommendations

If the groundwater monitoring wells installed in boreholes BH2-21 and BH3-21 are not going to be used in the future, or will be destroyed during future redevelopment activities, then they must be decommissioned according to Ontario Regulation Reg. 903 (Ontario Water Resources Act). 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 Grepault Developments Ltd., Paterson Group (Paterson) conducted a Phase II Environmental Site Assessment for the property addressed 439 Churchill Avenue North, in the City of Ottawa, Ontario. The purpose of this Phase II ESA has been to address areas of potential environmental concern (APECs) identified on the Phase II Property, during the Phase I ESA conducted by Paterson in March of 2021.

## 1.1 Site Description

| | |
|---|---|
| Address: | 439 Churchill Avenue North, Ottawa, Ontario |
| Legal Description: | Lot 13 (Churchill Avenue North) Registered Plan No. 269, City of Ottawa |
| Property Identification Number: | 04016-0005 |
| Location: | The subject site is located on the east side of Churchill Avenue North, approximately 55 m south of Byron Avenue, in the City of Ottawa, Ontario. The subject site is shown on Figure 1 - Key Plan following the body of this report. |
| Latitude and Longitude: | 45° 23' 27" N, 75° 45' 10" W |

**Site Description:**

| | |
|---|---|
| Configuration: | Rectangular |
| Site Area: | 0.05 ha (approximate) |
| Zoning: | LC[772] – Local Commercial Zone |

## 1.2 Property Ownership

Paterson was engaged to conduct this Phase II-ESA by Ms. Isabelle Depault with Grepault Developments Ltd. Ms. Depault can be reached by telephone at (613)-818-9810.

## 1.3 Current and Proposed Future Uses

The Phase II Property is currently occupied by a 2-storey commercial building with a full basement level and separate private garage. It is our understanding that the proposed Phase II Property development will consist of a four-storey mixed-use addition on the east portion of the Phase II Property and a third-floor addition to the existing two-storey commercial building. The existing detached garage will be removed and this portion of the Phase II Property will be used for parking. The proposed buildings will be municipally serviced.

## 1.4 Applicable Site Condition Standard

The site condition standards for the property were obtained from Table 7 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 Environment, Conservation and Parks (MECP), April 2011. The MECP selected Table 7 Standards are based on the following considerations:

- ❒ Coarse-grained soil conditions
- ❒ Shallow soil site conditions
- ❒ Non-potable groundwater conditions
- ❒ Residential land use

Section 35 of O.Reg. 153/04 does apply to the Phase II Property in that the property relies upon municipal drinking water.

Section 41 of O.Reg. 153/04 does not apply to the Phase II Property, as the property is not within 30m of an environmentally sensitive area and the pH of the soil is between between 5 and 9.

Section 43.1 of O.Reg. 153/04 does apply to the Phase II Property as bedrock is located less than 2 m below ground surface for more than 1/3 of the area of the Phase II Property.

The intended use of the Phase II Property is residential; therefore, the Residential Standards have been selected for the purpose of this Phase II ESA.

# 2.0 BACKGROUND INFORMATION

## 2.1 Physical Setting

The Phase II Property is located on the east side of Churchill Avenue North, approximately 55 m south of Byron Avenue, in the City of Ottawa, Ontario. The Phase II Property is situated in a general mixed-use zone consisting of commercial and residential land use. The setting of the Phase II Property is shown on Drawing PE5189-2 – Surrounding Land Use Plan.

At the time of the Phase II ESA, the west and central portions of the Phase II Property were occupied by a commercial building. The northeast portion of the Phase II Property was occupied by a private garage partially situated on the neighbouring property to the north. The remainder of the site is paved with some landscaping along the western property line.

The site is relatively flat with a slight downward slope towards Churchill Avenue North. Site drainage consists of sheet drainage towards catch basins located on Churchill Avenue North with some infiltration in landscaped areas. Multiple underground utilities were identified on the Phase II Property including electrical, gas, water, sewer and telecommunication lines.

## 2.2 Past Investigations

Paterson completed a Phase I ESA in March of 2021 for the Phase II Property. Based on the findings of the Phase I ESA, on- and off-site PCAs were considered to result in APECs on the Phase II Property as shown in Table 1.

**Table 1**
**Areas of Potential Environmental Concern**

| Area of Potential Environmental Concern | Location of Area of Potential Environmental Concern with respect to Phase I Property | Potentially Contaminating Activity | Location of PCA (on-site or off-site) | Contaminants of Potential Concern | Media Potentially Impacted (Groundwater, Soil, and/or Sediment) |
|---|---|---|---|---|---|
| APEC 1 (fill material of unknown quality) | Potentially across the Phase I Property | PCA 30 - Importation of Fill Material of Unknown Quality | On-site | Metals As, Sb, Se Hg, CrVI PAHs | Soil (Fill Material) |
| APEC 2[1] (use of de-icing salt associated with on-site asphaltic parking areas and adjacent roadways) | Potentially across the Phase I Property | Other - use of salt for de-icing purposes | On-site | EC SAR | Soil |
| APEC 3 (former off-site USTs) | South portion of the Phase I Property | Item 28, Table 2, O.Reg.153/04 as amended by O.Reg.269/11 ("Gasoline and Associated Products Storage in Fixed Tanks") | Off-site | BTEX, PHCs ($F_1$-$F_4$) | Groundwater |

Notes:
1 – In accordance with Section 49.1 of Ontario Regulation 153/04 standards are deemed to be met if an applicable site condition standard is exceeded at a property solely because the qualified person has determined, based on a phase two environmental site assessment, that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both. As further discussed in the Phase II CSM, the exemption outlined in Section 49.1 is being relied upon with respect to the RSC Property.

The rationale for identifying the above PCAs is based on fire insurance plans, city directories, aerial photographs, field observations, personal interviews and reports obtained for the Phase I Property. A Phase II ESA was recommended to address the aforementioned APECs.

# 3.0 SCOPE OF INVESTIGATION

## 3.1 Overview of Site Investigation

The subsurface investigation was conducted on August 30, 2021. The field program consisted of drilling four boreholes to address the APECs identified on the Phase II Property. Two of the boreholes (BH2-21 and BH3-21) were instrumented with groundwater monitoring wells. Boreholes were drilled to a maximum depth of 4.72 m below the ground surface (mbgs).

## 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 identified in the Phase I ESA.

The contaminants of potential concern for the soil and groundwater on the subject site include the following:

- Metals (including arsenic (As), antimony (Sb) and selenium (Se));
- Mercury (Hg)
- Hexavalent Chromium (CrVI)
- Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- Petroleum Hydrocarbons (PHCs, Fractions $F_1$-$F_4$);
- Polycyclic Aromatic Hydrocarbons (PAHs).

## 3.3 Phase I Conceptual Site Model

### Geological and Hydrogeological Setting

The Geological Survey of Canada website on the Urban Geology of the National Capital Area were consulted as part of this assessment. Based on this information, bedrock in the area of the site consists of interbedded limestone and dolostone of the Gull River Formation. Overburden is reported to consist of plain till with a drift thickness of up to 1m across the Phase I Property.

### Buildings and Structures

The Phase I Property is occupied by a 2-storey concrete block commercial building with a full basement level. The first floor and basement are occupied by a commercial business (Freeworld Tattoo & Piercing) and the top floor is occupied by office space (Churchill Collective). The building is considered to be the original building constructed circa 1956 and is heated with a natural-gas fired furnace located in the basement.

A separate private garage is located at the northeast corner of the Phase I Property and is partly situated on the adjacent property to the north (435 Churchill Avenue North); the garage is shared between the two properties. The garage is a wood-framed structure with a sloped, shingled roof and slab-on-grade foundation. No other buildings or structures are present on the Phase I Property.

### Water Bodies

No water bodies are present within the Phase I Study Area. The Ottawa River is the closest significant water body and is present approximately 740m northwest of the Phase I Property at its closest point.

### Areas of Natural Significance

A search for areas of natural significance and features within a 250m radius study area was conducted on the Ontario Ministry of Natural Resources (MNR) website and the search did not reveal any areas of natural significance within a 250m radius.

### Water Well Records

The MECP well mapping website was accessed on February 23, 2021, to obtain records for all drilled wells within the Phase I Study Area. Based on the search results, there are no well records for the Phase I Property. However, a monitoring well installed by McIntosh Perry was identified on the Phase I Property. The monitoring well was installed on June 6, 2021 and drilled to a depth of 5.9m for geotechnical purposes. Fill material consisting of black to brown sand and gravel with some silt was encountered to a depth of 0.8 m below ground surface underlain by brown silty sand and gravel with cobbles and boulders to a depth of 2.3 m below ground surface. Limestone bedrock was encountered at a depth of 2.3 m below ground surface.

A total of 16 well records were identified for properties within the Phase I Study Area. All of the reported well records were dated between 2010 and 2020. A monitoring well record for the property addressed 450 Churchill Avenue North, approximately 50 m southwest of the Phase I Property, was identified. Records of 4 well abandonments for the property addressed 345 Ravenhill Avenue, approximately 20 m west of the Phase I Property, were also identified. Remaining records correspond to properties a significant distance away from the Phase I Property and are not considered to pose an environmental concern to the Phase I Property.

As noted previously, an RSC has been filed in the MECP's ESR for the property at 450 Churchill Avenue and it is not considered to represent a concern to the Phase I Property. The purpose of the former wells at 345 Ravenhill Avenue is unknown, as original well records were not available, however based on the availability of municipal water, it is assumed that these wells are for groundwater monitoring purposes. Additionally, due to their separation distance and cross gradient orientation with respect to the Phase I Property, they are not considered to represent an environmental concern to the Phase I Property.

Based on the well records, limestone bedrock was encountered at depths ranging from approximately 0.6 to 3m below grade. A copy of the well record summary is provided in Appendix 2.

**Neighbouring Land Use**

Neighbouring land use in the 250m study area was historically used for primarily residential purposes with occasional commercial and institutional purposes. As further discussed below, several historical PCAs were identified within the 250m study area, the locations of which are presented on Drawing PE5189-2 – Surrounding Land Use Plan.

Current land use within the Phase I Study Area is primarily residential with occasional commercial (offices) and institutional (Westboro Masonic Hall and the Churchill Public School) land use. Two PCAs identified within the Phase I Study Area at the time of the site visit include the Laundry Land Dry Cleaners at 424 Churchill Avenue North and an automotive service garage at 319 Richmond Road. Based on the separation distances of 70m or more and their down-gradient orientations with respect to the Phase I Property, these PCAs and the remaining PCAs identified are not considered to represent areas of potential environmental concern (APECs) on the Phase I Property.

## Potentially Contaminating Activities and Areas of Potential Environmental Concern

As per section 7.1 of this report and presented in Table 1 below, three on- or off-site PCAs were considered to result APECs on the Phase I Property.

**Table 1**
**Areas of Potential Environmental Concern**

| Area of Potential Environmental Concern | Location of Area of Potential Environmental Concern with respect to Phase I Property | Potentially Contaminating Activity | Location of PCA (on-site or off-site) | Contaminants of Potential Concern | Media Potentially Impacted (Groundwater, Soil, and/or Sediment) |
|---|---|---|---|---|---|
| APEC 1 (fill material of unknown quality) | Potentially across the Phase I Property (outside the building footprint) | PCA 30 - Importation of Fill Material of Unknown Quality | On-site | Metals As, Sb, Se Hg, CrVI PAHs | Soil (Fill Material) |
| APEC 2A[1] (use of road salt for safety purposes) | Potentially across the Phase I Property (outside the building footprint) | Other - use of road salt for de-icing purposes | On-site | EC SAR | Soil |
| APEC 2 B (use of road salt for safety purposes) | Along the western portion of the Phase I Property | | Off-site | EC SAR | Soil |
| APEC 3 (former off-site USTs) | South portion of the Phase I Property | Item 28, Table 2, O.Reg.153/04 as amended by O.Reg.269/11 ("Gasoline and Associated Products Storage in Fixed Tanks") | Off-site | BTEX, PHCs ($F_1$-$F_4$) | Groundwater |

Notes:
1 – In accordance with Section 49.1 of Ontario Regulation 153/04 standards are deemed to be met if an applicable site condition standard is exceeded at a property solely because the qualified person has determined, based on a phase two environmental site assessment, that a substance has been applied to surfaces for the safety of vehicular or pedestrian traffic under conditions of snow or ice or both. As further discussed in the Phase II CSM, the exemption outlined in Section 49.1 is being relied upon with respect to the RSC Property.

### Contaminants of Potential Concern

The following CPCs are identified with respect to the Phase II Property:

- ❒ Metals (including arsenic (As), antimony (Sb) and selenium (Se))
- ❒ Mercury (Hg)
- ❒ Hexavalent Chromium (CrVI)
- ❒ Benzene, Toluene, Ethylbenzene, Xylenes (BTEX)
- ❒ Petroleum Hydrocarbons (PHCs, Fractions $F_1$-$F_4$)
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs)

### Assessment of Uncertainty and/or Absence of Information

The information available for review as part of the preparation of this Phase I-ESA is considered to be sufficient to conclude that there are APECs on the Phase I Property which may potentially have impacted the Phase I Property. The presence of PCAs was confirmed by a variety of independent sources, and as such, the conclusions of this report are not affected by uncertainty which may be present with respect to the individual sources.

## 3.4 Deviations from Sampling and Analysis Plan

The Sampling and Analysis Plan (SAP) for this project is included in Appendix 1 of this report. There were no deviations from the SAP.

## 3.5 Impediments

No physical impediments, aside from the utilities, were encountered during the Phase II ESA program.

# 4.0 INVESTIGATION METHOD

## 4.1 Subsurface Investigation

The subsurface investigation was conducted on August 30, 2021. The field program consisted of drilling four boreholes (BH1-21 through BH4-21) across the Phase II Property.

The boreholes were drilled to a maximum depth of 4.72 m below ground surface (mbgs). BoreholesBH2-21 and BH3-21 were cored into the bedrock and completed with monitoring well installations to access the groundwater table.

Boreholes BH1-21 through BH4-21 were placed to address the aforementioned APECs as present in Table 1. The boreholes were drilled using a low clearance drill rig operated by George Downing Estate Drilling of Hawkesbury, Ontario, under full-time supervision of Paterson personnel. The borehole locations are indicated on the attached Drawing PE5189-3 - Test Hole Location Plan.

## 4.2 Soil Sampling

A total of eight soil samples were obtained from the boreholes by means of grab sampling from auger flights/auger samples and split spoon sampling. Rock core samples were collected with the use of coring equipment.

The depths at which split spoon, auger flight and rock core samples were obtained from the boreholes are shown as "**SS**", "**AU**" and "**RC**" **respectively** on the Soil Profile and Test Data Sheets.

The stratigraphy encountered at the site generally consisted of a pavement structure consisting of a 0.03m layer of asphaltic concrete over engineered fill (consisting of silty sand with crushed stone). The engineered fill extended to an approximate depth of 0.51 to 0.56m below grade.

Fill material was encountered beneath the pavement structure at BH1-21, BH2-21 and BH3-21. The fill material extended to bedrock at depths ranging from 0.99 to 1.27m below grade, and consisted of brown silty sand with gravel and some clay. Apparent trace coal fragments were noted in BH2-21.

Native glacial till consisting of a brown silty sand with gravel, was identified beneath the pavement structure at BH4-21 and extended to bedrock at a depth of approximately 1.37m below grade.

Borehole locations are shown on Drawing PE5189-3 – Test Hole Location Plan.

## 4.3 Field Screening Measurements

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

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

The maximum vapour reading measured was 76.5 ppm in the soil samples obtained. These results were not considered to be indicative of potential significant contamination from volatile contaminants. Vapour readings are noted on the Soil Profile and Test Data Sheets in Appendix 1.

Furthermore, no visual or olfactory indications of potential hydrocarbon contamination were noted in any of the soil samples. The results of the vapour survey are presented on the Soil Profile and Test Data sheets.

## 4.4 Groundwater Monitoring Well Installation

Two groundwater monitoring wells were installed on the Phase II Property as part of the subsurface investigation. The monitoring wells consisted of 32 mm diameter, Schedule 40 threaded PVC risers and screens. Monitoring well construction details are listed in Table 2 and are also presented on the Soil Profile and Test Data Sheets provided in Appendix 1.

Borehole locations and elevations were surveyed geodetically by Paterson personnel.

**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 |
|---|---|---|---|---|---|---|
| BH2-21 | 77.85 | 4.52 | 1.47-4.52 | 1.37-4.52 | 0.15-1.37 | Flushmount |
| BH3-21 | 77.85 | 4.60 | 1.55-4.60 | 1.22-4.60 | 0.15-1.22 | Flushmount |

## 4.5 Field Measurement of Water Quality Parameters

Water quality parameters were measured in the field using a multi-parameter analyzer on September 3, 2021. As the monitoring wells were purged dry and due to the slow natural recharge of groundwater in the installed wells, groundwater samples were collected on September 8, 2021. Parameters measured in the field include temperature, pH and electrical conductivity.

Field parameters were measured after each well volume purged. Wells were purged prior to sampling until at least three well volumes had been removed, the field parameters were relatively stable or the well was dry. Stabilized field parameter values are summarized in Table 3.

**Table 3 - Field Measurement of Water Quality Parameters – Sept. 3, 2021**

| Parameter | BH2-21 | BH3-21 |
|---|---|---|
| Temperature (°C) | 17.1 | 17.1 |
| pH | 7.48 | 7.55 |
| Electrical Conductivity (µS/cm) | 4,800 | 4,700 |

## 4.6 Groundwater Sampling

Groundwater sampling protocols were followed using the MECP document entitled “Guidance on Sampling and Analytical Methods for Use at Contaminated Sites in Ontario”, dated May 1996. Groundwater samples were obtained from each monitoring well, using dedicated sampling equipment. Standing water was purged from each well prior to sampling. Samples were stored in coolers to reduce analyte volatilization during transportation. Details of our standard operating procedure for groundwater sampling are provided in the Sampling and Analysis Plan in Appendix 1.

## 4.7 Analytical Testing

Based on the guidelines outlined in the Sampling and Analysis Plan appended to this report, the following soil and groundwater samples, as well as analyzed parameters are presented in Tables 4 and 5.

**Table 4 - Testing Parameters for Submitted Soil Samples**

| Sample ID | Sample Depth & Stratigraphic Unit | Parameters Analyzed | | | Rationale |
|---|---|---|---|---|---|
| | | Metals[1] | PAHs | pH | |
| **May 14, 2021** | | | | | |
| BH1-SS2 | 0.76 - 1.37 m Brown Silty Sand (Fill Material) | X | X | | To assess fill material based on visual observations. |
| BH2-SS2 | 0.76 - 1.37 m Brown Silty Clay (Fill Material) | X | X | X | To assess fill material based on visual observations. |
| BH3-AU1 | 0.30 - 0.61 m Brown Silty Sand (Fill Material) | X | X | | To assess fill material based on visual observations. |
| DUP1 | 0.76 - 1.37 m Brown Silty Clay (Fill Material) | X | X | | Duplicate soil sample (BH2-SS2) for QA/QC purposes |

Notes:
- 1 – including Hg and CrVI

**TABLE 5 - Testing Parameters for Submitted Groundwater Samples**

| Sample ID | Screened Interval | Parameters Analyzed | | Rationale |
|---|---|---|---|---|
| | | BTEX | PHCs $F_1$-$F_4$ | |
| **September 8, 2021** | | | | |
| BH2-21-GW1 | 1.47 - 4.52 m Bedrock | X | X | Assess potential groundwater impacts resulting from the historical off-site USTs |
| BH3-21-GW1 | 1.55 – 4.60 m Bedrock | X | X | Assess potential groundwater impacts resulting from the historical off-site USTs |
| DUP 1 | 1.47 - 4.52 m Bedrock | X | X[1] | Duplicate groundwater sample (BH2-21-GW1) for QA/QC purposes |

Notes:
- 1 – Sample only tested for BTEX and PHC $F_1$ due to limited sample volume

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

## 4.8 Residue Management

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

## 4.9 Elevation Surveying

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

## 4.10 Quality Assurance and Quality Control Measures

A summary of 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

Sit soils consist of a pavement structure consisting of a 0.03 m layer of asphaltic concrete, over engineered fill (ranging from 0.03 – 0.53 mbgs elevation) consisting of silty sand with some clay and crushed stone, underlain by fill material. The fill material extended to bedrock at depths ranging from 0.99 to 1.27 m below grade, and consisted of brown silty sand with gravel and some clay.

A layer of native glacial till consisting of a brown silty sand with gravel, was encountered at BH4-21, between 0.56 and 1.37 mbgs (extending to bedrock). Apparent trace coal fragments were identified in the fill later between 0.53 and 1.27 mbgs elevation in BH2-21.

## 5.2 Groundwater Elevations, Flow Direction, and Hydraulic Gradient

Groundwater levels were measured during the groundwater sampling event on September 3, 2021 using an electronic water level meter. Groundwater levels are summarized in Table 6.

**TABLE 6 - Groundwater Level Measurements**

| Borehole Location | Ground Surface Elevation (m) | Water Level Depth (m below grade) | Water Level Elevation (m ASL) | Date of Measurement |
|---|---|---|---|---|
| BH2-21 | 77.81 | 2.54 | 75.27 | September 3, 2021 |
| BH3-21 | 78.13 | 2.75 | 75.38 | September 3, 2021 |
| BH21-03[1] | 77.85 | 2.95 | 74.90 | September 3, 2021 |

Notes:
- 1 – Existing monitoring well installed by others

Based on the groundwater elevations measured during the sampling events, groundwater contour mapping was completed. Groundwater contours are shown on Drawing PE5189-3 – Test Hole Location Plan. Based on the contour mapping, groundwater flow at the subject site is towards the southeast. A horizontal hydraulic gradient of approximately 0.027 m/m was calculated.

The local groundwater flow in the immediate vicinity of the subject property may be influenced by on-site and nearby services. Based on our knowledge of the area, the regional groundwater flow is considered to be to towards the northwest.

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

## 5.3 Fine-Coarse Soil Texture

Grain size analysis was not completed as part of this investigation. Coarse grained soil standards were chosen based on the nature of the recovered soil samples.

## 5.4 Soil: Field Screening

Field screening of the soil samples collected during drilling resulted in vapour readings ranging from 0 to 76.5 ppm. No olfactory indications of potential environmental concerns were identified in the soil samples. Deleterious material identified in the fill material consists of trace amounts of coal in BH2-21.

The 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, four soil samples (including one duplicate) were submitted for analysis of metals (including Hg and CrVI), PAHs and/or pH. The results of the analytical testing are presented in Tables 7 and 8. The laboratory certificate of analysis is provided in Appendix 1.

**TABLE 7 - Analytical Test Results – Soil**
**Metals**

| Parameter | MDL (µg/g) | Soil Samples (µg/g) | | | | MECP Table 7 Residential Standards (µg/g) |
|---|---|---|---|---|---|---|
| | | August 30, 2021 | | | | |
| | | BH1-SS2 | BH2-SS2 | BH3-AU1 | DUP1[1] | |
| Antimony | 1.0 | nd | nd | nd | nd | 7.5 |
| Arsenic | 1.0 | 1.8 | 4.2 | 2.5 | 4.2 | 18 |
| Barium | 1.0 | 35.6 | 78.6 | 69.4 | 78.0 | 390 |
| Beryllium | 0.5 | nd | 0.7 | nd | 0.7 | 4 |
| Boron | 5.0 | 26.3 | 19.7 | 7.2 | 17.0 | 120 |
| Cadmium | 0.5 | nd | nd | nd | nd | 1.2 |
| Chromium | 5.0 | nd | nd | nd | nd | 160 |
| Chromium (VI) | 0.2 | 16.4 | 29.3 | 13.2 | 27.4 | 8 |
| Cobalt | 1.0 | 4.7 | 9.0 | 5.9 | 9.4 | 22 |
| Copper | 5.0 | 7.5 | 14.2 | 13.5 | 15.4 | 140 |
| Lead | 1.0 | 18.7 | 17.1 | 29.2 | 17.7 | 120 |
| Mercury | 0.1 | nd | nd | nd | nd | 0.27 |
| Molybdenum | 1.0 | nd | nd | nd | nd | 6.9 |
| Nickel | 5.0 | 10.2 | 16.9 | 11.8 | 16.3 | 100 |
| Selenium | 1.0 | nd | nd | nd | nd | 2.4 |
| Silver | 0.3 | nd | nd | nd | nd | 20 |
| Thallium | 1.0 | nd | nd | nd | nd | 1 |
| Uranium | 1.0 | nd | nd | nd | nd | 23 |
| Vanadium | 10.0 | 19.8 | 38.5 | 24.7 | 36.4 | 86 |
| Zinc | 20.0 | 25.0 | 54.4 | 36.0 | 54.8 | 340 |

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard
- 1 – Duplicate of sample BH2-SS2

All detected metal concentrations in the soil samples analysed comply with the selected MECP Table 7 standards. The analytical results for metals tested in soil are shown on Drawing PE5189-4 – Analytical Testing Plan – Soil.

**TABLE 8 - Analytical Test Results – Soil**
**PAHs**

| Parameter | MDL (µg/g) | Soil Sample (µg/g) August 30, 2021 | | | | MECP Table 7 Residential Standards (µg/g) |
|---|---|---|---|---|---|---|
| | | BH1-SS2 | BH2-SS2 | BH3-AU1 | DUP[1] | |
| Acenaphthene | 0.02 | nd | nd | nd | nd | 7.9 |
| Acenaphthylene | 0.02 | nd | nd | nd | nd | 0.15 |
| Anthracene | 0.02 | 0.04 | nd | 0.04 | nd | 0.67 |
| Benzo[a]anthracene | 0.02 | 0.10 | 0.03 | nd | nd | 0.5 |
| Benzo[a]pyrene | 0.02 | 0.11 | 0.03 | 0.08 | 0.02 | 0.3 |
| Benzo[b]fluoranthene | 0.02 | 0.13 | 0.04 | 0.11 | 0.03 | 0.78 |
| Benzo[g,h,i]perylene | 0.02 | 0.08 | 0.03 | 0.06 | 0.02 | 6.6 |
| Benzo[k]fluoranthene | 0.02 | 0.07 | 0.02 | 0.05 | nd | 0.78 |
| Chrysene | 0.02 | 0.10 | 0.03 | 0.09 | nd | 7 |
| Dibenzo[a,h]anthracene | 0.02 | nd | nd | nd | nd | 0.1 |
| Fluoranthene | 0.02 | 0.21 | 0.06 | 0.17 | 0.03 | 0.69 |
| Fluorene | 0.02 | nd | nd | nd | nd | 62 |
| Indeno[1,2,3-cd]pyrene | 0.02 | 0.07 | 0.02 | 0.05 | nd | 0.38 |
| 1-Methylnaphthalene | 0.02 | nd | 0.05 | nd | 0.07 | 0.99 |
| 2-Methylnaphthalene | 0.02 | nd | 0.07 | nd | 0.10 | 0.99 |
| Methylnaphthalene (1&2) | 0.04 | nd | 0.12 | nd | 0.17 | 0.99 |
| Naphthalene | 0.01 | nd | 0.05 | nd | 0.07 | 0.6 |
| Phenanthrene | 0.02 | 0.15 | 0.06 | 0.12 | 0.05 | 6.2 |
| Pyrene | 0.02 | 0.18 | 0.05 | 0.14 | 0.03 | 78 |

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- **Bold and underlined –** Results exceed selected MECP standard
- 1 – Duplicate of sample BH2-SS2

All detected PAH concentrations in the soil samples analysed are in compliance with the selected MECP Table 7 standards. The analytical results for PAHs tested in soil are shown on Drawing PE5189-4 – Analytical Testing Plan – Soil.

The maximum concentrations of analyzed parameters in the soil at the site are summarized in Table 9.

| TABLE 9 - Maximum Concentrations – Soil | | | |
|---|---|---|---|
| **Parameter** | **Maximum Concentration (µg/g)** | **Sample ID** | **Depth Interval (m BGS)** |
| Arsenic | 4.2 | BH2-SS2, DUP1[1] | 0.76 - 1.37; Fill Material |
| Barium | 78.6 | BH2-SS2 | 0.76 - 1.37; Fill Material |
| Beryllium | 0.7 | BH2-SS2, DUP1[1] | 0.76 - 1.37; Fill Material |
| Boron | 26.3 | BH1-SS2 | 0.76 - 1.37; Fill Material |
| Chromium | 29.3 | BH2-SS2 | 0.76 - 1.37; Fill Material |
| Cobalt | 9.4 | DUP1[1] | 0.76 - 1.37; Fill Material |
| Copper | 15.4 | DUP1[1] | 0.76 - 1.37; Fill Material |
| Lead | 29.2 | BH3-AU1 | 0.30 - 0.61; Fill Material |
| Nickel | 16.9 | BH2-SS2 | 0.76 - 1.37; Fill Material |
| Vanadium | 38.5 | BH2-SS2 | 0.76 - 1.37; Fill Material |
| Zinc | 54.8 | DUP1[1] | 0.76 - 1.37; Fill Material |
| Anthracene | 0.04 | BH1-SS2<br>BH3-AU1 | 0.76 - 1.37; Fill Material<br>0.30 - 0.61; Fill Material |
| Benzo[a]anthracene | 0.10 | BH1-SS2 | 0.76 - 1.37; Fill Material |
| Benzo[a]pyrene | 0.11 | BH1-SS2 | 0.76 - 1.37; Fill Material |
| Benzo[b]fluoranthene | 0.13 | BH1-SS2 | 0.76 - 1.37; Fill Material |
| Benzo[g,h,i]perylene | 0.08 | BH1-SS2 | 0.76 - 1.37; Fill Material |
| Benzo[k]fluoranthene | 0.07 | BH1-SS2 | 0.76 - 1.37; Fill Material |
| Chrysene | 0.10 | BH1-SS2 | 0.76 - 1.37; Fill Material |
| Fluoranthene | 0.21 | BH1-SS2 | 0.76 - 1.37; Fill Material |
| Indeno[1,2,3-cd]pyrene | 0.07 | BH1-SS2 | 0.76 - 1.37; Fill Material |
| 1-Methylnaphthalene | 0.07 | DUP1[1] | 0.76 - 1.37; Fill Material |
| 2-Methylnaphthalene | 0.10 | DUP1[1] | 0.76 - 1.37; Fill Material |
| Methylnaphthalene (1&2) | 0.17 | DUP1[1] | 0.76 - 1.37; Fill Material |
| Naphthalene | 0.07 | DUP1[1] | 0.76 - 1.37; Fill Material |
| Phenanthrene | 0.15 | BH1-SS2 | 0.76 - 1.37; Fill Material |
| Pyrene | 0.18 | BH1-SS2 | 0.76 - 1.37; Fill Material |

Notes:
- 1 – Duplicate of sample BH2-SS2

All remaining parameter results were non-detect. The laboratory Certificate of Analysis is provided in Appendix 1.

## 5.6 Groundwater Quality

Groundwater samples (including one duplicate) from monitoring wells installed in BH2 and BH3 were submitted for laboratory analysis of BTEX and PHC (F1-F4). The groundwater samples were obtained from the screened intervals noted in Table 2.

The results of the analytical testing are presented in Tables 10 and 11. The laboratory certificates of analysis are provided in Appendix 1.

**TABLE 10 - Analytical Test Results – Groundwater**
**BTEX**

| Parameter | MDL (µg/L) | Groundwater Samples (µg/L) September 9, 2021 | | | MECP Table 7 Standards (µg/L) |
|---|---|---|---|---|---|
| | | BH2-21-GW1 | BH3-21-GW1 | DUP 1[1] | |
| Benzene | 0.5 | nd | nd | nd | 0.5 |
| Toluene | 0.5 | nd | nd | nd | 320 |
| Ethylbenzene | 0.5 | nd | nd | nd | 54 |
| Xylenes | 0.5 | nd | nd | nd | 72 |

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- 1 – Duplicate of sample BH2-21-GW1

No detectable BTEX concentrations were identified in the groundwater samples analysed. As such, the results comply with the selected MECP Table 7 standards. The analytical results for groundwater tested are shown on Drawing PE5189-5 – Analytical Testing Plan – Groundwater.

**TABLE 11 - Analytical Test Results – Groundwater**
**PHCs**

| Parameter | MDL (µg/L) | Groundwater Samples (µg/L) September 9, 2021 | | | MECP Table 7 Standards (µg/L) |
|---|---|---|---|---|---|
| | | BH2-21-GW1 | BH3-21-GW1 | DUP 1[1] | |
| PHC $F_1$ | 25 | nd | nd | nd | 420 |
| PHC $F_2$ | 100 | nd | nd | NA | 150 |
| PHC $F_3$ | 100 | nd | nd | NA | 500 |
| PHC $F_4$ | 100 | nd | nd | NA | 500 |

Notes:
- MDL – Method Detection Limit
- nd – not detected above the MDL
- NA – not analyzed for this parameter (due to low sample volume)
- 1 – Duplicate of sample BH2-21-GW1

No detectable PHC concentrations were identified in the groundwater samples analysed. As such, the results comply with the selected MECP Table 7 standards. The analytical results for groundwater tested are shown on Drawing PE5189-5 – Analytical Testing Plan – Groundwater.

## 5.7 Quality Assurance and Quality Control Results

All samples submitted as part of the August and September, 2021 sampling events were handled in accordance with the Analytical Protocol with respect to preservation method, storage requirement, and container type. As per Subsection 47(3) of O.Reg. 153/04, as amended, under the Environmental Protection Act, a Certificate of Analysis has been received for each sample submitted for analysis and all Certificates of Analysis are appended to this report.

Duplicate soil and groundwater samples from BH2-SS2 and BH2-21-GW1 were submitted for laboratory analysis of metals (including Hg and CrVI), BTEX, PHCs (F1-F4) and/or PAHs. The duplicates were collected with the intent of calculating the relative percent difference (RPD) between duplicate sample values, as a way of assessing the quality of the analytical test results. Several parameter concentrations were not detected in either or both the original sample and duplicate. The RPD values are therefore considered to be 0% and therefore meet the 20% target.

The RPD calculations for the original soil and duplicate sample are provided in Table 12.

| Table 12 - QA/QC Calculations – Soil | | | | | |
|---|---|---|---|---|---|
| **Parameter** | **MDL (µg/L)** | **BH2-SS2** | **DUP1 (BH2-SS2)** | **RPD (%)** | **QA/QC Result** |
| Antimony | 1.0 | nd | nd | 0 | Meets Target |
| Arsenic | 1.0 | 4.2 | 4.2 | 0 | Meets Target |
| Barium | 1.0 | 78.6 | 78.0 | 0.8 | Meets Target |
| Beryllium | 0.5 | 0.7 | 0.7 | 0 | Meets Target |
| Boron | 5.0 | 19.7 | 17.0 | 14.7 | Meets Target |
| Cadmium | 0.5 | nd | nd | 0 | Meets Target |
| Chromium | 5.0 | nd | nd | 0 | Meets Target |
| Chromium (VI) | 0.2 | 29.3 | 27.4 | 6.7 | Meets Target |
| Cobalt | 1.0 | 9.0 | 9.4 | 4.3 | Meets Target |
| Copper | 5.0 | 14.2 | 15.4 | 8.1 | Meets Target |
| Lead | 1.0 | 17.1 | 17.7 | 3.4 | Meets Target |
| Mercury | 0.1 | nd | nd | 0 | Meets Target |
| Molybdenum | 1.0 | nd | nd | 0 | Meets Target |
| Nickel | 5.0 | 16.9 | 16.3 | 3.6 | Meets Target |
| Selenium | 1.0 | nd | nd | 0 | Meets Target |
| Silver | 0.3 | nd | nd | 0 | Meets Target |
| Thallium | 1.0 | nd | nd | 0 | Meets Target |
| Uranium | 1.0 | nd | nd | 0 | Meets Target |
| Vanadium | 10.0 | 38.5 | 36.4 | 5.6 | Meets Target |
| Zinc | 20.0 | 54.4 | 54.8 | 0.7 | Meets Target |
| Acenaphthene | 0.02 | nd | nd | 0 | Meets Target |
| Acenaphthylene | 0.02 | nd | nd | 0 | Meets Target |
| Anthracene | 0.02 | nd | nd | 0 | Meets Target |
| Benzo[a]anthracene | 0.02 | 0.03 | nd | 40 | Does Not Meet Target |
| Benzo[a]pyrene | 0.02 | 0.03 | 0.02 | 40 | Does Not Meet Target |
| Benzo[b]fluoranthene | 0.02 | 0.04 | 0.03 | 28.6 | Does Not Meet Target |
| Benzo[g,h,i]perylene | 0.02 | 0.03 | 0.02 | 40 | Does Not Meet Target |
| Benzo[k]fluoranthene | 0.02 | 0.02 | nd | 0 | Meets Target |
| Chrysene | 0.02 | 0.03 | nd | 40 | Does Not Meet Target |
| Dibenzo[a,h]anthracene | 0.02 | nd | nd | 0 | Meets Target |
| Fluoranthene | 0.02 | 0.06 | 0.03 | 66.7 | Does Not Meet Target |
| Fluorene | 0.02 | nd | nd | 0 | Meets Target |
| Indeno[1,2,3-cd]pyrene | 0.02 | 0.02 | nd | 0 | Meets Target |
| 1-Methylnaphthalene | 0.02 | 0.05 | 0.07 | 33.3 | Does Not Meet Target |
| 2-Methylnaphthalene | 0.02 | 0.07 | 0.10 | 35.3 | Does Not Meet Target |
| Methylnaphthalene(1&2) | 0.04 | 0.12 | 0.17 | 34.5 | Does Not Meet Target |
| Naphthalene | 0.01 | 0.05 | 0.07 | 33.3 | Does Not Meet Target |
| Phenanthrene | 0.02 | 0.06 | 0.05 | 18.2 | Meets Target |
| Pyrene | 0.02 | 0.05 | 0.03 | 50 | Does Not Meet Target |

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

The majority of the RPD values meet the 20% target. It is not uncommon that very small parameter concentrations or values will yield higher RPD values, as such, the RPD value is not an accurate measure in these cases. Furthermore, the concentrations of the detected metal and PAH parameters were well within the selected MECP Table 7 standards in both samples by a large margin. As a result, it is our opinion that the decision-making usefulness of the samples is not considered to be impaired, and thus the quality of the field data collected during this remediation is considered to be sufficient to meet the overall objectives of this assessment.

A duplicate groundwater sample from BH2-21-GW1 was submitted for laboratory analysis of BTEX and PHC ($F_1$). The duplicate was collected with the intent of calculating the relative percent difference (RPD) between duplicate sample values, as a way of assessing the quality of the analytical test results. All parameter concentrations were not detected in both the original sample and duplicate. The RPD values are therefore considered to be 0% and therefore meet the 20% target.

## 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 by the Environmental Protection Act. Conclusions and recommendations are discussed in a subsequent section.

### Site Description

#### Potentially Contaminating Activity and Areas of Potential Environmental Concern

Based on the results of the Phase I ESA completed for the subject property, 11 PCAs were identified, three of which represent APECs on the Phase II Property. The APECs on the Phase II Property are as follows:

- APEC 1: Resulting from the presence of fill material of unknown quality (Item #30).
- APEC 2 (A and B): Resulting from the use of de-icing salt associated with both on-and-off-site and adjacent roadways (Item #N/A).
- APEC 3: Resulting from the historical presence of two off-site USTs (Item #28).

### Contaminants of Potential Concern

The following CPCs are identified with respect to the Phase II Property:

- ❒ Metals (including arsenic (As), antimony (Sb) and selenium (Se));
- ❒ Mercury (Hg)
- ❒ Hexavalent Chromium (CrVI)
- ❒ Benzene, Toluene, Ethylbenzene, and Xylenes (BTEX);
- ❒ Petroleum Hydrocarbons (PHCs, Fractions $F_1$-$F_4$);
- ❒ Polycyclic Aromatic Hydrocarbons (PAHs).

### Subsurface Structures and Utilities

No subsurface structures are present on the Phase I Property. Underground utilities on the Phase I Property include electrical, gas, water, sewer and telecommunication lines.

Based on the findings of the Phase II ESA, underground utilities are not expected to have affected contaminant transport or distribution at the Phase II Property.

## Physical Setting

### Site Stratigraphy

The stratigraphy of the Phase II Property generally consists of:

- ❒ Asphaltic concrete, encountered at depths ranging from approximately 0.00 to 0.03 m below ground surface
- ❒ Engineered fill material, consisting of brown silty sand with some clay and crushed stone; encountered at depths ranging from 0.03 to 0.53 m below ground sruface
- ❒ Fill material, consisting of brown silty sand or clay with gravel, cobbles, boulders and crushed stone; encountered at depths ranging from approximately 0.56 to 1.27 m below ground surface
- ❒ Glacial till, consisting of brown silty sand with gravel, cobbles and boulders; encountered in BH4-21 from approximately 0.56 to 1.37 m below ground surface;

- Limestone bedrock, encountered at depths ranging from approximately 0.99 to 1.37 m below ground surface.

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

**Hydrogeological Characteristics**

Groundwater at the Phase II Property was encountered within the bedrock. During the most recent groundwater monitoring event, groundwater flow was measured in a southeastern direction, with a hydraulic gradient of 0.027 m/m. Based on our knowledge of the area, the regional groundwater flow is considered to be towards the northwest. Groundwater contours are shown on Drawing PE5189-3 – Groundwater Contour Plan.

**Approximate Depth to Bedrock**

Bedrock was confirmed at three borehole locations, at depths ranging from approximately 0.99 to 1.27 m below ground surface, as determined by rock coring activities conducted in three of the boreholes at the time of the drilling program.

**Approximate Depth to Water Table**

The depth to the water table at the Phase II Property varies between approximately 2.54 to 2.90 m below existing grade.

**Sections 41 and 43.1 of the Regulation**

Section 41 of the Regulation does not apply to the Phase II Property, in that the subject property is not within 30m of an environmentally sensitive area, and the pH of subsurface soil is between 5 and 9.

Section 43.1 of the Regulation does apply as bedrock is located less than 2 mbgs for more than 1/3 of the area of the Phase II Property.

**Fill Placement**

Engineered fill is present on the Phase I Property, forming part of the pavement structure. Fill material, generally consisting of brown silty sand mixed with gravel and clay was identified beneath the pavement structure at all borehole locations. Traces of coal were observed in the fill material at BH2-21. Otherwise, no deleterious materials or signs of potential contamination were identified in the fill material at the Phase II Property.

### Existing Buildings and Structures

The Phase II Property is currently occupied by a two-storey commercial building and separate private garage constructed circa 1956 and 2002, respectively.

### Proposed Buildings and Other Structures

It is our understanding that the proposed Phase II Property development will consist of a four-storey mixed-use addition on the east portion of the Phase II Property and a third-floor addition to the existing two-storey commercial building. The existing detached garage will be removed and associated parking spaces put in its place. It is expected that the proposed buildings will be municipally serviced.

### Areas of Natural Scientific Interest and Water Bodies

There are no areas of natural and scientific interest or waterbodies on the Phase II Property or within the 250 m study area.

## Environmental Condition

### Areas Where Contaminants are Present

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding MECP Table 7 Residential Standards were identified within the soil or groundwater on the Phase II Property.

### Types of Contaminants

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding MECP Table 7 Residential Standards were identified within the soil or groundwater on the Phase II Property.

### Contaminated Media

Based on the findings of this Phase II ESA, the soil and groundwater conditions at the Phase II Property are in compliance with the selected MECP Table 7 Residential Standards.

### What Is Known About Areas Where Contaminants Are Present

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding MECP Table 7 Residential Standards were identified within the soil or groundwater on the Phase II Property.

### Distribution and Migration of Contaminants

Based on the findings of this Phase II ESA, no contaminant concentrations exceeding MECP Table 7 Residential Standards were identified within the soil or groundwater on the Phase II Property. As such no distribution or migration of contaminants has occurred on the Phase II Property.

### Discharge of Contaminants

Based on the findings on this Phase II ESA, no contaminants have been discharged on the Phase II Property.

### Climatic and Meteorological Conditions

In general, climatic and meteorological conditions have the potential to affect contaminant distribution. Two 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.

Based on the findings of the Phase II ESA, climatic and meteorological conditions are not considered to have affected contaminant distribution on the Phase II Property.

### Potential for Vapour Intrusion

Based on the findings of this Phase II ESA, there is no potential for vapour intrusion on the Phase II Property.

# 6.0 CONCLUSIONS

## Assessment

A Phase II ESA was conducted for the property addressed 439 Churchill Avenue North, in the City of Ottawa, Ontario. The purpose of the Phase II ESA was to address potentially contaminating activities (PCAs) that were identified during the Phase I ESA and considered to result in areas of potential environmental concern (APECs) on the Phase II Property.

The subsurface investigation consisted of four boreholes, two of which were constructed with groundwater monitoring wells. The general site stratigraphy encountered during the field program generally consists of a pavement structure over fill material. Native glacial till was identified at one borehole location. Limestone bedrock was identified at shallow depths beneath the overburden. No unusual staining or odour was noted at the time of the field program.

A total of four soil samples (including one duplicate) were submitted for laboratory analysis of Metals (including Hg and CrVI), and Polycyclic Aromatic Hydrocarbons (PAHs). Various metal and PAH parameter concentrations were identified in the soil samples analyzed. All parameter concentrations analyzed in the soil samples comply with the selected MECP Table 7 Residential Standards.

Three (3) groundwater samples (including one duplicate) from monitoring wells BH2-21 and BH2-21 were collected during the September 9, 2021 sampling event. No sheen, free product or odour was noted during the groundwater sampling event.

Groundwater samples were analyzed for BTEX and PHCs. All analyzed parameters were not detected above the laboratory detection limit. All groundwater results comply with the selected MECP Table 7 Residential Standards.

Based on the findings of this Phase II ESA, no further environmental investigation is required.

## Recommendations

If the groundwater monitoring wells installed in boreholes BH2-21 and BH3-21 are not going to be used in the future, or will be destroyed during future redevelopment activities, then they must be decommissioned according to Ontario Regulation Reg. 903 (Ontario Water Resources Act). The monitoring wells will be registered with the MECP under this regulation. Further information can be provided upon request in this regard.

# 7.0 STATEMENT OF LIMITATIONS

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

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

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

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

**Paterson Group Inc.**

Jeremy Camposarcone, B. Eng.


Karyn Munch, P.Eng., Q.P.ESA

**Report Distribution:**

- ❒ Grepault Developments Ltd.
- ❒ Paterson Group

# FIGURES

**FIGURE 1 – KEY PLAN**

**DRAWING PE5189-1 – SITE PLAN**

**DRAWING PE5189-2 – SURROUNDING LAND USE PLAN**

**DRAWING PE5189-3 – TEST HOLE LOCATION PLAN**

**DRAWING PE5189-4 – ANALYTICAL TESTING PLAN – SOIL**

**DRAWING PE5189-4A – CROSS SECTION A-A' – SOIL**

**DRAWING PE5189-4B – CROSS SECTION B-B' – SOIL**

**DRAWING PE5189-5 – ANALYTICAL TESTING PLAN – GROUNDWATER**

**DRAWING PE5189-5A – CROSS-SECTION A–A' – GROUNDWATER**

**DRAWING PE5189-5B – CROSS-SECTION B–B' – GROUNDWATER**

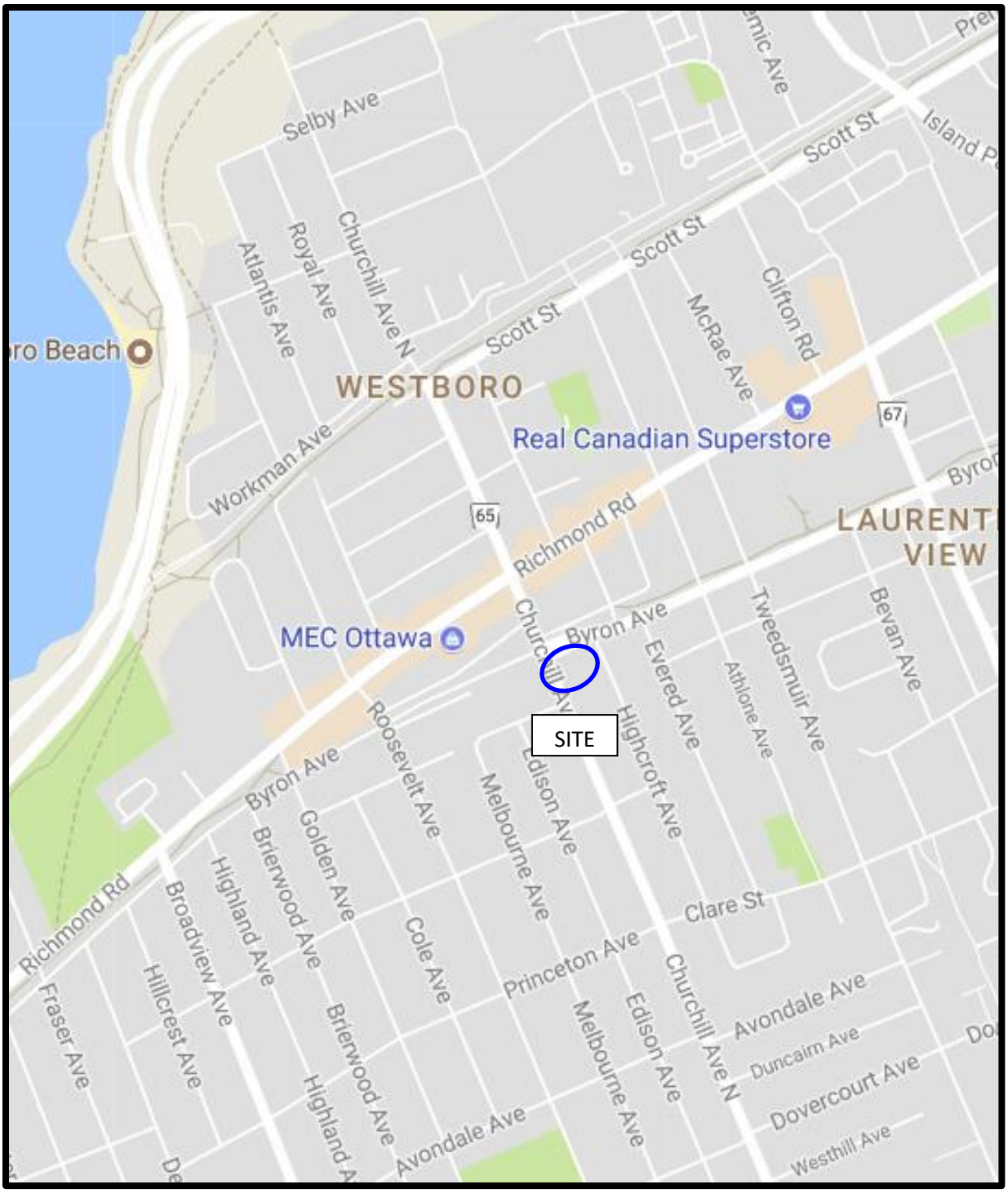
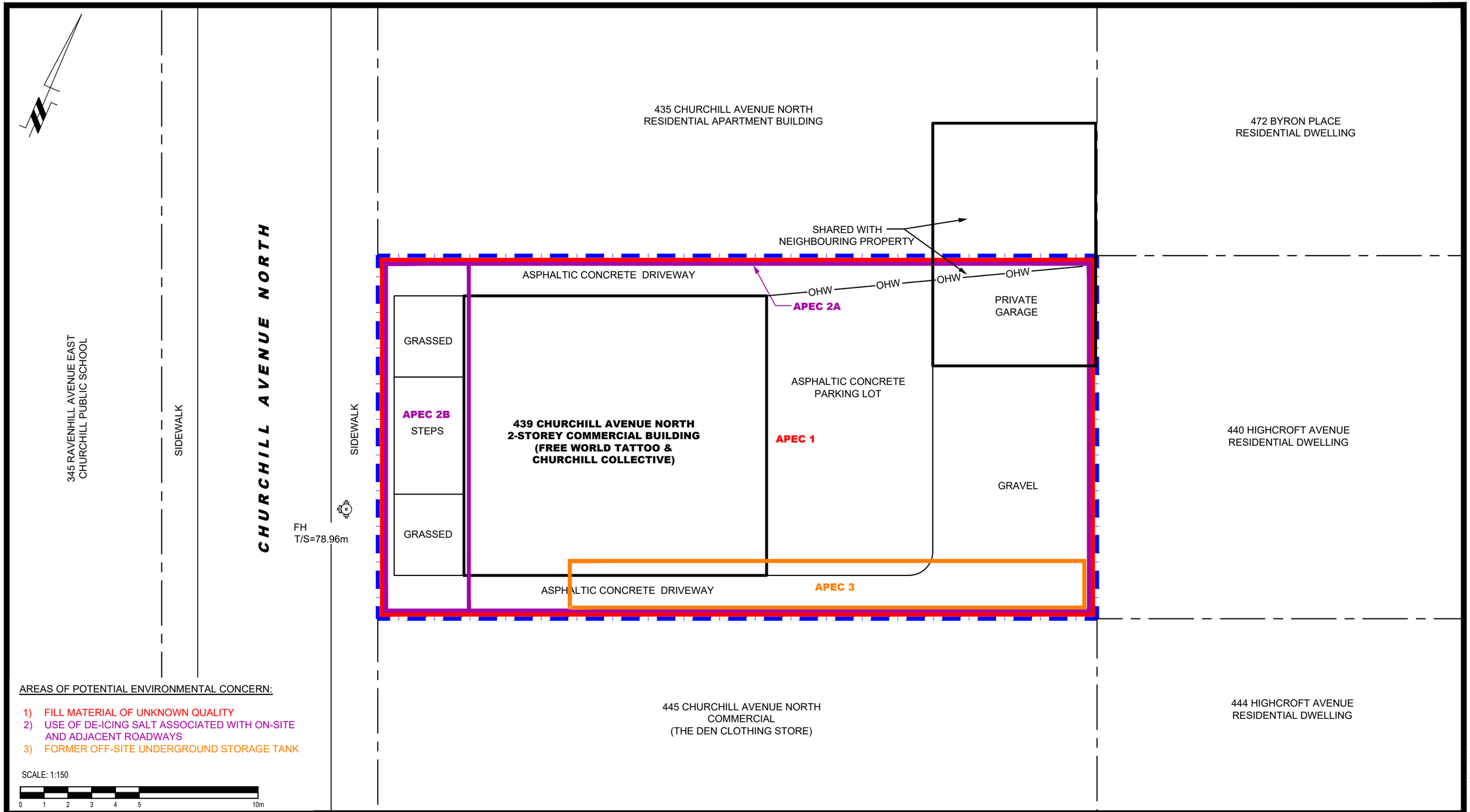



FIGURE 1

# KEY PLAN




AREAS OF POTENTIAL ENVIRONMENTAL CONCERN:

1) FILL MATERIAL OF UNKNOWN QUALITY
2) USE OF DE-ICING SALT ASSOCIATED WITH ON-SITE AND ADJACENT ROADWAYS
3) FORMER OFF-SITE UNDERGROUND STORAGE TANK

SCALE: 1:150

0 1 2 3 4 5 10m


**patersongroup**
consulting engineers

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

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
439 CHURCHILL AVENUE NORTH

OTTAWA, ONTARIO

Title:

# SITE PLAN

| | |
|---|---|
| Scale: 1:150 | Date: 09/2021 |
| Drawn by: JM | Report No.: PE5189-1 |
| Checked by: JC | Dwg No.: PE5189-1 |
| Approved by: MSD | Revision No.: |

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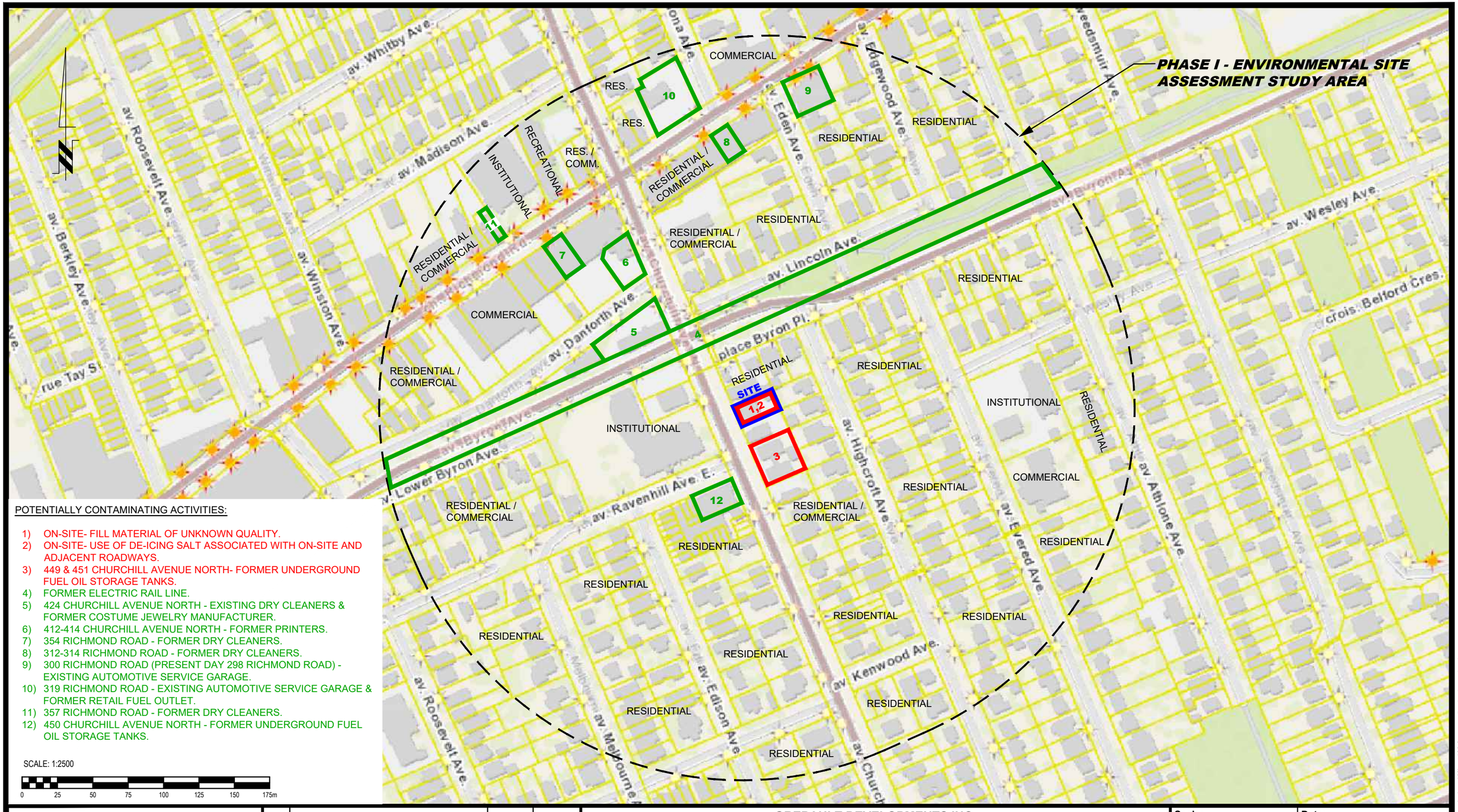


POTENTIALLY CONTAMINATING ACTIVITIES:

1) ON-SITE- FILL MATERIAL OF UNKNOWN QUALITY.
2) ON-SITE- USE OF DE-ICING SALT ASSOCIATED WITH ON-SITE AND ADJACENT ROADWAYS.
3) 449 & 451 CHURCHILL AVENUE NORTH- FORMER UNDERGROUND FUEL OIL STORAGE TANKS.
4) FORMER ELECTRIC RAIL LINE.
5) 424 CHURCHILL AVENUE NORTH - EXISTING DRY CLEANERS & FORMER COSTUME JEWELRY MANUFACTURER.
6) 412-414 CHURCHILL AVENUE NORTH - FORMER PRINTERS.
7) 354 RICHMOND ROAD - FORMER DRY CLEANERS.
8) 312-314 RICHMOND ROAD - FORMER DRY CLEANERS.
9) 300 RICHMOND ROAD (PRESENT DAY 298 RICHMOND ROAD) - EXISTING AUTOMOTIVE SERVICE GARAGE.
10) 319 RICHMOND ROAD - EXISTING AUTOMOTIVE SERVICE GARAGE & FORMER RETAIL FUEL OUTLET.
11) 357 RICHMOND ROAD - FORMER DRY CLEANERS.
12) 450 CHURCHILL AVENUE NORTH - FORMER UNDERGROUND FUEL OIL STORAGE TANKS.

SCALE: 1:2500

0 25 50 75 100 125 150 175m

**patersongroup**
consulting engineers

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

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

GREPAULT DEVELOPMENTS INC.

PHASE I - ENVIRONMENTAL SITE ASSESSMENT
439 CHURCHILL AVENUE NORTH

OTTAWA, ONTARIO

Title:

# SURROUNDING LAND USE PLAN

| | |
|---|---|
| Scale: 1:2500 | Date: 09/2021 |
| Drawn by: JM | Report No.: PE5189-1 |
| Checked by: JC | Dwg No.: PE5189-2 |
| Approved by: MSD | Revision No.: |

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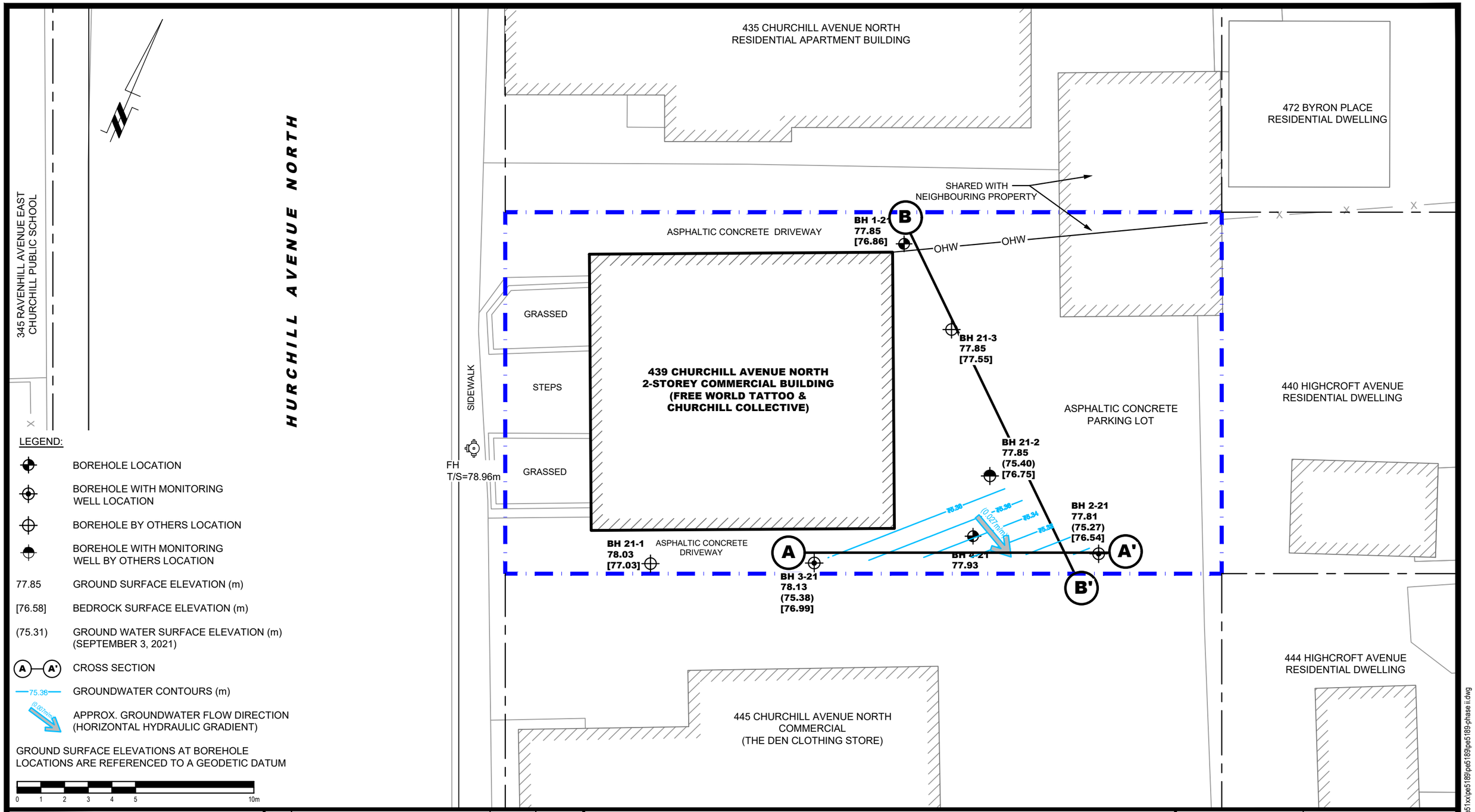


LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE BY OTHERS LOCATION
- BOREHOLE WITH MONITORING WELL BY OTHERS LOCATION
- 77.85 — GROUND SURFACE ELEVATION (m)
- [76.58] — BEDROCK SURFACE ELEVATION (m)
- (75.31) — GROUND WATER SURFACE ELEVATION (m) (SEPTEMBER 3, 2021)
- A — A' — CROSS SECTION
- 75.36 — GROUNDWATER CONTOURS (m)
- (0.007mm/s) — APPROX. GROUNDWATER FLOW DIRECTION (HORIZONTAL HYDRAULIC GRADIENT)

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

0 1 2 3 4 5 10m


**patersongroup**
consulting engineers

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


| NO. | REVISIONS | DATE | INITIAL |
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GREPAULT DEVELOPMENTS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
439 CHURCHILL AVENUE NORTH

OTTAWA, ONTARIO

Title:

# GROUNDWATER CONTOUR PLAN

| | |
|---|---|
| Scale: 1:150 | Date: 10/2021 |
| Drawn by: YA | Report No.: PE5189-2 |
| Checked by: JC | Dwg No.: PE5189-3 |
| Approved by: MSD | Revision No.: |

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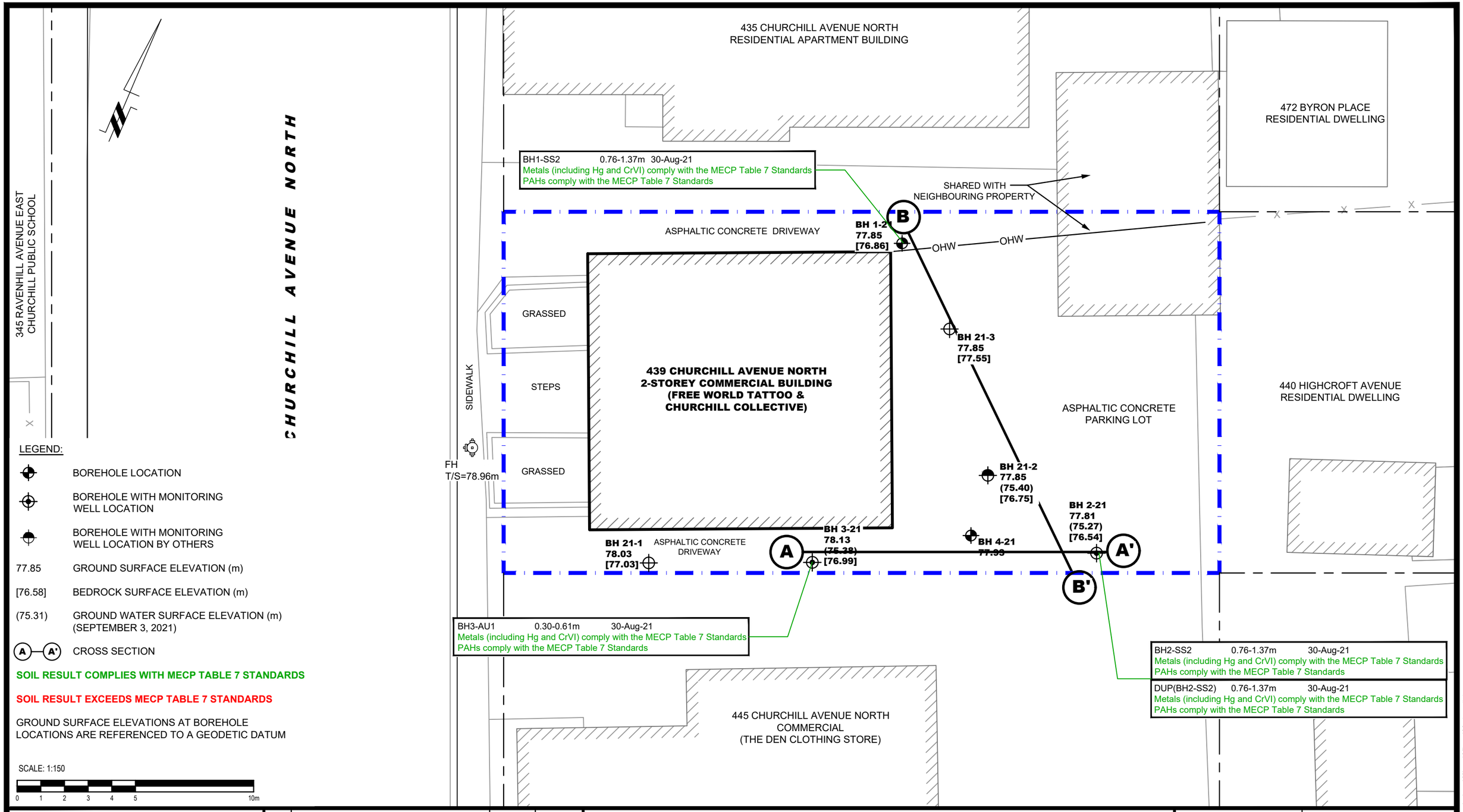


LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION BY OTHERS
- 77.85 GROUND SURFACE ELEVATION (m)
- [76.58] BEDROCK SURFACE ELEVATION (m)
- (75.31) GROUND WATER SURFACE ELEVATION (m) (SEPTEMBER 3, 2021)
- A — A' CROSS SECTION

**SOIL RESULT COMPLIES WITH MECP TABLE 7 STANDARDS**

**SOIL RESULT EXCEEDS MECP TABLE 7 STANDARDS**

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

SCALE: 1:150

0 1 2 3 4 5 10m


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


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GREPAULT DEVELOPMENTS INC.

**PHASE II - ENVIRONMENTAL SITE ASSESSMENT**
**439 CHURCHILL AVENUE NORTH**
**OTTAWA, ONTARIO**

Title:

# ANALYTICAL TESTING PLAN - SOIL

| | |
|---|---|
| Scale: 1:150 | Date: 10/2021 |
| Drawn by: YA | Report No.: PE5189-2 |
| Checked by: JC | Dwg No.: PE5189-4 |
| Approved by: MSD | Revision No.: |

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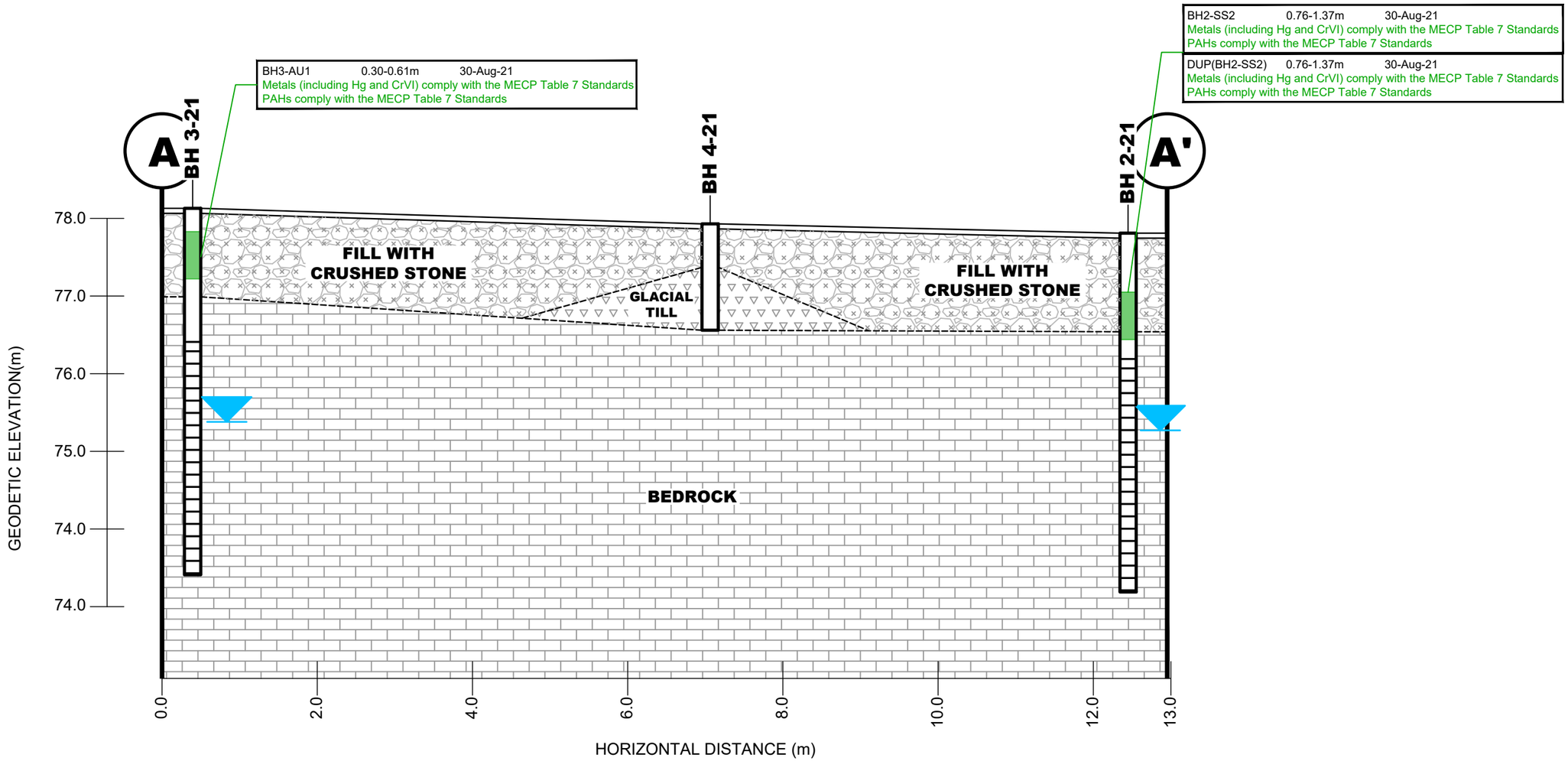


LEGEND:

SOIL RESULT COMPLIES WITH MECP TABLE 7 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 7 STANDARDS


**patersongroup**
consulting engineers

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


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GREPAULT DEVELOPMENTS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
439 CHURCHILL AVENUE NORTH

OTTAWA, ONTARIO

Title:

# CROSS SECTION A-A' - SOIL

| | |
|---|---|
| Scale: AS SHOWN | Date: 10/2021 |
| Drawn by: YA | Report No.: PE5189-2 |
| Checked by: JC | Dwg No.: PE5189-4A |
| Approved by: MSD | Revision No.: |

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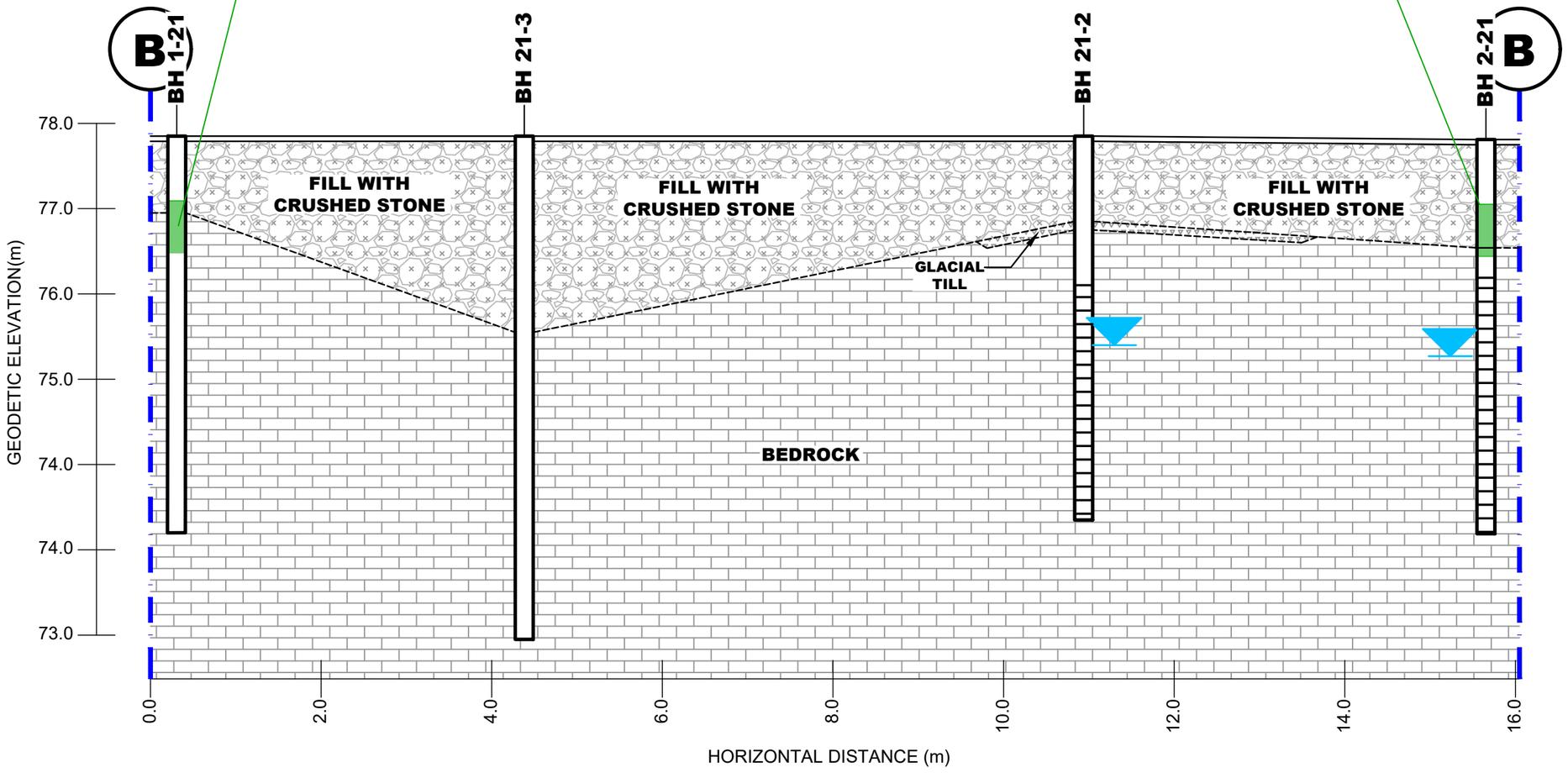
BH1-SS2 0.76-1.37m 30-Aug-21
Metals (including Hg and CrVI) comply with the MECP Table 7 Standards
PAHs comply with the MECP Table 7 Standards

BH2-SS2 0.76-1.37m 30-Aug-21
Metals (including Hg and CrVI) comply with the MECP Table 7 Standards
PAHs comply with the MECP Table 7 Standards

DUP(BH2-SS2) 0.76-1.37m 30-Aug-21
Metals (including Hg and CrVI) comply with the MECP Table 7 Standards
PAHs comply with the MECP Table 7 Standards




LEGEND:

SOIL RESULT COMPLIES WITH MECP TABLE 7 STANDARDS

SOIL RESULT EXCEEDS MECP TABLE 7 STANDARDS


**patersongroup**
consulting engineers

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

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
439 CHURCHILL AVENUE NORTH

OTTAWA, ONTARIO

Title:

# CROSS SECTION B-B' - SOIL

| | |
|---|---|
| Scale: AS SHOWN | Date: 10/2021 |
| Drawn by: YA | Report No.: PE5189-2 |
| Checked by: JC | Dwg No.: PE5189-4B |
| Approved by: MSD | Revision No.: |

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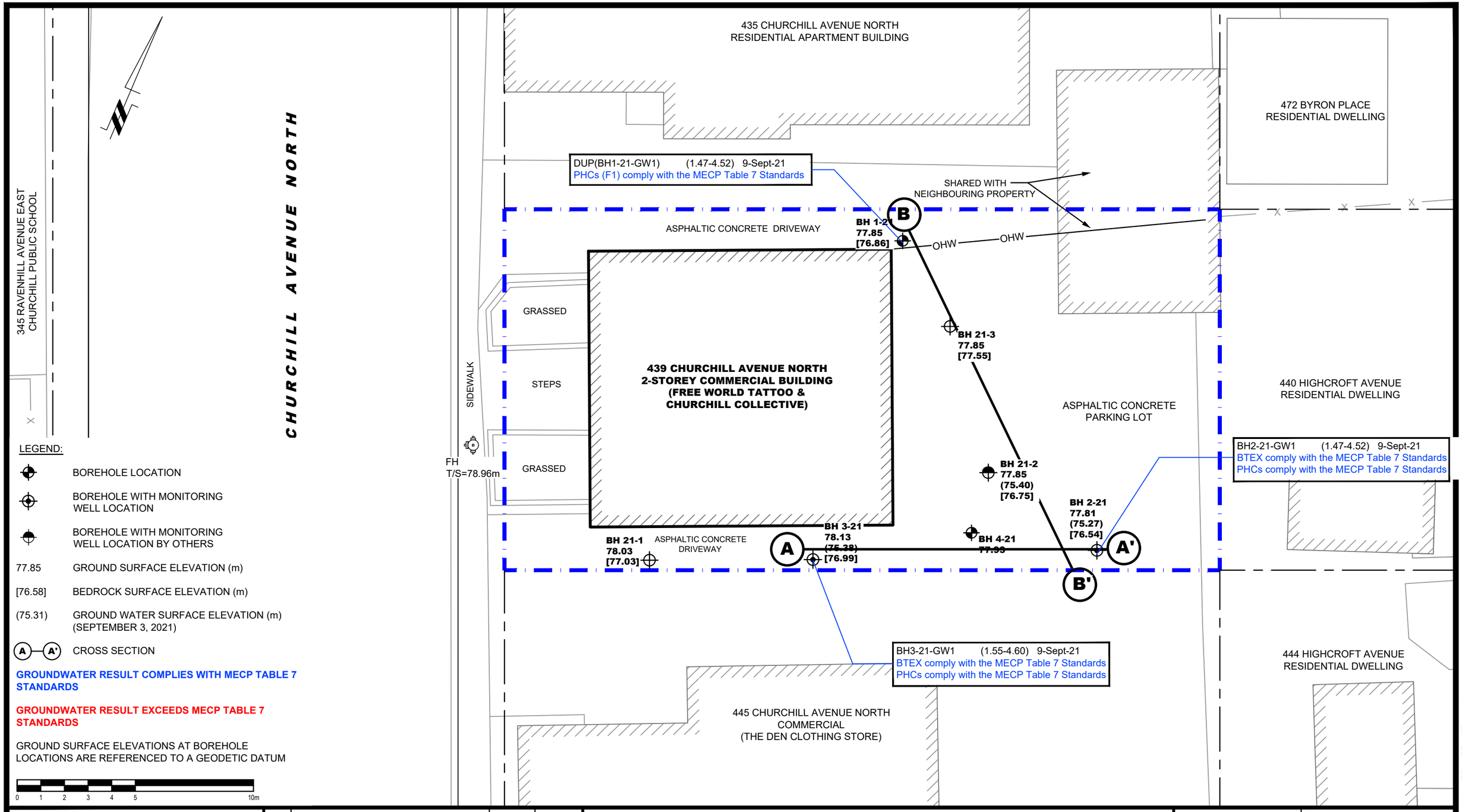


LEGEND:

- BOREHOLE LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION
- BOREHOLE WITH MONITORING WELL LOCATION BY OTHERS
- 77.85 GROUND SURFACE ELEVATION (m)
- [76.58] BEDROCK SURFACE ELEVATION (m)
- (75.31) GROUND WATER SURFACE ELEVATION (m) (SEPTEMBER 3, 2021)
- A — A' CROSS SECTION

**GROUNDWATER RESULT COMPLIES WITH MECP TABLE 7 STANDARDS**

**GROUNDWATER RESULT EXCEEDS MECP TABLE 7 STANDARDS**

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

0 1 2 3 4 5 10m


**patersongroup**
consulting engineers

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


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GREPAULT DEVELOPMENTS INC.

**PHASE II - ENVIRONMENTAL SITE ASSESSMENT**
**439 CHURCHILL AVENUE NORTH**

OTTAWA, ONTARIO

Title:

# ANALYTICAL TESTING PLAN - GROUNWATER

| | |
|---|---|
| Scale: 1:150 | Date: 10/2021 |
| Drawn by: YA | Report No.: PE5189-2 |
| Checked by: JC | Dwg No.: PE5189-5 |
| Approved by: MSD | Revision No.: |

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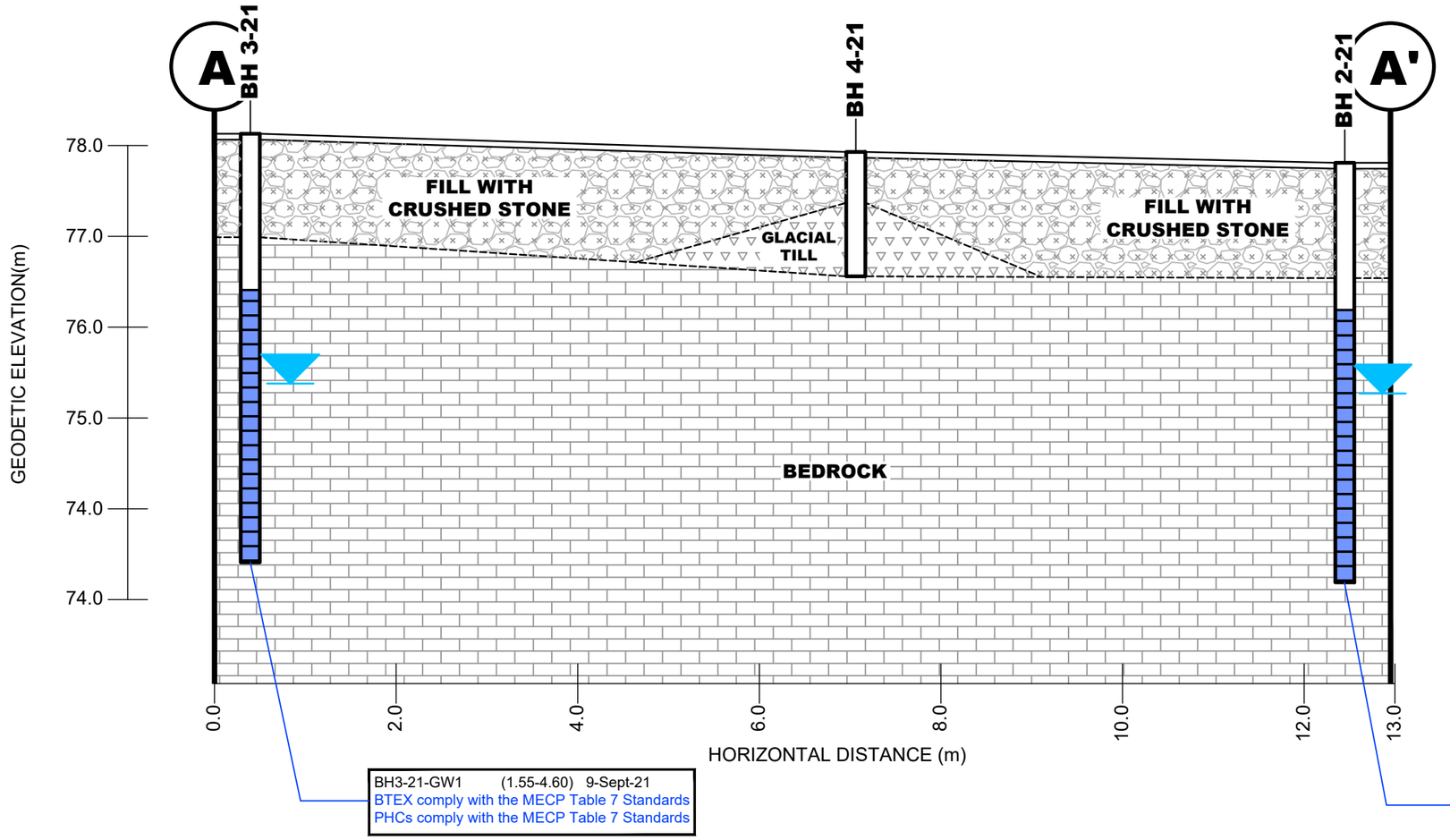


BH3-21-GW1 (1.55-4.60) 9-Sept-21
BTEX comply with the MECP Table 7 Standards
PHCs comply with the MECP Table 7 Standards

BH2-21-GW1 (1.47-4.52) 9-Sept-21
BTEX comply with the MECP Table 7 Standards
PHCs comply with the MECP Table 7 Standards

LEGEND:

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 7 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 7 STANDARDS


**patersongroup**
consulting engineers

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


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GREPAULT DEVELOPMENTS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
439 CHURCHILL AVENUE NORTH

OTTAWA, ONTARIO

Title:

# CROSS SECTION A-A' - GROUNDWATER

| | |
|---|---|
| Scale: AS SHOWN | Date: 10/2021 |
| Drawn by: YA | Report No.: PE5189-2 |
| Checked by: JC | Dwg No.: PE5189-5A |
| Approved by: MSD | Revision No.: |

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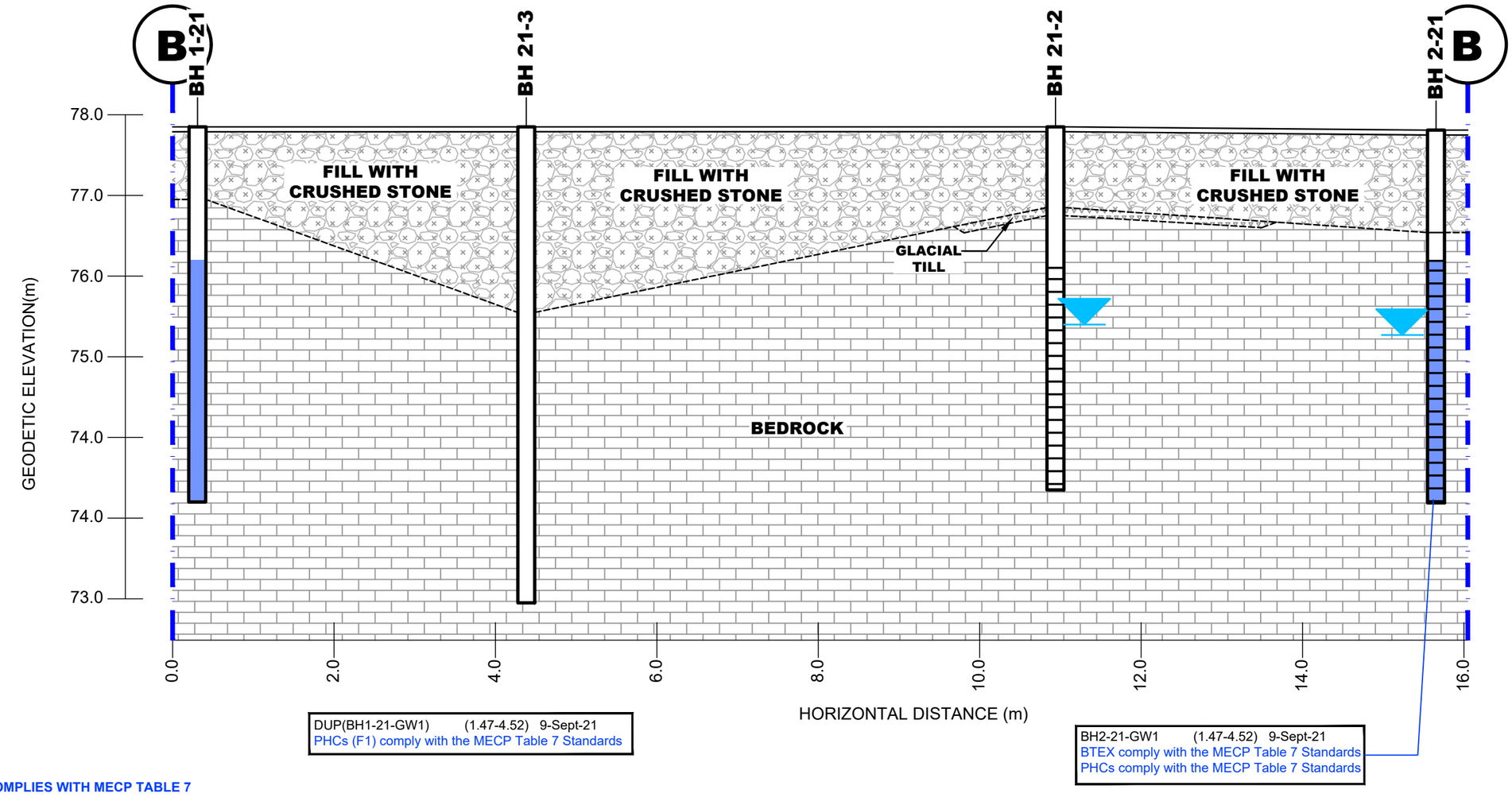


LEGEND:

GROUNDWATER RESULT COMPLIES WITH MECP TABLE 7 STANDARDS

GROUNDWATER RESULT EXCEEDS MECP TABLE 7 STANDARDS


**patersongroup**
consulting engineers

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


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GREPAULT DEVELOPMENTS INC.

PHASE II - ENVIRONMENTAL SITE ASSESSMENT
439 CHURCHILL AVENUE NORTH

OTTAWA, ONTARIO

Title:

# CROSS SECTION B-B' - GROUNDWATER

| | |
|---|---|
| Scale: AS SHOWN | Date: 10/2021 |
| Drawn by: YA | Report No.: PE5189-2 |
| Checked by: JC | Dwg No.: PE5189-5B |
| Approved by: MSD | Revision No.: |

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# APPENDIX 1

## SAMPLING AND ANALYSIS PLAN

## SOIL PROFILE AND TEST DATA SHEETS

## SYMBOLS AND TERMS

## LABORATORY CERTIFICATES OF ANALYSIS

Geotechnical Engineering

Environmental Engineering

Hydrogeology

Geological Engineering

Materials Testing

Building Science

**Paterson Group Inc.**

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

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

patersongroup

# Sampling & Analysis Plan

Phase II – Environmental Site Assessment
439 Churchill Avenue North
Ottawa, Ontario

Prepared For

Grepault Development Ltd

August 25, 2021

Report: PE5189-SAP

## TABLE OF CONTENTS

# 1.0 SAMPLING PROGRAM

Paterson Group Inc. (Paterson) was commissioned by Grepault Development Ltd, to conduct a Phase II – Environmental Site Assessment (Phase II ESA) for the property addressed 439 Churchill Avenue North, in the City of Ottawa, Ontario.

Based on the findings of the Phase I ESA, the following subsurface investigation program was developed.

| Borehole | Location & Rationale | Proposed Depth & Rationale |
|---|---|---|
| BH1-21 | Placed on the north central portion of the Phase II Property, to assess for potential soil impacts resulting from the historical on-site use of de-icing salt and the presence of fill material | 4-6 m; Assess quality of the fill material |
| BH2-21 | Placed on the southeast corner of the Phase II Property, to assess potential soil and/or groundwater impacts resulting from the historical on-site use of de-icing salt, the presence of fill material and the historical off-site UST | 4-6 m; Drill to intercept water table for monitoring well installation. Core bedrock if there is no evidence of water in the overburden. |
| BH3-21 | Placed on the south central portion of the Phase II Property, to assess potential soil and/or groundwater impacts resulting from the historical on-site use of de-icing salt, the presence of fill material and the historical off-site UST | 4-6 m; Drill to intercept water table for monitoring well installation. Core bedrock if there is no evidence of water in the overburden. |
| BH4-21 | Placed on the southeastern portion of the Phase II Property, to assess for potential soil impacts resulting from the historical on-site use of de-icing salt and the presence of fill material | 4 – 6 m; Assess quality of the fill material |

Borehole locations are shown on Drawing PE5189-3 – Test Hole Location Plan, appended to the main report.

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

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

# 2.0 ANALYTICAL TESTING PROGRAM

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

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

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

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

# 3.0 STANDARD OPERATING PROCEDURES

## 3.1 Environmental Drilling Procedure

### Purpose

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

### Equipment

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

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

### Determining Borehole Locations

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

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

### Drilling Procedure

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

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

### Spoon Washing Procedure

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

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

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

### Screening Procedure

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

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

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

## 3.2 Monitoring Well Installation Procedure

### Equipment

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

### Procedure

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

## 3.3 Monitoring Well Sampling Procedure

### Equipment

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

### Sampling Procedure

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

# 4.0 QUALITY ASSURANCE/QUALITY CONTROL (QA/QC)

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

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

# 5.0 DATA QUALITY OBJECTIVES

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

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

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

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

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

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

These considerations are discussed in the body of the report.

# 6.0 PHYSICAL IMPEDIMENTS

Physical impediments to the Sampling and Analysis plan may include:

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

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

# patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

## SOIL PROFILE AND TEST DATA

**Phase II - Environmental Site Assessment**
**439 Church Avenue North**
**Ottawa, Ontario**

**DATUM** Geodetic

**FILE NO.** PE5189

**REMARKS**

**HOLE NO.** BH 1-21

**BORINGS BY** CME-55 Low Clearance Drill **DATE** August 30, 2021

| SOIL DESCRIPTION | STRATA PLOT | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE % RECOVERY | SAMPLE N VALUE or RQD | DEPTH (m) | ELEV. (m) |
|---|---|---|---|---|---|---|---|
| **GROUND SURFACE** | | | | | | 0 | 77.85 |
| Asphaltic concrete 0.03 | | | | | | | |
| **FILL:** Brown silty sand with crushed stone 0.51 | | AU | 1 | | | | |
| **FILL:** Brown silty sand with clay, gravel and crushed stone 0.99 | | SS | 2 | 89 | 50+ | 1 | 76.85 |
| | | RC | 1 | 100 | 58 | | |
| | | | | | | 2 | 75.85 |
| | | RC | 2 | 100 | 75 | | |
| **BEDROCK:** Fair to good quality, grey limestone | | | | | | 3 | 74.85 |
| | | RC | 3 | 100 | 83 | | |
| | | | | | | 4 | 73.85 |
| 4.65 End of Borehole | | | | | | | |

**Photo Ionization Detector**

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

**RKI Eagle Rdg. (ppm)**

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

# patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

## SOIL PROFILE AND TEST DATA

**Phase II - Environmental Site Assessment**
**439 Church Avenue North**
**Ottawa, Ontario**

**DATUM** Geodetic

**FILE NO.** PE5189

**REMARKS**

**HOLE NO.** BH 2-21

**BORINGS BY** CME-55 Low Clearance Drill **DATE** August 30, 2021

| SOIL DESCRIPTION | STRATA PLOT | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE % RECOVERY | SAMPLE N VALUE or RQD | DEPTH (m) | ELEV. (m) |
|---|---|---|---|---|---|---|---|
| **GROUND SURFACE** | | | | | | 0 | 77.81 |
| Asphaltic concrete 0.03 | | | | | | | |
| **FILL:** Brown silty sand, some crushed stone | | AU | 1 | | | | |
| 0.53 | | | | | | | |
| **FILL:** Brown silty clay with sand and gravel, trace coal | | SS | 2 | | 50+ | 1 | 76.81 |
| 1.27 | | | | | | | |
| | | RC | 2 | 100 | 88 | | |
| | | RC | 1 | 100 | 33 | 2 | 75.81 |
| **BEDROCK:** Poor to excellent quality, grey limestone | | | | | | 3 | 74.81 |
| | | RC | 3 | 100 | 91 | 4 | 73.81 |
| 4.62 | | | | | | | |
| End of Borehole | | | | | | | |
| (GWL @ 2.54m - Sept. 3, 2021) | | | | | | | |

**Photo Ionization Detector**

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

**RKI Eagle Rdg. (ppm)**

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

# patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

## SOIL PROFILE AND TEST DATA

**Phase II - Environmental Site Assessment**
**439 Church Avenue North**
**Ottawa, Ontario**

**DATUM** Geodetic

**FILE NO.** PE5189

**REMARKS**

**HOLE NO.** BH 3-21

**BORINGS BY** CME-55 Low Clearance Drill **DATE** August 30, 2021

| SOIL DESCRIPTION | STRATA PLOT | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE % RECOVERY | SAMPLE N VALUE or RQD | DEPTH (m) | ELEV. (m) |
|---|---|---|---|---|---|---|---|
| **GROUND SURFACE** | | | | | | 0 | 78.13 |
| Asphaltic concrete 0.03 | | | | | | | |
| **FILL:** Brown silty sand with crushed stone 0.51 | | AU | 1 | | | | |
| **FILL:** Brown silty sand with clay and gravel, some rock fragments 1.14 | | SS | 2 | 60 | 50+ | 1 | 77.13 |
| | | RC | 1 | 100 | 19 | | |
| | | | | | | 2 | 76.13 |
| **BEDROCK:** Poor to excellent quality, grey limestone | | RC | 2 | 100 | 70 | | |
| | | | | | | 3 | 75.13 |
| | | RC | 3 | 100 | 100 | | |
| | | | | | | 4 | 74.13 |
| 4.72 | | | | | | | |
| End of Borehole | | | | | | | |
| (GWL @ 2.75m - Sept. 3, 2021) | | | | | | | |

**Photo Ionization Detector**

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

**RKI Eagle Rdg. (ppm)**

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

# patersongroup Consulting Engineers

154 Colonnade Road South, Ottawa, Ontario K2E 7J5

## SOIL PROFILE AND TEST DATA

**Phase II - Environmental Site Assessment**
**439 Church Avenue North**
**Ottawa, Ontario**

**DATUM** Geodetic

**FILE NO.** PE5189

**REMARKS**

**HOLE NO.** BH 4-21

**BORINGS BY** CME-55 Low Clearance Drill **DATE** August 30, 2021

| SOIL DESCRIPTION | STRATA PLOT | SAMPLE TYPE | SAMPLE NUMBER | SAMPLE % RECOVERY | SAMPLE N VALUE or RQD | DEPTH (m) | ELEV. (m) |
|---|---|---|---|---|---|---|---|
| **GROUND SURFACE** | | | | | | 0 | 77.87 |
| Asphaltic concrete 0.03 | | | | | | | |
| **FILL:** Brown silty sand, some clay crushed stone and gravel 0.56 | | AU | 1 | | | | |
| **GLACIAL TILL:** Very dense, brown silty sand with gravel, cobbles and boulders | | SS | 2 | 35 | 50+ | 1 | 76.87 |
| 1.37 | | | | | | | |
| End of Borehole | | | | | | | |
| Practical refusl to augering at 1.37m depth. | | | | | | | |

**Photo Ionization Detector**

● Volatile Organic Rdg. (ppm)

○ **Lower Explosive Limit %**

20 40 60 80

100 200 300 400 500

**RKI Eagle Rdg. (ppm)**

▲ Full Gas Resp. △ Methane Elim.

Monitoring Well Construction

# SYMBOLS AND TERMS

## SOIL DESCRIPTION

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

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

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

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

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

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

# SYMBOLS AND TERMS (continued)

## SOIL DESCRIPTION (continued)

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

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

## ROCK DESCRIPTION

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

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

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

## SAMPLE TYPES

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

## SYMBOLS AND TERMS (continued)

### PLASTICITY LIMITS AND GRAIN SIZE DISTRIBUTION

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

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

### CONSOLIDATION TEST

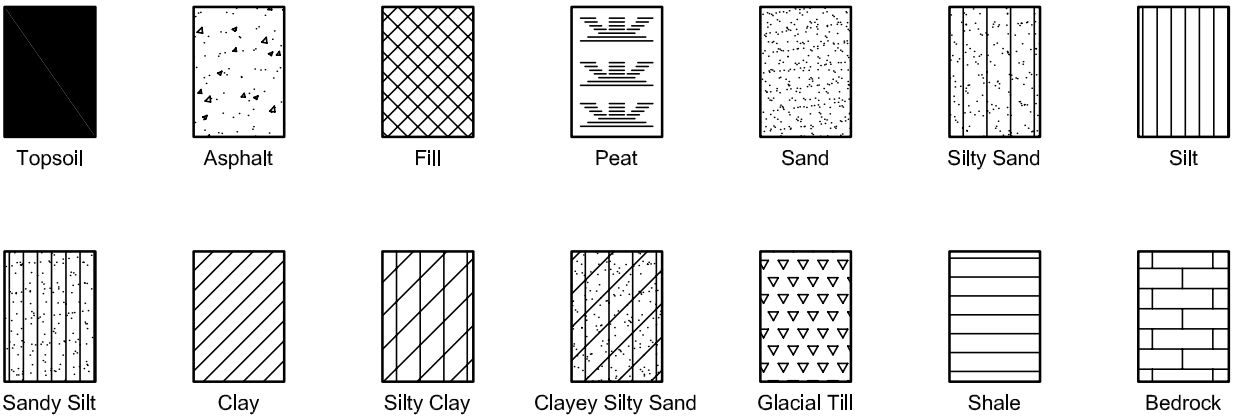
| | | |
|---|---|---|
| $p'_o$ | - | Present effective overburden pressure at sample depth |
| $p'_c$ | - | Preconsolidation pressure of (maximum past pressure on) sample |
| Ccr | - | Recompression index (in effect at pressures below $p'_c$) |
| Cc | - | Compression index (in effect at pressures above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

### PERMEABILITY TEST

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

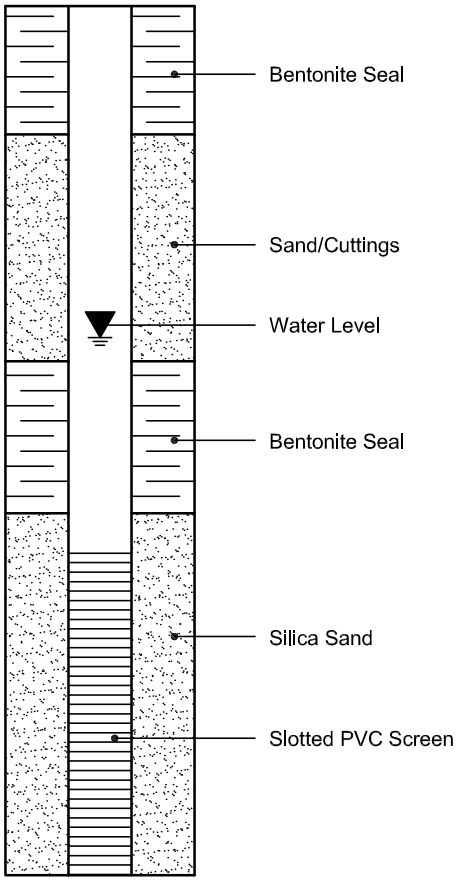
# SYMBOLS AND TERMS (continued)

## STRATA PLOT

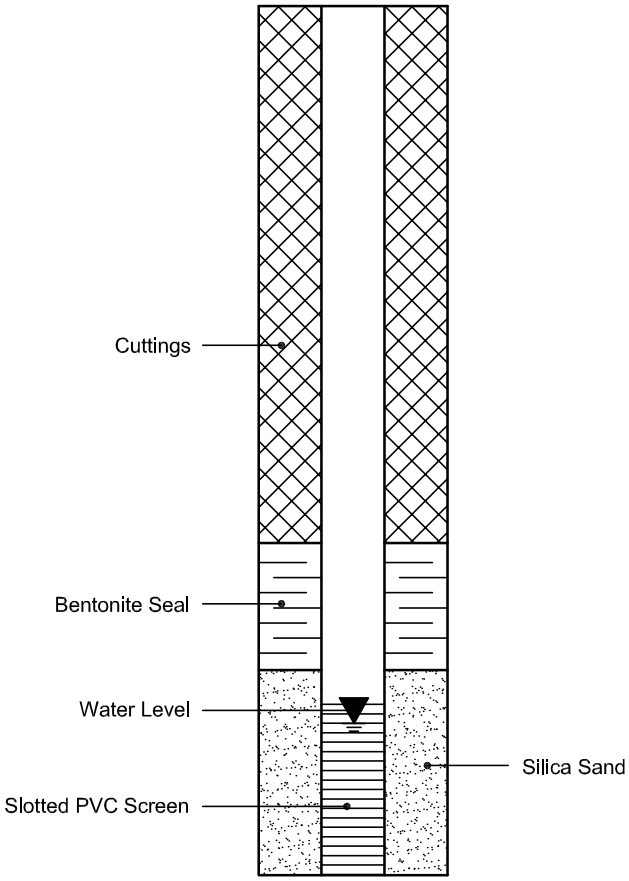



## MONITORING WELL AND PIEZOMETER CONSTRUCTION

MONITORING WELL CONSTRUCTION




PIEZOMETER CONSTRUCTION



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# Certificate of Analysis

**Paterson Group Consulting Engineers**

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Karyn Munch

Client PO: 32497
Project: PE5189
Custody: 133035

Report Date: 7-Sep-2021
Order Date: 31-Aug-2021

**Order #: 2136276**

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

| Paracel ID | Client ID |
|---|---|
| 2136276-01 | BH1-SS2 |
| 2136276-02 | BH2-SS2 |
| 2136276-03 | BH3-AU1 |
| 2136276-04 | DUP1 |

Approved By:

Dale Robertson, BSc
Laboratory Director

Certificate of Analysis

Report Date: 07-Sep-2021

**Client: Paterson Group Consulting Engineers**

Order Date: 31-Aug-2021

**Client PO: 32497**

**Project Description: PE5189**

## Analysis Summary Table

| Analysis | Method Reference/Description | Extraction Date | Analysis Date |
|---|---|---|---|
| Chromium, hexavalent - soil | MOE E3056 - Extraction, colourimetric | 7-Sep-21 | 7-Sep-21 |
| Mercury by CVAA | EPA 7471B - CVAA, digestion | 7-Sep-21 | 7-Sep-21 |
| pH, soil | EPA 150.1 - pH probe @ 25 °C, CaCl buffered ext. | 1-Sep-21 | 1-Sep-21 |
| REG 153: Metals by ICP/MS, soil | EPA 6020 - Digestion - ICP-MS | 2-Sep-21 | 2-Sep-21 |
| REG 153: PAHs by GC-MS | EPA 8270 - GC-MS, extraction | 30-Aug-21 | 2-Sep-21 |
| Solids, % | Gravimetric, calculation | 1-Sep-21 | 2-Sep-21 |

Certificate of Analysis

Report Date: 07-Sep-2021

**Client: Paterson Group Consulting Engineers**

Order Date: 31-Aug-2021

**Client PO: 32497**

**Project Description: PE5189**

| | Client ID: | BH1-SS2 | BH2-SS2 | BH3-AU1 | DUP1 |
|---|---|---|---|---|---|
| | Sample Date: | 30-Aug-21 09:00 | 30-Aug-21 09:00 | 30-Aug-21 09:00 | 30-Aug-21 09:00 |
| | Sample ID: | 2136276-01 | 2136276-02 | 2136276-03 | 2136276-04 |
| | MDL/Units | Soil | Soil | Soil | Soil |
| **Physical Characteristics** | | | | | |
| % Solids | 0.1 % by Wt. | 92.3 | 84.9 | 95.5 | 85.4 |
| **General Inorganics** | | | | | |
| pH | 0.05 pH Units | - | 7.48 | - | - |
| **Metals** | | | | | |
| Antimony | 1.0 ug/g dry | <1.0 | <1.0 | <1.0 | <1.0 |
| Arsenic | 1.0 ug/g dry | 1.8 | 4.2 | 2.5 | 4.2 |
| Barium | 1.0 ug/g dry | 35.6 | 78.6 | 69.4 | 78.0 |
| Beryllium | 0.5 ug/g dry | <0.5 | 0.7 | <0.5 | 0.7 |
| Boron | 5.0 ug/g dry | 26.3 | 19.7 | 7.2 | 17.0 |
| Cadmium | 0.5 ug/g dry | <0.5 | <0.5 | <0.5 | <0.5 |
| Chromium | 5.0 ug/g dry | 16.4 | 29.3 | 13.2 | 27.4 |
| Chromium (VI) | 0.2 ug/g dry | <0.2 | <0.2 | <0.2 | <0.2 |
| Cobalt | 1.0 ug/g dry | 4.7 | 9.0 | 5.9 | 9.4 |
| Copper | 5.0 ug/g dry | 7.5 | 14.2 | 13.5 | 15.4 |
| Lead | 1.0 ug/g dry | 18.7 | 17.1 | 29.2 | 17.7 |
| Mercury | 0.1 ug/g dry | <0.1 | <0.1 | <0.1 | <0.1 |
| Molybdenum | 1.0 ug/g dry | <1.0 | <1.0 | <1.0 | <1.0 |
| Nickel | 5.0 ug/g dry | 10.2 | 16.9 | 11.8 | 16.3 |
| Selenium | 1.0 ug/g dry | <1.0 | <1.0 | <1.0 | <1.0 |
| Silver | 0.3 ug/g dry | <0.3 | <0.3 | <0.3 | <0.3 |
| Thallium | 1.0 ug/g dry | <1.0 | <1.0 | <1.0 | <1.0 |
| Uranium | 1.0 ug/g dry | <1.0 | <1.0 | <1.0 | <1.0 |
| Vanadium | 10.0 ug/g dry | 19.8 | 38.5 | 24.7 | 36.4 |
| Zinc | 20.0 ug/g dry | 25.0 | 54.4 | 36.0 | 54.8 |
| **Semi-Volatiles** | | | | | |
| Acenaphthene | 0.02 ug/g dry | <0.02 | <0.02 | <0.02 | <0.02 |
| Acenaphthylene | 0.02 ug/g dry | <0.02 | <0.02 | <0.02 | <0.02 |
| Anthracene | 0.02 ug/g dry | 0.04 | <0.02 | 0.04 | <0.02 |
| Benzo [a] anthracene | 0.02 ug/g dry | 0.10 | 0.03 | <0.02 | <0.02 |
| Benzo [a] pyrene | 0.02 ug/g dry | 0.11 | 0.03 | 0.08 | 0.02 |
| Benzo [b] fluoranthene | 0.02 ug/g dry | 0.13 | 0.04 | 0.11 | 0.03 |
| Benzo [g,h,i] perylene | 0.02 ug/g dry | 0.08 | 0.03 | 0.06 | 0.02 |
| Benzo [k] fluoranthene | 0.02 ug/g dry | 0.07 | 0.02 | 0.05 | <0.02 |
| Chrysene | 0.02 ug/g dry | 0.10 | 0.03 | 0.09 | <0.02 |
| Dibenzo [a,h] anthracene | 0.02 ug/g dry | <0.02 | <0.02 | <0.02 | <0.02 |

Certificate of Analysis

Report Date: 07-Sep-2021

**Client: Paterson Group Consulting Engineers**

Order Date: 31-Aug-2021

**Client PO: 32497**

**Project Description: PE5189**

| | **Client ID:** | BH1-SS2 | BH2-SS2 | BH3-AU1 | DUP1 |
|---|---|---|---|---|---|
| | **Sample Date:** | 30-Aug-21 09:00 | 30-Aug-21 09:00 | 30-Aug-21 09:00 | 30-Aug-21 09:00 |
| | **Sample ID:** | 2136276-01 | 2136276-02 | 2136276-03 | 2136276-04 |
| | **MDL/Units** | Soil | Soil | Soil | Soil |
| Fluoranthene | 0.02 ug/g dry | 0.21 | 0.06 | 0.17 | 0.03 |
| Fluorene | 0.02 ug/g dry | <0.02 | <0.02 | <0.02 | <0.02 |
| Indeno [1,2,3-cd] pyrene | 0.02 ug/g dry | 0.07 | 0.02 | 0.05 | <0.02 |
| 1-Methylnaphthalene | 0.02 ug/g dry | <0.02 | 0.05 | <0.02 | 0.07 |
| 2-Methylnaphthalene | 0.02 ug/g dry | <0.02 | 0.07 | <0.02 | 0.10 |
| Methylnaphthalene (1&2) | 0.04 ug/g dry | <0.04 | 0.12 | <0.04 | 0.17 |
| Naphthalene | 0.01 ug/g dry | <0.01 | 0.05 | <0.01 | 0.07 |
| Phenanthrene | 0.02 ug/g dry | 0.15 | 0.06 | 0.12 | 0.05 |
| Pyrene | 0.02 ug/g dry | 0.18 | 0.05 | 0.14 | 0.03 |
| 2-Fluorobiphenyl | Surrogate | 66.8% | 80.9% | 88.2% | 101% |
| Terphenyl-d14 | Surrogate | 76.4% | 97.6% | 85.7% | 91.0% |

Certificate of Analysis

Report Date: 07-Sep-2021

**Client: Paterson Group Consulting Engineers**

Order Date: 31-Aug-2021

**Client PO: 32497**

**Project Description: PE5189**

## Method Quality Control: Blank

| Analyte | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Metals** | | | | | | | | | |
| Antimony | ND | 1.0 | ug/g | | | | | | |
| Arsenic | ND | 1.0 | ug/g | | | | | | |
| Barium | ND | 1.0 | ug/g | | | | | | |
| Beryllium | ND | 0.5 | ug/g | | | | | | |
| Boron | ND | 5.0 | ug/g | | | | | | |
| Cadmium | ND | 0.5 | ug/g | | | | | | |
| Chromium (VI) | ND | 0.2 | ug/g | | | | | | |
| Chromium | ND | 5.0 | ug/g | | | | | | |
| Cobalt | ND | 1.0 | ug/g | | | | | | |
| Copper | ND | 5.0 | ug/g | | | | | | |
| Lead | ND | 1.0 | ug/g | | | | | | |
| Mercury | ND | 0.1 | ug/g | | | | | | |
| Molybdenum | ND | 1.0 | ug/g | | | | | | |
| Nickel | ND | 5.0 | ug/g | | | | | | |
| Selenium | ND | 1.0 | ug/g | | | | | | |
| Silver | ND | 0.3 | ug/g | | | | | | |
| Thallium | ND | 1.0 | ug/g | | | | | | |
| Uranium | ND | 1.0 | ug/g | | | | | | |
| Vanadium | ND | 10.0 | ug/g | | | | | | |
| Zinc | ND | 20.0 | ug/g | | | | | | |
| **Semi-Volatiles** | | | | | | | | | |
| Acenaphthene | ND | 0.02 | ug/g | | | | | | |
| Acenaphthylene | ND | 0.02 | ug/g | | | | | | |
| Anthracene | ND | 0.02 | ug/g | | | | | | |
| Benzo [a] anthracene | ND | 0.02 | ug/g | | | | | | |
| Benzo [a] pyrene | ND | 0.02 | ug/g | | | | | | |
| Benzo [b] fluoranthene | ND | 0.02 | ug/g | | | | | | |
| Benzo [g,h,i] perylene | ND | 0.02 | ug/g | | | | | | |
| Benzo [k] fluoranthene | ND | 0.02 | ug/g | | | | | | |
| Chrysene | ND | 0.02 | ug/g | | | | | | |
| Dibenzo [a,h] anthracene | ND | 0.02 | ug/g | | | | | | |
| Fluoranthene | ND | 0.02 | ug/g | | | | | | |
| Fluorene | ND | 0.02 | ug/g | | | | | | |
| Indeno [1,2,3-cd] pyrene | ND | 0.02 | ug/g | | | | | | |
| 1-Methylnaphthalene | ND | 0.02 | ug/g | | | | | | |
| 2-Methylnaphthalene | ND | 0.02 | ug/g | | | | | | |
| Methylnaphthalene (1&2) | ND | 0.04 | ug/g | | | | | | |
| Naphthalene | ND | 0.01 | ug/g | | | | | | |
| Phenanthrene | ND | 0.02 | ug/g | | | | | | |
| Pyrene | ND | 0.02 | ug/g | | | | | | |
| *Surrogate: 2-Fluorobiphenyl* | *1.23* | | *ug/g* | | *92.0* | *50-140* | | | |
| *Surrogate: Terphenyl-d14* | *1.27* | | *ug/g* | | *95.6* | *50-140* | | | |

## Method Quality Control: Duplicate

| Analyte | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **General Inorganics** | | | | | | | | | |
| pH | 7.48 | 0.05 | pH Units | 7.48 | | | 0.0 | 2.3 | |
| **Metals** | | | | | | | | | |
| Antimony | ND | 1.0 | ug/g dry | 1.0 | | | NC | 30 | |
| Arsenic | 2.6 | 1.0 | ug/g dry | 2.4 | | | 6.0 | 30 | |
| Barium | 28.0 | 1.0 | ug/g dry | 28.0 | | | 0.2 | 30 | |
| Beryllium | ND | 0.5 | ug/g dry | ND | | | NC | 30 | |
| Boron | ND | 5.0 | ug/g dry | ND | | | NC | 30 | |
| Cadmium | ND | 0.5 | ug/g dry | ND | | | NC | 30 | |
| Chromium (VI) | ND | 0.2 | ug/g dry | ND | | | NC | 35 | |
| Chromium | 10.7 | 5.0 | ug/g dry | 11.1 | | | 3.7 | 30 | |
| Cobalt | 3.8 | 1.0 | ug/g dry | 3.9 | | | 1.3 | 30 | |
| Copper | 8.8 | 5.0 | ug/g dry | 9.1 | | | 3.1 | 30 | |
| Lead | 6.9 | 1.0 | ug/g dry | 7.4 | | | 7.0 | 30 | |
| Mercury | ND | 0.1 | ug/g dry | ND | | | NC | 30 | |
| Molybdenum | ND | 1.0 | ug/g dry | ND | | | NC | 30 | |
| Nickel | 7.2 | 5.0 | ug/g dry | 7.6 | | | 5.0 | 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 | 22.8 | 10.0 | ug/g dry | 24.1 | | | 5.6 | 30 | |
| Zinc | 26.9 | 20.0 | ug/g dry | 28.4 | | | 5.7 | 30 | |
| **Physical Characteristics** | | | | | | | | | |
| % Solids | 84.2 | 0.1 | % by Wt. | 85.4 | | | 1.4 | 25 | |
| **Semi-Volatiles** | | | | | | | | | |
| Acenaphthene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Acenaphthylene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Anthracene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Benzo [a] anthracene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Benzo [a] pyrene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Benzo [b] fluoranthene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Benzo [g,h,i] perylene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Benzo [k] fluoranthene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Chrysene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Dibenzo [a,h] anthracene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Fluoranthene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Fluorene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Indeno [1,2,3-cd] pyrene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| 1-Methylnaphthalene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| 2-Methylnaphthalene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Naphthalene | ND | 0.01 | ug/g dry | ND | | | NC | 40 | |
| Phenanthrene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| Pyrene | ND | 0.02 | ug/g dry | ND | | | NC | 40 | |
| *Surrogate: 2-Fluorobiphenyl* | *1.24* | | *ug/g dry* | | *85.6* | *50-140* | | | |
| *Surrogate: Terphenyl-d14* | *1.36* | | *ug/g dry* | | *93.9* | *50-140* | | | |

Certificate of Analysis

Report Date: 07-Sep-2021

**Client: Paterson Group Consulting Engineers**

Order Date: 31-Aug-2021

**Client PO: 32497**

**Project Description: PE5189**

## Method Quality Control: Spike

| Analyte | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Metals** | | | | | | | | | |
| Antimony | 48.8 | 1.0 | ug/g | ND | 96.8 | 70-130 | | | |
| Arsenic | 52.0 | 1.0 | ug/g | 1.0 | 102 | 70-130 | | | |
| Barium | 58.1 | 1.0 | ug/g | 11.2 | 93.9 | 70-130 | | | |
| Beryllium | 50.1 | 0.5 | ug/g | ND | 99.8 | 70-130 | | | |
| Boron | 47.0 | 5.0 | ug/g | ND | 91.3 | 70-130 | | | |
| Cadmium | 47.5 | 0.5 | ug/g | ND | 95.0 | 70-130 | | | |
| Chromium (VI) | 0.2 | 0.2 | ug/g | ND | 78.5 | 70-130 | | | |
| Chromium | 53.1 | 5.0 | ug/g | ND | 97.3 | 70-130 | | | |
| Cobalt | 51.0 | 1.0 | ug/g | 1.6 | 98.9 | 70-130 | | | |
| Copper | 52.0 | 5.0 | ug/g | ND | 96.8 | 70-130 | | | |
| Lead | 49.9 | 1.0 | ug/g | 3.0 | 93.9 | 70-130 | | | |
| Mercury | 1.69 | 0.1 | ug/g | ND | 113 | 70-130 | | | |
| Molybdenum | 48.5 | 1.0 | ug/g | ND | 96.6 | 70-130 | | | |
| Nickel | 51.2 | 5.0 | ug/g | ND | 96.4 | 70-130 | | | |
| Selenium | 46.1 | 1.0 | ug/g | ND | 92.1 | 70-130 | | | |
| Silver | 40.8 | 0.3 | ug/g | ND | 81.5 | 70-130 | | | |
| Thallium | 47.2 | 1.0 | ug/g | ND | 94.3 | 70-130 | | | |
| Uranium | 48.3 | 1.0 | ug/g | ND | 96.3 | 70-130 | | | |
| Vanadium | 59.4 | 10.0 | ug/g | ND | 99.6 | 70-130 | | | |
| Zinc | 58.8 | 20.0 | ug/g | ND | 94.8 | 70-130 | | | |
| **Semi-Volatiles** | | | | | | | | | |
| Acenaphthene | 0.112 | 0.02 | ug/g | ND | 61.9 | 50-140 | | | |
| Acenaphthylene | 0.106 | 0.02 | ug/g | ND | 58.4 | 50-140 | | | |
| Anthracene | 0.127 | 0.02 | ug/g | ND | 69.9 | 50-140 | | | |
| Benzo [a] anthracene | 0.127 | 0.02 | ug/g | ND | 70.2 | 50-140 | | | |
| Benzo [a] pyrene | 0.139 | 0.02 | ug/g | ND | 76.8 | 50-140 | | | |
| Benzo [b] fluoranthene | 0.202 | 0.02 | ug/g | ND | 112 | 50-140 | | | |
| Benzo [g,h,i] perylene | 0.126 | 0.02 | ug/g | ND | 69.2 | 50-140 | | | |
| Benzo [k] fluoranthene | 0.175 | 0.02 | ug/g | ND | 96.6 | 50-140 | | | |
| Chrysene | 0.156 | 0.02 | ug/g | ND | 86.0 | 50-140 | | | |
| Dibenzo [a,h] anthracene | 0.125 | 0.02 | ug/g | ND | 68.9 | 50-140 | | | |
| Fluoranthene | 0.121 | 0.02 | ug/g | ND | 66.6 | 50-140 | | | |
| Fluorene | 0.116 | 0.02 | ug/g | ND | 63.9 | 50-140 | | | |
| Indeno [1,2,3-cd] pyrene | 0.107 | 0.02 | ug/g | ND | 58.8 | 50-140 | | | |
| 1-Methylnaphthalene | 0.117 | 0.02 | ug/g | ND | 64.5 | 50-140 | | | |
| 2-Methylnaphthalene | 0.131 | 0.02 | ug/g | ND | 72.2 | 50-140 | | | |
| Naphthalene | 0.128 | 0.01 | ug/g | ND | 70.3 | 50-140 | | | |
| Phenanthrene | 0.121 | 0.02 | ug/g | ND | 66.8 | 50-140 | | | |
| Pyrene | 0.124 | 0.02 | ug/g | ND | 68.4 | 50-140 | | | |
| *Surrogate: 2-Fluorobiphenyl* | *1.13* | | *ug/g* | | *77.9* | *50-140* | | | |
| *Surrogate: Terphenyl-d14* | *1.11* | | *ug/g* | | *76.6* | *50-140* | | | |

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

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

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**Paracel ID: 2136276**

# Chain Of Custody
(Lab Use Only)

№ 133035

| | | |
|---|---|---|
| Client Name: PATERSON | Project Ref: PE5189 | Page 1 of 1 |
| Contact Name: KARYN MUNCH | Quote #: | Turnaround Time |
| Address: 154 Colonnade Road | PO #: 32497 | ☐ 1 day ☐ 3 day ☐ 2 day ☑ Regular |
| Telephone: 613-226-7381 | E-mail: Kmunch@patersongroup.ca | Date Required: |

☐ REG 153/04 ☐ REG 406/19

☐ Table 1 ☐ Res/Park ☐ Med/Fine
☐ Table 2 ☐ Ind/Comm ☐ Coarse
☑ Table 3 ☐ Agri/Other
☑ Table 7
For RSC: ☐ Yes ☐ No

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

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

| | Sample ID/Location Name | Matrix | Air Volume | # of Containers | Sample Taken: Date | Sample Taken: Time | PHCs F1-F4+BTEX | VOCs | PAHs | Metals by ICP | Hg | CrVI | B (HWS) | pH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BH1-SS2 | S | | 1 | Aug 30/2021 | | | | ✓ | ✓ | ✓ | ✓ | | |
| 2 | BH2-SS2 | ↓ | | ↓ | ↓ | | | | ↓ | ↓ | ↓ | ↓ | | ✓ |
| 3 | BH3-AU1 | | | | | | | | | | | | | |
| 4 | DUP1 | ↓ | | ↓ | ↓ | | | | ↓ | ↓ | ↓ | ↓ | | |
| 5 | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | |

Comments:

Method of Delivery: PARACEL COURIER

| | | | |
|---|---|---|---|
| Relinquished By (Sign): | Received By Driver/Depot: T. Louise | Received at Lab: Shreegaan Rohmai | Verified By: |
| Relinquished By (Print): Joshua Dempsey | Date/Time: 31/08/21 3:10 | Date/Time: Aug 31, 2021 04:45 | Date/Time: Sept 1/21 9:12a |
| Date/Time: August 31/2021 | Temperature: °C | Temperature: 14.4°C | pH Verified: ☐ By: N/A |

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# Certificate of Analysis

**Paterson Group Consulting Engineers**

154 Colonnade Road South
Nepean, ON K2E 7J5
Attn: Karyn Munch

Client PO: 32995
Project: PE5189
Custody: 133099

Report Date: 10-Sep-2021
Order Date: 8-Sep-2021

**Order #: 2137276**

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

| Paracel ID | Client ID |
|---|---|
| 2137276-01 | BH2-21 |
| 2137276-02 | BH3-21 |
| 2137276-03 | DUP 1 |

Approved By:

Mark Foto

Mark Foto, M.Sc.
Lab Supervisor

Certificate of Analysis

**Client: Paterson Group Consulting Engineers**

**Client PO: 32995**

Report Date: 10-Sep-2021

Order Date: 8-Sep-2021

**Project Description: PE5189**

## Analysis Summary Table

| Analysis | Method Reference/Description | Extraction Date | Analysis Date |
|---|---|---|---|
| BTEX by P&T GC-MS | EPA 624 - P&T GC-MS | 10-Sep-21 | 10-Sep-21 |
| PHC F1 | CWS Tier 1 - P&T GC-FID | 9-Sep-21 | 10-Sep-21 |
| PHCs F2 to F4 | CWS Tier 1 - GC-FID, extraction | 8-Sep-21 | 9-Sep-21 |

Certificate of Analysis

Report Date: 10-Sep-2021

**Client: Paterson Group Consulting Engineers**

Order Date: 8-Sep-2021

**Client PO: 32995**

**Project Description: PE5189**

| | Client ID: | BH2-21 | BH3-21 | DUP 1 | - |
|---|---|---|---|---|---|
| | Sample Date: | 08-Sep-21 09:00 | 08-Sep-21 09:00 | 08-Sep-21 09:00 | - |
| | Sample ID: | 2137276-01 | 2137276-02 | 2137276-03 | - |
| | MDL/Units | Water | Water | Water | - |
| **Volatiles** | | | | | |
| Benzene | 0.5 ug/L | <0.5 | <0.5 | <0.5 | - |
| Ethylbenzene | 0.5 ug/L | <0.5 | <0.5 | <0.5 | - |
| Toluene | 0.5 ug/L | <0.5 | <0.5 | <0.5 | - |
| m,p-Xylenes | 0.5 ug/L | <0.5 | <0.5 | <0.5 | - |
| o-Xylene | 0.5 ug/L | <0.5 | <0.5 | <0.5 | - |
| Xylenes, total | 0.5 ug/L | <0.5 | <0.5 | <0.5 | - |
| Toluene-d8 | Surrogate | 95.8% | 102% | 88.0% | - |
| **Hydrocarbons** | | | | | |
| F1 PHCs (C6-C10) | 25 ug/L | <25 | <25 | <25 | - |
| F2 PHCs (C10-C16) | 100 ug/L | <100 | <100 | - | - |
| F3 PHCs (C16-C34) | 100 ug/L | <100 | <100 | - | - |
| F4 PHCs (C34-C50) | 100 ug/L | <100 | <100 | - | - |

Certificate of Analysis

Report Date: 10-Sep-2021

**Client: Paterson Group Consulting Engineers**

Order Date: 8-Sep-2021

**Client PO: 32995**

**Project Description: PE5189**

## 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* | *75.1* | | *ug/L* | | *93.9* | *50-140* | | | |

Certificate of Analysis

Report Date: 10-Sep-2021

**Client: Paterson Group Consulting Engineers**

Order Date: 8-Sep-2021

**Client PO: 32995**

**Project Description: PE5189**

## 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* | *104* | | *ug/L* | | *130* | *50-140* | | | |

## Method Quality Control: Spike

| Analyte | Result | Reporting Limit | Units | Source Result | %REC | %REC Limit | RPD | RPD Limit | Notes |
|---|---|---|---|---|---|---|---|---|---|
| **Hydrocarbons** | | | | | | | | | |
| F1 PHCs (C6-C10) | 1940 | 25 | ug/L | ND | 97.1 | 68-117 | | | |
| F2 PHCs (C10-C16) | 1590 | 100 | ug/L | ND | 99.5 | 60-140 | | | |
| F3 PHCs (C16-C34) | 3450 | 100 | ug/L | ND | 88.0 | 60-140 | | | |
| F4 PHCs (C34-C50) | 2240 | 100 | ug/L | ND | 90.5 | 60-140 | | | |
| **Volatiles** | | | | | | | | | |
| Benzene | 42.0 | 0.5 | ug/L | ND | 105 | 60-130 | | | |
| Ethylbenzene | 42.2 | 0.5 | ug/L | ND | 106 | 60-130 | | | |
| Toluene | 31.6 | 0.5 | ug/L | ND | 79.1 | 60-130 | | | |
| m,p-Xylenes | 78.7 | 0.5 | ug/L | ND | 98.3 | 60-130 | | | |
| o-Xylene | 45.5 | 0.5 | ug/L | ND | 114 | 60-130 | | | |
| *Surrogate: Toluene-d8* | *59.2* | | *ug/L* | | *74.1* | *50-140* | | | |

**Qualifier Notes:**

None

**Sample Data Revisions**

None

**Work Order Revisions / Comments:**

None

**Other Report Notes:**

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

*CCME PHC additional information:*

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

PARA LABORATOR

**Paracel ID: 2137276**

ice
St. Laurent Blvd.
Ontario K1G 4J8
749-1947
@paracellabs.com
acellabs.com

| Paracel Order Number (Lab Use Only) | Chain Of Custody (Lab Use Only) |
|---|---|
| 2137276 | Nº 133099 |

Client Name: Paterson
Contact Name: Karyn Munch
Address: 154 Colonnade
Telephone: 613 226 7381

Project Ref: PE 5189
Quote #:
PO #: 32995
E-mail: KMunch@Patersongroup.ca
JCamposarcone@Patersongroup.ca

Page __ of __

**Turnaround Time**
☐ 1 day ☐ 3 day
☐ 2 day ☒ Regular
Date Required: _____

☐ REG 153/04 ☐ REG 406/19

Table 1 ☐ Res/Park ☐ Med/Fine
Table 2 ☐ Ind/Comm ☐ Coarse
Table 3 ☐ Agri/Other
☒ Table 7
For RSC: ☐ Yes ☐ No

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

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

**Required Analysis**

| | Sample ID/Location Name | Matrix | Air Volume | # of Containers | Sample Taken: Date | Sample Taken: Time | PHCs F1-F4+BTEX | VOCs | PAHs | Metals by ICP | Hg | CrVI | B (HWS) | F1 + BTEX | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | BH2-21 | GW | | 3 | Sep 8 2021 | | ✓ | | | | | | | | | | | |
| 2 | BH3-21 | | | 3 | | | ✓ | | | | | | | | | | | |
| 3 | [illegible] | | | | | | ✓ | | | | | | | | | | | |
| 4 | DUP1 | | | 2 | | | | | | | | | | ✓ | | | | |
| 5 | | | | | | | | | | | | | | | | | | |
| 6 | | | | | | | | | | | | | | | | | | |
| 7 | | | | | | | | | | | | | | | | | | |
| 8 | | | | | | | | | | | | | | | | | | |
| 9 | | | | | | | | | | | | | | | | | | |
| 10 | | | | | | | | | | | | | | | | | | |

Comments:

Method of Delivery: drop box

| Relinquished By (Sign): GPat | Received By Driver/Depot: | Received at Lab: | Verified By: |
|---|---|---|---|
| Relinquished By (Print): Grant Paterson | Date/Time: | Date/Time: Sept 8 2021 4:45 | Date/Time: Sep 8 2021 849 |
| Date/Time: Sep 8 2021 | Temperature: °C | Temperature: 19.9 °C | pH Verified: ☐ By: NA |